

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

CISCO SYSTEMS INC.,

Petitioner

IPR2024-00090

U.S. Patent No. 7,885,286

**DECLARATION OF A.L. NARASIMHA REDDY, PH.D.,
UNDER 37 C.F.R. § 1.68 IN SUPPORT OF PETITION
FOR *INTER PARTES* REVIEW**

Ex.1003

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I, Narasimha Reddy, Ph.D., do hereby declare as follows:

I. INTRODUCTION

1. I am making this Declaration at the request of Cisco Systems, Inc. in the matter of the *Inter Partes* Review of U.S. 7,885,286 (“the ’286 patent”).

2. I am being compensated for my work in this matter at my standard hourly rate. I am also being reimbursed for reasonable and customary expenses associated with my work and testimony in this proceeding. My compensation is not contingent on the outcome of this matter or the specifics of my testimony.

3. I have been asked to provide my opinions regarding whether the subject matter of claims 1-12 (“the Challenged Claims”) of the ’286 patent would have been obvious to a person having ordinary skill in the art (“POSITA”) at the time of the alleged invention, in light of the prior art. I have reviewed the petition and agree that the Challenged Claims would have been obvious to a POSITA.

4. In the preparation of this Declaration, I have studied:

- (1) The ’286 patent, Ex.1001;
- (2) Prosecution History of the ’286 patent, Ex.1002;
- (3) U.S. Pub. 2005/0081244A1 to Barrett *et al.* (“Barrett”), Ex.1005;
- (4) U.S. 6,986,156B1 to Rodriguez *et al.* (“Rodriguez”), Ex.1006;
- (5) U.S. Pub. 2004/0082338A1 to Norrgard *et al.* (“Norrgard”), Ex.1021;
and
- (6) U.S. 6,487,170B1 to Chen *et al.* (“Chen”), Ex.1024.

5. I have also reviewed the following documents:

- (1) U.S. 6,543,053B1, Ex.1007;
- (2) U.S. Pub. 2008/0205435A1, Ex.1008;
- (3) U.S. 7,191,332B1, Ex.1009;
- (4) U.S. 7,904,581B2, Ex.1010;
- (5) U.S. 7,430,222B2, Ex.1011;
- (6) U.S. 9,178,743B2, Ex.1012;
- (7) U.S. Pub. 2006/0020995A1, Ex.1013;
- (8) WO2004/062074A2, Ex.1014;
- (9) “Performance of QoS Agents for Provisioning Network Resources,”
Schelén *et al.* published by IEEE in 1999, Ex.1015;
- (10) U.S. 7,616,601B2, Ex.1016;
- (11) “An Architecture for Advance Reservations in the Internet,” Berson *et al.*, 1998, Ex.1017;
- (12) “Sharing Resources through Advance Reservation Agents,” Schelén *et al.*, 1997, Ex.1018;
- (13) U.S. 6,631,122B1, Ex.1019;
- (14) U.S. 6,331,983B1, Ex.1020;
- (15) U.S. 6,865,185B1, Ex.1022;
- (16) U.S. 7,043,225B1, Ex.1023;
- (17) U.S. Pub. 2005/0076339A1, Ex.1025;
- (18) U.S. Pub. 2010/0226301A1, Ex.1026;
- (19) U.S. Pub. 2004/0172464A1, Ex.1027;
- (20) U.S. 7,889,732B2, Ex.1028;

- (21) “Application-Specific Processing on a General-Purpose Core via Transparent Instruction Set Customization,” Clark *et al.* published by IEEE in 2004, Ex.1029;
- (22) U.S. 8,898,722B2, Ex.1030;
- (23) U.S. 6,631,122B1, Ex.1031;
- (24) U.S. Pub. 2002/0124262A1, Ex.1032;
- (25) U.S. 7,380,022B2, Ex.1033;
- (26) EP0951157A1, Ex.1034;
- (27) RFC3376, Ex.1035; and
- (28) A Quality of Service Architecture, Ex.1042.

6. In forming the opinions expressed below, I have considered: the documents listed above; the relevant legal standards, including the standard for obviousness; and my own knowledge and experience based upon my work in the field of network communications and security as described below, as well as any additional materials cited herein.

7. Unless otherwise noted, all emphasis in any quoted material has been added.

II. QUALIFICATIONS

8. My qualifications and professional experience are described in my *Curriculum Vitae*, a copy of which is submitted as Ex.1004. The following is a brief summary of my relevant qualifications and professional experience.

9. I am currently the Truchard Foundation Chair Professor of Electrical and Computer Engineering at Texas A&M University in College Station, Texas. I have over 25 years of experience in a wide variety of technologies and industries relating to data communications, storage systems, and distributed systems, including packet-switched network communications.

10. My academic credentials include a Bachelor of Technology degree in Electronics and Electrical Communications Engineering from the Indian Institute of Technology, Kharagpur, India, in August 1985. I then received a Master of Science and a Ph.D. in Computer Engineering from the University of Illinois at Urbana-Champaign in May 1987 and August 1990, respectively.

11. I have worked for over 25 years in the field of Electrical Engineering. My primary focus and research interest has been on computer networks, storage systems, multimedia systems, and computer architecture. I have authored and co-authored over a hundred technical papers and several book chapters related to several of these interests, including on such topics as multipath routing, route control, high-speed networks, network congestion, packet management, quality of service regulation, network security, network modeling, differentiated services, storage system enhancements, caching strategies, and multimedia system enhancements to name a few examples. I am listed as an inventor on six U.S. Patents in the field of multi-node communication networks and computer systems.

12. My employment history following my graduation from the University of Illinois at Urbana-Champaign began at the IBM Almaden Research Center in San Jose, California in 1990. At IBM, I worked on projects related to disk arrays, multiprocessor communication, hierarchical storage systems and video servers.

13. In 1995, I joined the faculty of the department of Electrical Engineering at Texas A&M University initially as an Associate Professor and was later promoted to full, tenured Professor. At Texas A&M, during 2016-21, I was the Associate Agency Director for Strategic Initiatives and Centers for the Texas A&M Engineering Experiment Station (TEES), which engages in engineering and technology-oriented research and educational collaborations. Further, I also served as Associate Dean for Research in the College of Engineering during 2016-21.

14. At Texas A&M, I have taught dozens of courses related to computer networking and communications, as well as computer architecture, multimedia systems and networks, topics in networking security, multimedia storage and delivery, as well as networking for multimedia applications. I have also served on various committees for the benefit of the scientific community and the Texas A&M University community.

15. I am a member of a number of professional societies, including the Institute of Electrical and Electronic Engineers (IEEE), where I have been elevated to an IEEE Fellow, and the Association for Computing Machinery (ACM). I have

been responsible for chairing or co-chairing numerous conferences and programs, as well as presenting research at major IEEE and ACM conferences. For example, I served as program co-chair for the 2008 5th International Conference on Broadband Communications, Networks and Systems, panels co-chair for the 2008 3rd International Conference on Communication Systems Software & Middleware, and panel chair of the IEEE Conference of High Performance Computer Architecture.

16. My presentations include a Keynote speech at International Conference on Information Technology-New Generations in 2013, a Keynote speech at IEEE International Symposium on Computers and Communications 2010, and several invited talks including at Georgia Tech (2013), COMSNETS Conference (2013), Int. Conf. on Networking and Communications (2012), Samsung (2011), Korea University (2011), Aijou University (2011), Catedra Series at University of Carlos III, Madrid (2009), Thomson Research, Paris (2009), Telefonica Research, Barcelona (2009), and a Distinguished Seminar at IBM Austin Research Lab (2008).

17. I have received multiple awards in the field of networks and computer architecture. I received the NSF Career Award from 1996-2000. I received an outstanding professor award by the IEEE student branch at Texas A&M during 1997-1998, an outstanding faculty award by the department of Electrical and Computer Engineering during 2003-2004, a Distinguished Achievement award for

teaching from the former students' association of Texas A&M University, and a citation "for one of the most influential papers from the 1st ACM Multimedia conference.

III. LEVEL OF ORDINARY SKILL IN THE ART

18. I understand there are multiple factors relevant to determining the level of ordinary skill in the pertinent art, including (1) the levels of education and experience of persons working in the field at the time of the invention; (2) the sophistication of the technology; (3) the types of problems encountered in the field; and (4) the prior art solutions to those problems.

19. I am familiar with the network communications art that is pertinent to the '286 patent. I am also aware of the state of the art at the time. I understand that the earliest priority date of the '286 patent is December 23, 2005, its filing date. Based on the technologies disclosed in the '286 patent, a POSITA would include someone who had a bachelor's degree in computer science, computer engineering, or an equivalent, and two years of professional experience relating to network communications. Lack of professional experience can be remedied by additional education, and vice versa.

20. For purposes of this Declaration, in general, and unless otherwise noted, my statements and opinions, such as those regarding my own experience and what a POSITA would have understood or known generally (and specifically

related to the references I consulted herein), reflect the knowledge that existed in the relevant field as of the priority date of the '286 patent.

IV. RELEVANT LEGAL STANDARDS

21. I am not an attorney. In preparing and expressing my opinions and considering the subject matter of the '286 patent, I am relying on certain legal principles that counsel has explained to me.

22. I understand that prior art to the '286 patent includes patents and printed publications in the relevant art that predate the priority date of the '286 patent. For purposes of this Declaration, I am applying December 23, 2005, as the priority date of the '286 patent.

23. I have been informed by Cisco's counsel that a claimed invention is unpatentable under 35 U.S.C. § 103 if the differences between the claimed invention and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a POSITA. I have also been informed by Cisco's counsel that the obviousness analysis considers factual inquiries, including the level of ordinary skill in the art, the scope and content of the prior art, and the differences between the prior art and the claimed subject matter.

24. I have been further informed by Cisco's counsel that there are several recognized rationales for combining references or modifying a reference to show obviousness. These rationales include: (a) combining prior art elements according

to known methods to yield predictable results; (b) simple substitution of one known element for another to obtain predictable results; (c) use of a known technique to improve a similar device (method, or product) in the same way; (d) applying a known technique to a known device (method, or product) ready for improvement to yield predictable results; (e) choosing from a finite number of identified, predictable solutions, with a reasonable expectation of success; and (f) some teaching, suggestion, or motivation in the prior art that would have led a POSITA to modify the prior art or to combine prior art teachings to arrive at the claimed invention.

25. Also, I have been informed and understand that obviousness does not require physical combination/bodily incorporation, but rather consideration of what the combined teachings would have suggested to a POSITA at the time of the alleged invention.

V. OVERVIEW OF THE '286 PATENT

26. The '286 patent “relates to methods and arrangements in an IP network, in particular for initiating a multicast media distribution.” Ex. 1001, 1:6-9. The '286 patent states that “[t]oday the Internet is being used for a huge variety of applications including real-time applications such as IP telephony and video on demand over broadband networks.” Ex. 1001, 1:48-50. According to the '286 patent, “[f]or distributing media streams e.g. video in IP networks, there are currently basically two different methods called unicast and multicast.” Ex.1001,

Ex.1003

2:43-45. Unicast is used when “a user controlling the client may want to start a media stream at any instant,” and “[m]ulticast, in contrast to unicast, describes a method whereby a plurality of clients can receive a media stream simultaneously... imply[ing] that multicast is [] very resource efficient.” Ex.1001, 2:46-67. The ’286 patent explains that using both unicast followed by multicast “enables very fast media changes such as channel changes...[and] is referred to as ‘Media Quick Start’ in this description.” Ex.1001, 3:50-54.

27. According to the ’286 patent, “problems occur when the media server gets a request that would result in Media Quick Start unicast data from a client in an already congested network or a network that will experience congestion if the resulting unicast traffic should be admitted into the network.” Ex.1001, 3:58-62. To address this purported problem, the ’286 patent describes using a resource manager to “provid[e] feedback information to the application framework e.g. the IPTV server, regarding the resource availability between the sender and the receiver.” Ex.1001, 4:27-30. The application framework uses the feedback information to determine whether to “use the Media Quick Start if enough resources are available” or alternatively “select another more suitable start method that requires less resources.” Ex.1001, 4:30-34.

28. The ’286 patent’s system is illustrated at Figure 1, reproduced below.

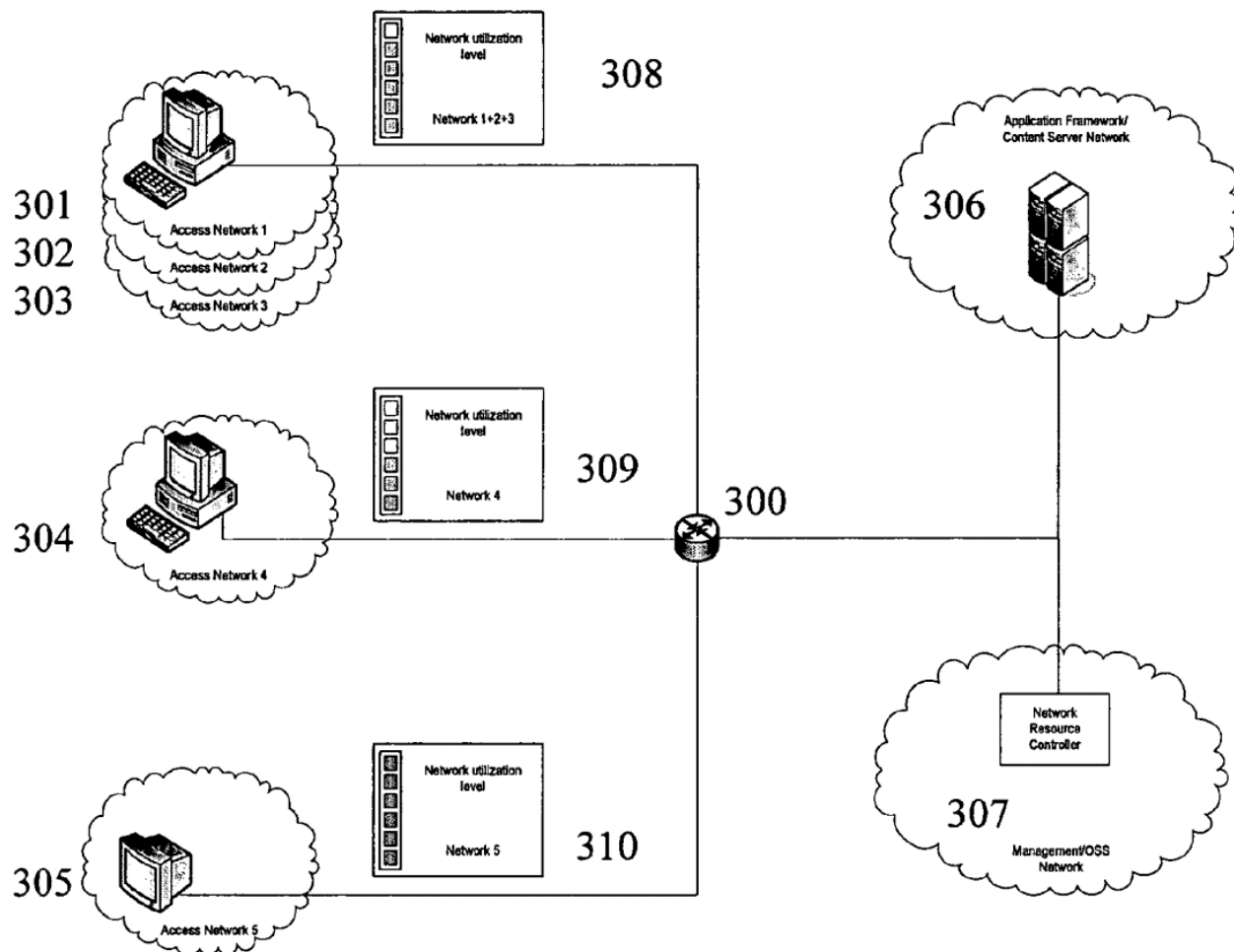


Fig. 3

Ex.1001, Fig. 3.

29. The '286 patent includes twelve claims. Independent claim 7 is reproduced below as illustrative of the challenged claims.

7. A method for an application framework connectable to an IP network, wherein the method comprises the steps of: receiving a request for a media distribution requiring a multicast distribution from a client in said IP network, requesting network resources from a network resource manager for a Media Quick Start, to start the requested media distribution, receiving feedback information relating to network resource availability from the network resource manager, and allowing the Media Quick start or using another behavior to start the requested media distribution based on the received feedback information, wherein said another behavior is to use the feedback information provided by the network resource manager to signal to the client that a Media Quick Start unicast stream for the requested media distribution is not available due to resource shortage in the IP network but the client is still allowed to subscribe to the multicast distribution.

30. Notably, as I demonstrate in this Declaration, there is nothing novel about the claims of the '286 patent since all of the elements—including providing feedback information regarding the resource availability—were taught in the prior art and it would have been obvious to combine the relevant teachings as claimed.

VI. PROSECUTION HISTORY OF THE '286 PATENT

31. In a First Office Action dated April 9, 2010, claims 1-8, 10-12, 14-19, and 21-24 were rejected as obvious under 35 USC §103 and dependent claims 9, 13, and 20 were indicated as allowable. Ex.1002, 124-137. In a Response dated July 9, 2010, Applicant incorporated the allowable subject matter of claims 9, 13, and 20

into independent claims 6, 10, and 17, respectively. Ex.1002, 155-164. The amendment to claim 6 (issued claim 1) is shown below.

wherein said another behavior is to use the feedback information provided by the resource manager to signal to the client that a Media Quick Start unicast stream for the requested media distribution is not available due to resource shortage in the IP network but the client is still allowed to subscribe to the multicast distribution.

The Examiner then issued a Notice of Allowance allowing the claims. Ex.1002, 169-172.

32. There is nothing novel, however, about the features identified by the Examiner since they were known in the art and it would have been obvious to combine the teachings as analyzed below.

VII. CLAIM CONSTRUCTION

33. It is my understanding that in order to properly evaluate the '286 patent, the terms of the claims must first be interpreted. It is my understanding that for the purposes of this *inter partes* review, the claims are to be construed under the so-called *Phillips* standard, under which claim terms are given their ordinary and customary meaning as would be understood by one of ordinary skill in the art in light of the specification and prosecution history, unless the inventor has set forth a special meaning for a term.

34. I also understand that certain terms in a patent claim may be drafted in “means-plus-function” format. Without conceding that the claim limitations reciting these terms satisfy the written description requirement, I provide the below construction for these limitations.

35. Consistent with the above noted understanding, for the purposes of this declaration, no terms require specific construction, other than the following:

A. “*Media Quick Start*”

36. The term “*Media Quick Start*” is recited in independent claims 1, 4, 7, and 12. According to the ’286 patent, the term “*Media Quick Start*” “implies that both a unicast media distribution and also a multicast media distribution are initiated if there is no existing multicast media distribution.” ’286 patent 5:10-21. “[T]he media receiver is first served a unicast stream and the receiver can initiate play out from the unicast stream immediately while waiting for the multicast transmission to be able to start.” Ex.1001, 3:37-42. “The unicast stream may then be dropped when the multicast stream itself can continue to reproduce the media.” Ex.1001, 3:48-49. The ’286 patent explains that this procedure “enables very fast media changes such as channel changes...[and] is referred to as ‘Media Quick Start’ in this description.” Ex.1001, 3:50-54.

37. Accordingly, the '286 patent's disclosure describes an example embodiment of "*Media Quick Start*" as including using a unicast media distribution followed by a multicast distribution, such as for a fast channel change.

B. "*allowing the Media Quick start or using another behavior to start the requested media distribution*"

38. Independent claims 1, 4, 7, and 12 contain mutually exclusive conditional language. For example, independent method claim 7 recites "*allowing the Media Quick start or using another behavior to start the requested media distribution.*"

39. This recitation is an either-or conditional statement, whereby only one of the recited conditions can be performed by the claims. Effectively, the claim recites two distinct steps, one which claims what happens ("*allowing the Media Quick start*"), e.g., when the feedback information indicates that there are resources available, and a second ("*using another behavior to start the requested media distribution*"), e.g., when resources are insufficient. The claim is complete if either one of the recited methods is performed. Nothing in the earlier claimed steps requires both steps to be completed—indeed, requiring both steps would be contrary to the mutually exclusive limitations. A POSITA would have understood that so long as one of the steps recited in the independent claim (such as allowing

the Media Quick start) would have been obvious to a person having ordinary skill in the art, the claim is unpatentable.

40. Accordingly, the claim’s recitation of “*allowing the Media Quick start or using another behavior to start the requested media distribution,*” should be construed as two separate mutually exclusive steps.

C. Claims 1, 4, and 12: “*means for*” limitations

41. Independent claims 1, 4, and 12 recite several “*means for*” limitations. Below I have identified what is described in the specification of the ’286 patent as performing the claimed function of each recited “*means for*.” I understand that for each means-plus-function limitation in the claims, the specification should explain what structure performs the corresponding function; if the specification does not describe sufficient structure for performing the function, the claim is invalid for indefiniteness. I also understand that the possibility of an existing patent claim being invalid for indefiniteness is an issue outside the permissible scope of an inter partes review. Accordingly, I have not considered, and I express no opinion on the question of whether the specification identifies sufficient structure as to each “*means for*” limitation.

Claim(s)	Claimed “ <i>means for</i> ” function	Function Described in Specification
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1, 4, 12	receiving a request for a media distribution requiring a multicast distribution from a client in said IP network	Ex.1001, 6:19-27, 8:49-54.
1, 4, 12	requesting network resources from a network resource manager for a Media Quick Start, to start the requested media distribution	Ex.1001, 6:51-54, 8:55-57
4	providing the application framework with feedback information relating to network resource availability from the network resource manager	Ex.1001, 6:60-65, 9:1-5,
1, 4, 12	receiving feedback information relating to network resource availability from the network resource manager	Ex.1001, 6:60-67, 8:57-59
1, 4, 12	allowing the Media Quick start or using another behavior to start the requested media distribution	Ex.1001, 6:33-35, 6:65-7:10, 8:60-64

42. The specification describes such functions being performed by a “router or server” with corresponding “software.”

The methods are preferably implemented by computer program products. The computer program products are directly loadable into the

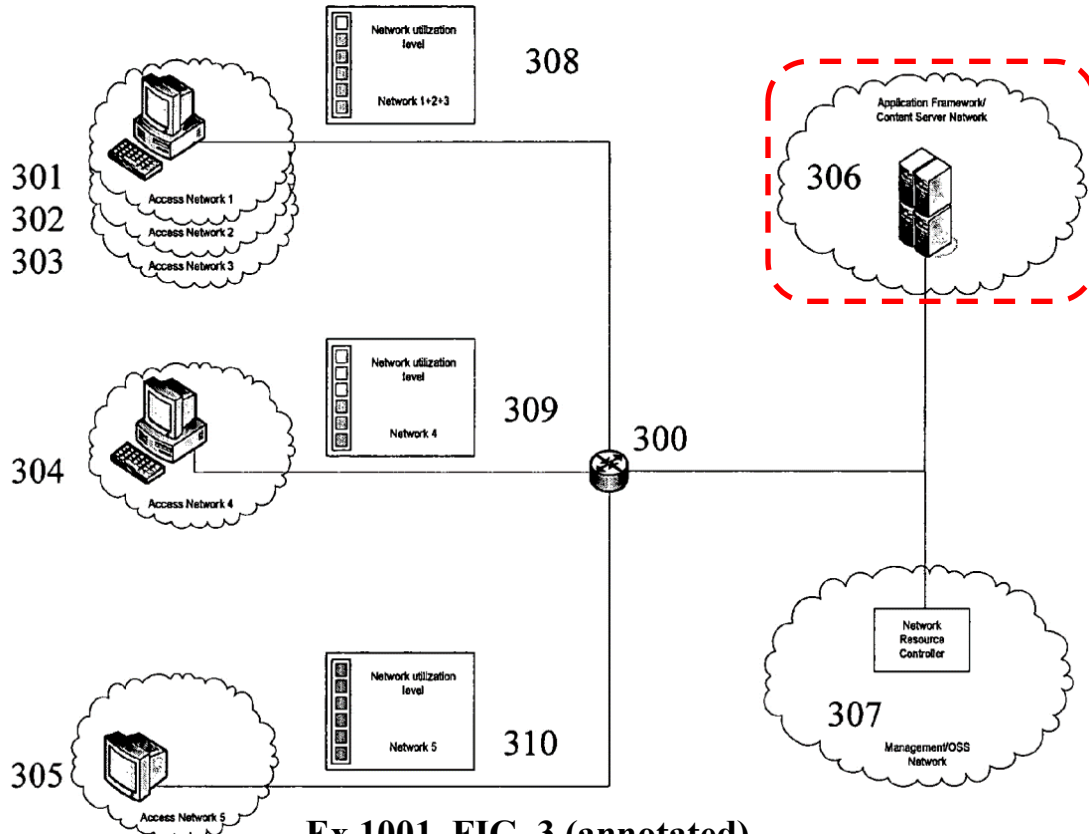
internal memory of a computer within a router or server in the IP network, comprising the software code portions for performing the steps of the methods. The computer program products may also be stored on a computer usable medium, comprising readable program for causing a computer, within a router or server in the IP network, to control execution of the steps of the methods.

Ex.1001, 9:6-14.

43. In one example, an “application framework” corresponds to a server that implements the method steps. Ex.1001, 1:57-61, 5:24-34, 7:55-59.

Additionally, the specification discloses that the “network resource manager” is a “functional entity” that “may also be a partition of a device” in the network.

Ex.1001, 5:35-44.



44. Alternatively, the '286 patent states that “the methods may also be implemented by Application-Specific Integrated Circuits (ASICs) which are chips designed for the particular methods according to the invention.” Ex.1001, 9:15-18.

VIII. DETAILED UNPATENTABILITY ANALYSIS

45. I have been asked to provide my opinion as to whether the Challenged Claims of the '286 patent would have been obvious in view of the prior art. In rendering my opinion, I have considered the scope and content of the prior art and any potential differences between the claimed subject matter and the prior art. I have also considered the level of ordinary skill in the pertinent art as well as the

knowledge of a POSITA as of the priority date of the '286 patent, December 23, 2005.

46. I have reviewed the petition and the prior art analysis presented therein and agree with the analysis and adopt it for the purposes of this Declaration. As such, and as I discuss below, it is my opinion that the claimed subject matter of the Challenged Claims of the '286 patent would have been obvious in view of the teachings of the identified prior art references as well as the knowledge of a POSITA.

A. Ground 1: Claims 1-3 and 7-11 are Obvious over Barrett and Rodriguez

1. Summary of Barrett

47. The primary reference that I rely upon is U.S. Patent Publication 2005/0081244 to Barrett *et al.* (Ex.1005, "Barrett"), which was filed on October 10, 2003.

48. Like the '286 patent, Barrett generally discloses "a digital video environment and in particular" addresses "reducing the video presentation latency when changing from one video channel to another video channel in a digital multicast network." Ex.1005, [0001].

49. Barrett at Figure 1 "illustrates an exemplary video distribution architecture that includes a network that is capable of both multicast and unicast

communications” to facilitate “fast channel changing.” Ex.1005, [0009], Abstract,
claim 1, Fig. 1.

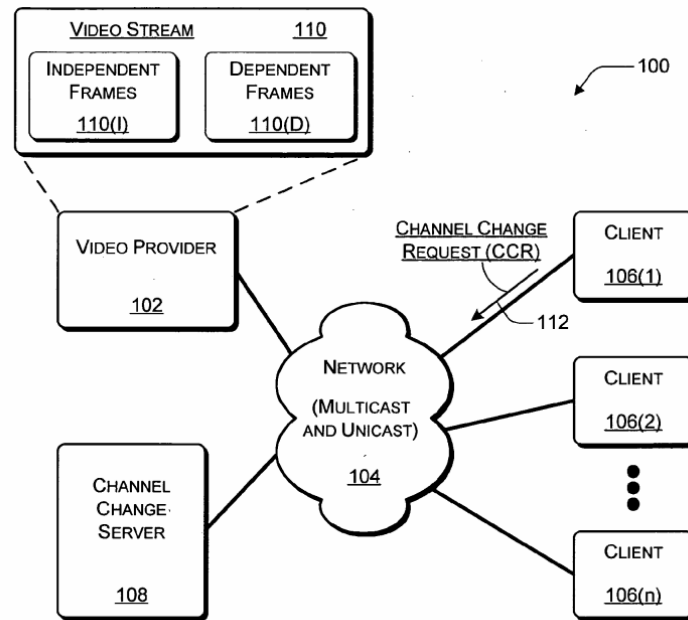


Fig. 1

Ex.1005, FIG. 1 (annotated).

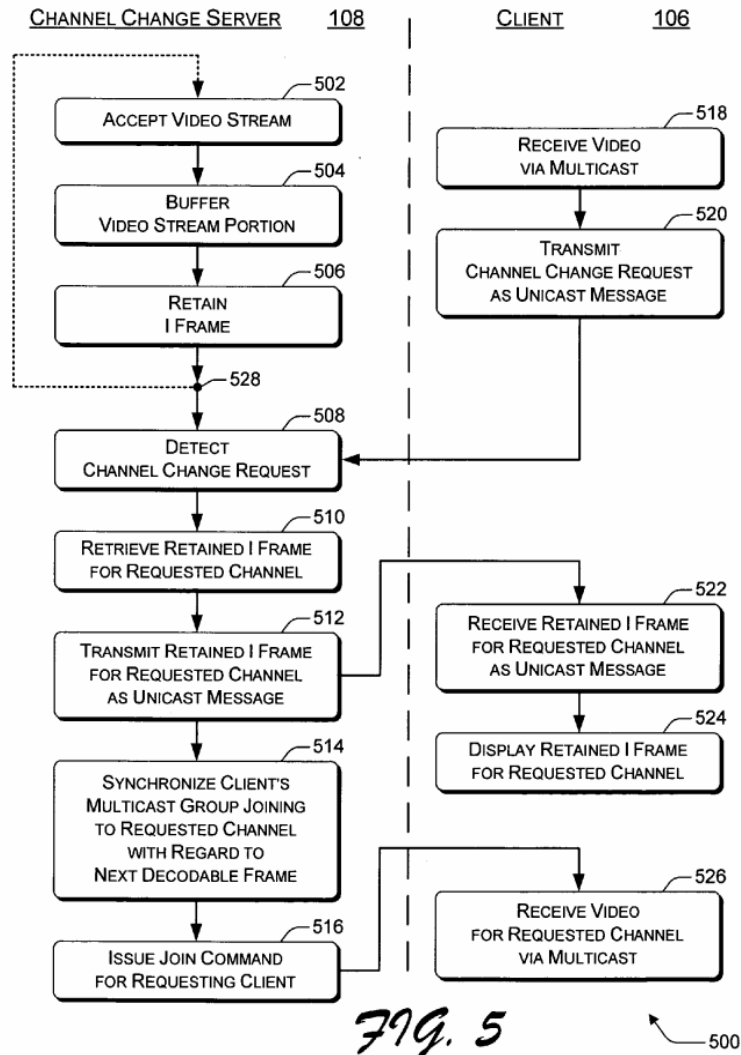
50. Figure 1 is “an exemplary video distribution architecture 100 that includes a network 104 that is capable of both multicast and unicast communications.” Ex.1005, [0016]. As shown in Figure 1, the distribution architecture includes “a video provider 102, a channel change server 108, and one or more clients 106(1), 106(2)... 106(n) [that] are coupled to network 104.” Ex.1005, [0017]. “Generally, video stream 110 is distributed from video provider

102 over network 104 to selected clients 106 using a multicast scheme.” Ex.1005, [0019].

51. Barrett discloses that “[w]hen a given client 106 (e.g., client 106(1)) wishes to change channels, client 106(1) transmits a channel change request (CCR) 112 toward a video distribution headend or similar server or system.” Ex.1005, [0021]. To reduce channel change latency, “channel change server 108 is adapted to unicast an independent frame 110(I) for the requested video channel to client 106(1).” Ex.1005, [0022]-[0023]. “Channel change server 108 may operate in any one or more of three exemplary modes when unicasting,” and then “synchronized joining of clients to a relevant multicast group.” Ex.1005, [0024].

52. Barrett also discloses at Figures 2, 3A, and 3B additional details of exemplary video distribution architectures capable of both multicast and unicast communications to implement its invention. Ex.1005, [0025]-[0051], Figs. 2, 3A, 3B.

53. Barrett’s exemplary method “for fast channel changing with a combination multicast and unicast network,” is illustrated at Figure 5, reproduced below. Ex.1005, [0056].



Ex.1005, FIG. 5.

54. In above Figure 5, “the actions of blocks 502-526 may be performed by a channel change server 108 and a client 106, possibly in conjunction with one or more replication points 202 of a network 104.” Ex.1005, [0057]. Specifically, “the channel change server 108 performs the actions of blocks 502-516” on the left and “client 106 performs the actions of blocks 518-526” on the right. Ex.1005, [0057].

55. During operation, after video multicast has been received at block 518, “[a]t block 520, a channel change request is transmitted,” which at block 508 is detected at “channel change server 108.” Ex.1005, [0060]-[0061]. “At block 510, a retained I frame for the requested channel is retrieved” and “transmitted as a unicast message” at block 512. Ex.1005, [0062]. After the client 106(1) has received and displayed video frames corresponding to the unicast message at blocks 522, 524, the client is joined to the multicast group that corresponds to the requested channel at blocks 514, 516, and 526. Ex.1005, [0063]-[0066].

2. Summary of Rodriguez

56. U.S. 6,986,156 to Rodriguez *et al.* (Ex.1006, “Rodriguez”), was filed on June 9, 2000, and claims priority to provisional application No. 60/170,302, filed on December 13, 1999, and provisional application No. 60/138,756, filed on June 11, 1999.

57. Like the ’286 patent, Rodriguez “relates to digital broadband delivery systems” and “[m]ore particularly, the invention relates to management of bandwidth allocation in a digital broadband delivery system.” Ex.1006, 1:17-21; Ex.1001, 1:30-60. Rodriguez specifically addresses the “need for a delivery system which includes a means for intelligent and efficient management of bandwidth allocation in a manner that makes optimal use of the available bandwidth.”

Ex.1006, 2:63-67. Rodriguez’s system and method “offers capabilities for adaptive

Ex.1003

scheduling and dynamic bandwidth resource allocation so that the available bandwidth can be allocated... [using] available content delivery modes” to thereby “[a]dvantageously... provid[e] extraordinary flexibility in allocating finite bandwidth.” Ex.1006, 12:10-17, 19:33-34.

58. In more detail, Rodriguez’s system “allows for subscriber interactivity with services, such as Pay-Per-View programming, Near Video-On-Demand (NVOD) programming according to any of several known NVOD implementation methods, View-on-Demand (VOD) programming (according to any of several known VOD implementation methods), and interactive applications, such as Internet connections and Electronic Program Guide (EPG) applications.” Ex.1006, 4:60-5:4. The ’286 patent addresses similar technologies. *See e.g.*, Ex.1001, 1:48-50 (“...applications including real-time applications such as IP telephony and video on demand over broadband networks.”); Ex.1001, 2:46-54 (“Unicast describes the method whereby each client receives its own copy of the media stream...[which] is typically used to provide services such as video-on-demand (VoD).”).

59. The system components disclosed in Rodriguez are shown in Figures 1-4 and described in the related written description, of which Figure 4 is reproduced below.

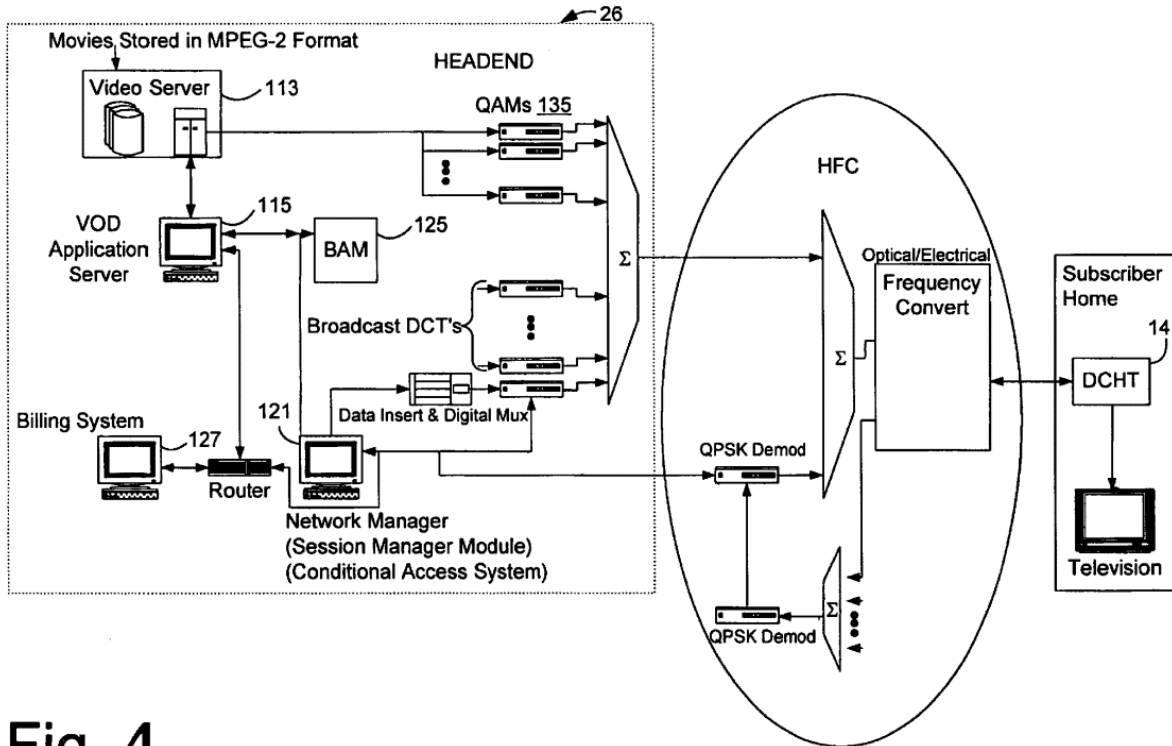


Fig. 4

Ex.1006, FIG. 4.

60. In general, with reference to Figure 4, the system includes a digital home communication terminal (“DHCT”) 14 at the subscriber’s home, a hybrid/fiber coax (“HFC”) access network, and a headend 26. Ex.1006, 12:18-30; *see also* Ex.1006, 4:45-60. “The headend 26 contains a video server 113, a video-on demand application server 115, a network manager 121, a billing system 127, and the bandwidth allocation manager 125.” Ex.1006, 12:27-30.

61. During operation, the network manager 121 transmits a subscribers reservation request (with corresponding bandwidth allocation criteria) to the

bandwidth allocation manager 125, which processes the request to determine a bandwidth allocation schedule.

The network manager 121 then communicates the subscriber reservation request to the bandwidth allocation manager 125. It will be appreciated that the bandwidth allocation manager 125 may be configured so as to communicate directly with the DHCT 14, thus eliminating the need for the message to be passed through the network manager 121. After the subscriber reservation request is received by the bandwidth allocation manager 125, it is stored by the bandwidth allocation manager 125 until such time as the bandwidth allocation manager 125 initiates a bandwidth allocation event.

Ex.1006, 16:64-17:10.

The bandwidth allocation manager determines a bandwidth allocation schedule for a predetermined bandwidth based on allocation criteria comprising a criteria received from a subscriber. The allocation criteria received from the subscriber may comprise a subscriber reservation request which is processed by the bandwidth allocation manager to determine the bandwidth allocation schedule.

Ex.1006, Abstract.

Referring still to FIG. 4, in one embodiment of the present invention, the bandwidth allocation manager 125 is in communication with the VOD application server 115, the network manager 121, and, preferably, the DHCT 14. It will be appreciated by one of ordinary skill in the art, however, that such communication can be established in a number of ways and does not require that there be a direct connection between

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each of the components. For example, the band width allocation manager 125 may communicate with the VOD application server 115 indirectly by transmitting and receiving information to and from the network manager 121 which then communicates with the VOD application server 115. Similarly, the bandwidth allocation manager 125 may communicate with the DHCT 14 indirectly either through the network manager 121 or through the VOD application server 115. Likewise, any communication can be established with any headend component that interfaces a first VOD component to a second VOD component. The bandwidth allocation manager 125 may receive one or more allocation criteria from any one of the above referenced components in communication with the bandwidth allocation manager. Ex.1006, 13:61-14:14.

62. If the bandwidth allocation manager 125 determines that “bandwidth is readily available, the bandwidth allocation manager 125 may communicate with the network manager and the VOD application server 115 to initiate” the requested media distribution to the subscriber. Ex.1006, 17:33-39; *see also* Ex.1006, 17:43-50, 23:29-43.

63. On the other hand, when there are insufficient network resources such that a “reservation request is not or cannot be fulfilled ...the bandwidth allocation manager 125 may send a message to the subscriber notifying them that their reservation could not be fulfilled.” Ex.1006, 17:60-65. The bandwidth allocation

manager 125 also sends notification of alternative viewing options. Rodriguez identifies three alternative viewing options.

For instance, in the event that the bandwidth allocation manager determines that a particular subscriber reservation request cannot be fulfilled (such as when there is insufficient available bandwidth), **[alternative 1]** the bandwidth allocation manager may provide the subscriber the option of viewing the movie at a different time. **[alternative 2]** Alternatively, a subscriber may be asked to accept an NVOD delivery model with reduced random-access functionality. **[alternative 3]** Or a subscriber may be asked to delay or wait a certain period of time until the requested movie viewing can commence to capture a larger number of subscribers that have requested to view the same movie at approximately the same time.

Ex.1006, 19:45-56; *see also* Ex.1006, 15:63-16:66.

64. Rodriguez explains that the above noted notification messages may be sent to the “network manager 121,” which then communicates the information to the subscriber “DHCTs.” Ex.1006, 13:15-27; *see also* Ex.1006, 3:33-36 (“The network manager is in communication with the bandwidth allocation manager and the network manager allocates bandwidth in the digital broadband delivery system.”); 14:6-9 (“...the bandwidth allocation manager 125 may communicate with the DHCT 14 indirectly either through the network manager 121...”).

3. Reasons to Combine Barrett and Rodriguez

65. A POSITA would have been motivated to combine the teachings of Barrett and Rodriguez as detailed below.

a. Analogous Art

66. A POSITA when considering the teachings of Barrett would have also considered the teachings of Rodriguez. As noted above in the prior art summaries, both references are generally in the same filed of endeavor as the '286 patent (network communications), including providing video to multiple subscribers at the same time. Ex.1001, 1:6-8, 2:46-65; Ex.1005, [0001], [0009], Abstract; Ex.1006, 4:45-60, 19:44-56. Also, like the '286 patent, the references address video-on-demand and other interactive services. Ex.1001, 1:46-61; Ex.1005, [0002]; Ex.1006, 4:60-5:4.

67. Furthermore, Barrett and Rodriguez would have logically commended themselves to an inventor's attention in considering two different problems addressed by the '286 patent. One problem that Barrett addresses, like the '286 patent, is providing fast channel change (also referred to as "Media Quick Start"). Ex.1001, 3:51-54; Ex.1005, [0056], [0068], Abstract. Another problem that Rodriguez addresses, like the '286 patent, is using a bandwidth allocation manager (referred to as a network resource manager in the '286 patent) to allocate network

resources (e.g., bandwidth) for a subscriber's request. Ex.1001, 4:27-34; Ex.1006, 13:61-14:14, 16:64-17:10.

b. Motivation to Combine

68. A POSITA would have combined the teachings of Rodriguez with Barrett to successfully practice Barrett's method and to produce numerous predictable and beneficial results.

69. Barrett discloses that a client 106 sends a fast channel change request 112 to a channel change server 108 for a video channel. Ex.1005, [0021], Abstract. Barnett's channel change server 108 fulfills the fast channel change request 112 by transmitting an initial unicast video stream followed by a message to synchronize to a multicast. Ex.1005, [0021]-[0024]. Barrett, although addressing "transmission bandwidth" (Ex.1005, [0036]) and seeking to "avoid...bandwidth squandering," (Ex.1005, [0042]), provides limited details pertaining to how it allocates or manages overall network bandwidth.

70. Rodriguez provides implementation details regarding the allocation and management of network resources (e.g., bandwidth). For example, and consistent with the prior art summary above and claim analysis below (limitations [7-2]-[7.5]), Rodriguez provides details of how a bandwidth allocation manager checks and allocates bandwidth for a subscriber's request to

“[a]dvantageously...provid[e] extraordinary flexibility in allocating finite

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bandwidth.” Ex.1006, 19:33-34. Rodriguez’s bandwidth allocation manager can also “**maximiz[e] the total number of subscriber requests fulfilled**” or “**maximiz[e] the revenue generated** from the available bandwidth.” Ex.1006, 18:35-40.

71. It would have been obvious to a POSITA, when implementing Barrett’s system, to apply the bandwidth allocation manager teachings of Rodriguez because they provide implementation details for achieving beneficial results in Barrett’s system when fulfilling a client’s request; namely, allocating finite bandwidth in an intelligent, efficient, and flexible way to make optimal use of the available bandwidth when fulfill a client’s request. Ex.1005, [0042] (seeking “[t]o avoid...bandwidth squandering...”); Ex.1006, 2:63-67 (disclosing “means for **intelligent and efficient management of bandwidth allocation** in a manner that makes **optimal use of the available bandwidth.**”). These implementation details would have allowed a POSITA to successfully practice Barrett’s method while obtaining numerous benefits.

72. These reasons are sufficient to explain why a POSITA would have sought and combined the identified disclosures of Barrett and Rodriguez. Nevertheless, below I provide additional reasons for combining the relevant teachings.

additional reasons to combine

73. As already noted, Barrett provides fast channel change, which includes unicast and multicast. Ex.1005, Abstract, [0056], [0068], Fig. 5. It was known in the art that unicast for fast channel change may be problematic because service providers may reach technical limitations when servicing many subscribers. Ex.1008, [0057] (“This is not always possible due to technical limitations or service provider operational constraints. This **problem will magnify when many users will demand multiple unicast media storage services such as...fast channel change.**”). For example, it was known that unicast becomes increasingly less efficient and requires increasingly more bandwidth as the number of subscribers increases. Ex.1011, 1:25-31 (“As the receiving group increases in size, **unicast becomes increasingly less efficient** because it is simultaneously transmitting copies of the same data packets to an increasing number of computing devices. In direct and geometric proportions, **unicast requires increasingly more bandwidth as the receiving group increases.**”).

74. To ensure that a service provider’s technical limits are not reached, it was known to use a logical entity (referred to as a network resource manager or a bandwidth broker in the ’286 patent, *see* Ex.1001, 5:45-55) to check if there are sufficient network resources (e.g., bandwidth) available before a request is fulfilled. Ex.1008, [0064] (“A separate user **management system checks if there is sufficient bandwidth allocated** for that user so that the request can be fulfilled.”).

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The concept of a network resource manager was first introduced by Van Jacobson in 1997 as a “bandwidth broker” or an “agent,” as a logical entity that manages network resources. Ex.1025, 5; Ex.1021, 4; *see also* Ex.1001, 5:45-55 (recognizing that its network resource manager corresponds to a prior art “bandwidth broker”). Such a logical entity was widely utilized in the art to “check for sufficient resources so that both advance reservations and immediate reservations can be served.” Ex.1015, 17-18; *see also* Ex.1015, 19-20 (“...check[ing] whether the total aggregate plus the new requested bandwidth is still below the link bandwidth...”); Ex.1016, 7:9-11 (“The NRM [Network Resource Manager]...decide[s] whether there are resources available or not.”); Ex.1017, 7 (“An admission control decision for a new reservation is made by checking if the resources needed for the new reservation will be available.”). With this general background knowledge, a POSITA would have looked to other references to successfully implement Barrett’s system and method, which does not include a network resource manager or bandwidth broker that checks for sufficiency of network resources (e.g., bandwidth) before attempting to fulfill a new request.

75. Rodriguez discloses the use of a “bandwidth allocation manager 125.” Ex.1006, 13:61-64, 16:64-17:3. Rodriguez’s bandwidth allocation manager 125 receives a subscriber’s request for video content (with corresponding bandwidth allocation criteria) from a network manager 121 in communication with the

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subscriber DHCT 14. Ex.1006, 13:61-14:14, 16:53-17:10, Figs. 1-4. Based on the received request, the bandwidth allocation manager 125 determines if sufficient network bandwidth is available to fulfill the request and allocates resources accordingly to facilitate “intelligent and efficient management of bandwidth allocation in a manner that makes optimal use of the available bandwidth.”

Ex.1006, 2:63-67, 16:53-17:67, Abstract.

76. In one example, when network bandwidth is readily available, the bandwidth allocation manager 125 communicates with the network manager 121 to initially fulfill the request as true VOD, which is unicast transmission of video to individual subscribers. Ex.1006, 1:45-51, 17:33-50, 23:29-43. In another example, when network bandwidth is not available, the bandwidth allocation manager 125 communicates with the network manager 121 that the request is not or cannot be fulfilled and also provides alternative viewing options that the subscriber can select to view the video. Ex.1006, 17:60-65. The alternative viewing options include (alternative 1) providing the subscriber the option of having its request fulfilled at a different time, (alternative 2) asking the subscriber to accept an NVOD delivery model where programs that are in high demand are broadcast on multiple channels so that multiple subscribers can view the channel at preset time intervals, and (alternative 3) asking the subscriber to delay or wait a certain period of time until the request can be fulfilled with a larger number of subscribers that have requested

Ex.1003

to view the same movie at approximately the same time. Ex.1006, 1:59-2:1, 15:63-16:66, 17:60-67, 19:45-56, 21:12-18. The network manager 121 communicates the received information to the subscriber's DHCT, which can select one of the alternative viewing options. Ex.1006, 13:15-27; *see also* Ex.1006, 3:33-36, 14:6-9.

i. “...a network resource manager...”

77. It would have been obvious to a POSITA to implement Barrett's system to include a bandwidth allocation manager, in view of Rodriguez. The bandwidth allocation manager, when implemented in Barrett, would beneficially check that sufficient network resources (e.g., bandwidth) are available before the channel change server 108 fulfills fast channel change request 112, thereby “[a]dvantageously...provid[ing] extraordinary flexibility in allocating finite bandwidth” and facilitating “intelligent and efficient management of bandwidth allocation in a manner that makes optimal use of the available bandwidth.” Ex.1006, 2:63-67, 19:33-34. Such an efficient bandwidth allocation implementation would further Barrett's goal of “avoid[ing]...bandwidth squandering.” Ex.1005, [0042].

78. An additional benefit, in implementing Barrett's system with a bandwidth allocation manager, is guaranteeing that a requisite quality-of-service for a video channel can be maintained by avoiding service degradation caused by overtaxing the available network resources. Ex.1042, 2 (“[For] the transfer of

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continuous media of digital audio and video, **it is essential that quality of service is... maintainable.**"); Ex.1019, 1:31-35 ("With the proliferation of multimedia services via the Internet-Video-conferencing, tele-medicine, telephony, Video-on-demand etc., there is an increasing demand to support **guaranteed Quality-of-Service (QoS)**").

79. Furthermore, implementing Barrett's system with a bandwidth allocation manager that checks for sufficiency of network resources would beneficially reduce a risk of over-allocating network resources because new fast channel change requests would not be fulfilled when there are insufficient resources. Ex.1006, 17:60-65 ("...reservation could not be fulfilled"); Ex.1018, 268 ("When immediate reservations and advance reservations share resources and the duration of each immediate reservation is unknown, there is a risk of over-allocation."). Reducing the risk of over-allocating resources also beneficially reduces the potential of interrupting or canceling another service. Ex.1015, 18 ("It is unfortunate if a planned event has to be canceled with late notice because it turns out there are insufficient network resources at the time."). Checking for sufficient resources also improves network reliability since the risk of over-allocation and of interruption of services is reduced.

80. Moreover, the proposed implementation would beneficially permit scalability, even though network resources (e.g., bandwidth) are limited. As already

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noted above, fast channel change (which initially utilizes unicast) may be problematic because service providers may reach technical limitations when servicing many clients. Ex.1008, [0057]; Ex.1011, 1:25-31. In instances where there are insufficient network resources to fulfill a new fast channel change request that uses unicast, the bandwidth allocation manager may facilitate one more alternative viewing options that more efficiently scale, e.g., by sending the same video to many subscribers at the same time. Ex.1006, 15:63-16:66, 17:39-42, 19:44-56; Ex.1009, 1:48-55. This would allow the system to “**maximiz[e] the total number of subscriber requests fulfilled.**” Ex.1006, 18:35-40. A POSITA would have recognized that providing alternative viewing options, including more efficient options for system scaling, is generally more advantageous than denying service. Ex.1006, 19:33-34 (“[a]dvantageously...provid[e] extraordinary flexibility in allocating finite bandwidth.”).

81. Each of the above noted benefits, separately and together, would have motivated a POSITA to implement Barrett with a bandwidth allocation manager, per Rodriguez, to check that sufficient network resources (e.g., bandwidth) are available before the channel change server 108 fulfills a client 106 fast channel change request 112 and allocate bandwidth accordingly.

ii. “...requesting network resources...”

82. When implementing Barrett's system to include a bandwidth allocation manager, per Rodriguez, it would have been obvious for Barrett's channel change server 108 (which initially receives a fast channel change request 112 from the client 106) to send a corresponding request (with bandwidth allocation criteria) to the bandwidth allocation manager, per Rodriguez. Ex.1006, 13:61-14:14, 16:53-17:10, Abstract. A POSITA would have recognized that sending such a request to the bandwidth allocation manager is beneficial because it would inform the bandwidth allocation manager of the client's bandwidth needs. Based on this information, the bandwidth allocation manager would be able to check if there are sufficient network resources available to meet the client's bandwidth needs to fulfill the fast channel change request and schedule bandwidth accordingly. Ex.1006, 17:33-65, 23:29-43. This implementation also allows the bandwidth allocation manager to keep track of the currently utilized network resources since it knows what has been allocated per the bandwidth allocation schedule.

83. As already noted above, checking that sufficient network resources (e.g., bandwidth) are available before fulfilling a fast channel change request provides numerous benefits including guaranteeing and maintaining QoS (by reserving bandwidth per the bandwidth allocation schedule), avoiding over-allocating resources (by not fulfilling the fast channel change request when

bandwidth is insufficient), and providing scalability (by providing the client 106 alternative viewing options that use multicast).

84. The above noted benefits, separately and together, would have motivated a POSITA to modify Barrett's system in view of Rodriguez and implement the channel change server 108 to request network resources by sending a request (with bandwidth allocation criteria) to the bandwidth allocation manager.

iii. "...receiving feedback information ..."

85. When implementing the combination of Rodriguez and Barrett, it would have been obvious to a POSITA for the channel change server 108 to receive a responsive notification message from the bandwidth allocation manager, because it would provide information regarding the availability of network bandwidth for the request. Such an implementation would provide Barrett's system "intelligent and efficient management of bandwidth allocation in a manner that makes optimal use of the available bandwidth." Ex.1006, 2:63-67, 19:33-34.

86. For example, the notification message would inform the channel change server 108 that there is sufficient network bandwidth available to fulfill a request. Ex.1006, 17:33-50; Ex.1021, [0036], [0052]. This information would allow the channel change server 108 (in conjunction with the bandwidth allocation manager) to allocate resources per a bandwidth allocation schedule to provide the requested video channel. Ex.1006, 23:29-43. The notification message, in some

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instances, would also inform the channel change server 108 that there are not sufficient network resources (because the demand is high) and therefore to not fulfill the fast channel change request 112 and provide alternative viewing options. Ex.1006, 15:63-16:66, 17:33-65, 19:44-56; 23:29-43, Abstract. Accordingly, it would have been obvious to a POSITA for the channel change server 108 to receive a notification message from the bandwidth allocation manager, because it would provide useful information regarding the availability of network bandwidth and allow for “intelligent and efficient management of bandwidth allocation in a manner that makes optimal use of the available bandwidth.” Ex.1006, 2:63-67, 19:33-34.

87. Furthermore, a POSITA would have been motivated to combine the relevant teachings to obtain numerous additional benefits, including guaranteeing and maintaining QoS (by reserving bandwidth per the bandwidth allocation schedule), avoiding over-allocating resources (by not fulfilling the fast channel change request when resources are insufficient), and providing scalability (by providing the client 106 alternative viewing options, including sending the same video to many clients at the same time).

88. The above noted benefits, separately and together, would have motivated a POSITA to modify Barrett’s system in view of Rodriguez such that the channel change server 108 receives notification message information regarding availability of network resources from the bandwidth allocation manager.

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iv. “...allowing the Media Quick start or using another behavior ...”

89. Consistent with the above analysis, it would have been obvious to a POSITA for the channel change server 108 to the fast channel change request when there are sufficient network resources (e.g., bandwidth) available. Ex.1006, 17:33-50. Because the channel change server 108 has information indicating that network resources (e.g., bandwidth) are readily available, the client 106 fast channel change request 112 can be fulfilled with minimal risk of over-allocating resources. This furthers Barrett’s goal of using unicast and multicast to display the video channel “relatively quickly.” Ex.1005, [0023], [0062]-[0066], Fig. 5. Such an implementation also furthers Barrett’s goal of “avoid[ing]...bandwidth squandering” as well as using residual bandwidth to generate revenue for the service provider. Ex.1005, [0042]; Ex.1006, 17:16-18 (“A residual amount of bandwidth may be allocated to accommodate last minute viewing requests for subscribers that wish to pay a considerably higher service fee.”), 21:37-42 (“[T]he Cable Operator may assess a fee per time usage.”).

90. On the other hand, when there is insufficient bandwidth to fulfill the fast channel change request, it would have been obvious to a POSITA for the channel change server 108 to use alternative viewing options to start the video channel. Ex.1006, 15:63-16:66, 17:33-65, 19:44-56; 23:29-43, Abstract. Such an

implementation would “[a]dvantageously...provid[e] extraordinary flexibility in allocating finite bandwidth” in Barrett’s system. Ex.1006, 19:33-34

91. For example, it would have been obvious to provide the client 106 an option of having the initial fast channel change request fulfilled at a different time, thereby flexibly allocating bandwidth when demand is low. Ex.1006, 19:44-56. As another example, it would have been obvious to a POSITA “to fulfill the subscriber requests more efficiently” when “demand is high.” Ex.1006, 17:39-42. Such efficient means include Rodriguez’s alternative 2 (giving the subscriber the option to select to accept NVOG channel broadcast to multiple subscribers at the same time) and alternative 3 (giving the subscriber the option select to delay or wait a period of time to capture a larger number of subscribers that view the same video at the same time) each of which correspond to multicast distribution. Ex.1006, 1:59-2:1, 19:44-56; Ex.1009, 1:48-57 (“Multicasting is a known ...technique for distributing content **more efficiently** between a single content server and multiple recipients... Multicasting can result in **significantly more efficient** use of overall network resources.”). Making efficient use of resources has been a goal throughout the history of the modern computer industry, and so a POSITA would have been motivated to make efficient use of bandwidth by using multicast distribution as described in Rodriguez, when network resources are not available for fast channel change using unicast. A POSITA, in combining the relevant teachings of using

Ex.1003

alternative 2 or 3 would have implemented Barrett to use multicast distribution, because multicast (which Barrett's system already uses, *see* Ex.1005, [0016]-[0017]) is specifically designed for distributing content to many clients at the same time.

92. The above noted benefits, separately and together, would have motivated a POSITA to modify Barrett's system in view of Rodriguez such that the channel change server 108 allows fast channel change when there are sufficient network resources (e.g., bandwidth) or use alternative viewing options to start the video channel when there are insufficient network resources (e.g., bandwidth).

v. "...signal to the client ..."

93. It would have been obvious to a POSITA for the channel change server 108 to signal to client 106 that unicast for the fast channel change is unavailable due to insufficient network resources, because this would inform the client 106 about a status of its request; namely, that the request cannot be fulfilled with unicast.

Ex.1006, 3:33-36, 13:15-27, 14:6-9, 17:60-67. This information would allow the client 106 to display a notification to the subscriber that the fast channel change request cannot be fulfilled. Without a displayed notification, the subscriber would have no knowledge of what is happening other than that the channel is not changing, e.g., subscriber would not know whether the client system has a malfunctioned or whether the service provider is not providing the video channel. A

Ex.1003

notification would inform the subscriber that the channel change is underway but occurring more slowly than they may be accustomed to due to the delay associated with joining the multicast distribution. Informing the subscriber would motivate a POSITA to send such a signal to client 106.

94. Furthermore, when the channel change server 108 signal to client 106 includes alternative viewing options information (Ex.1006, 3:33-36, 13:15-27; 14:6-9, 17:60-67, 19:44-56), it would have been obvious to a POSITA for Barrett's client 106 to be implemented with fallback behavior such that, upon notification that there are insufficient network resources to fulfill the fast channel change request 112, client 106 automatically (or with subscriber input) switches to the next available multicast stream (e.g., using either alternative 2 or 3), while providing notification to the subscriber of the switch. Such an implementation would also more efficiently utilize bandwidth by using multicast thereby furthering Barrett's goal of "avoid[ing]...bandwidth squandering." Ex.1005, [0042]. Also, switching to multicast would provide scalability of Barrett's system (even though network resources are limited) to "maximiz[e] the total number of subscriber requests fulfilled." Ex.1006, 1:59-2:1, 18:35-40, 19:44-56; Ex.1009, 1:48-57.

95. The above noted benefits, separately and together, would have motivated a POSITA to modify Barrett's system in view of Rodriguez such that the

channel change server 108 signals the client 106 that there are insufficient network resources (e.g., bandwidth) to fulfill unicast for the fast channel change request 112.

vi. “...the client is still allowed to subscribe...”

96. It would have been obvious to a POSITA for the channel change server 108 to send the client 106 a signal that includes alternative viewing options information (Ex.1006, 3:33-36, 13:15-27; 14:6-9, 17:60-67, 19:44-56) to give Barrett’s client 106 the option to select to receive the multicast distribution of the requested video channel (using either alternative 2 or alternative 3). This would “[a]dvantageously... provid[e] extraordinary flexibility in allocating finite bandwidth” in Barrett’s system because the subscriber can dynamically choose the best option. Ex.1006, 12:18-22, 19:33-34.

97. Also, utilizing multicast would be beneficial because it allows for “fulfill[ing] the subscriber requests **more efficiently**” when “demand is high” for “efficient management of bandwidth allocation in a manner that makes **optimal use of the available bandwidth.**” Ex.1006, 2:63-67, 17:39-42; *see also* Ex.1009, 1:48-57 (“Multicasting is a known ... technique for distributing content **more efficiently** between a single content server and multiple recipients... Multicasting can result in **significantly more efficient** use of overall network resources.”). Because bandwidth is utilized efficiently, the system would be able to “**maximiz[e] the total number of subscriber requests fulfilled.**” Ex.1006, 18:35-40.

Ex.1003

98. Additionally, allowing the client 106 to select from alternative viewing options enables the subscriber to select the most desirable fee structure. *See* Ex.1006, 2:50-53 (recognizing the benefit of “offer[ing] services at a cost attractive to consumers”), 21:37-42 (“[T]he Cable Operator may assess a fee per time usage.”), 22:65-67 (“[T]he subscriber has visual feedback of how his/her on-demand random access consumption and the associated additional incurred expense.”).

99. The above noted benefits, separately and together, would have motivated a POSITA to modify Barrett’s system in view of Rodriguez such that the client 106 is still allowed to subscribe to multicast distribution using either alternative 2 or alternative 3.

100. The combination of Barrett and Rodriguez is merely combining prior art elements (a bandwidth allocation manager, per Rodriguez, with Barrett’s system) according to known methods (Rodriguez describes exemplary methods of requesting network resources, receiving notification messages regarding network resource availability, signaling the client, and allowing the client to choose alternative viewing options) to yield predictable results (allow fast channel change or use another behavior to start the requested channel).

101. Additionally, the combination is nothing more than applying a known technique (e.g., using a bandwidth allocation manager to receive network resource

Ex.1003

request and provide feedback information regarding network resources available, signaling the client, and allowing the client to choose alternative viewing options, per Rodriguez) to improve the similar system of Barrett (e.g., ensuring that there is sufficient bandwidth available to fulfill a fast channel change request, guaranteeing and maintaining QoS, avoiding over-allocating resources, and providing scalability by using multicast).

c. **Reasonable Expectation of Success**

102. I also note that the results would have been predictable and there would have been a reasonable expectation of success in the combination given that the systems of Rodriguez and Barrett are similar. For example, as illustrated in the annotated figures below, both Barrett and Rodriguez include: (1) a client terminal (orange), (2) a management device (green) at the head end that is configured to interact with the client terminal and a video provider, and (3) a video provider (blue) that interacts with the management terminal to provide videos to the client terminal. A POSITA would have expected to be able to successfully implement a bandwidth allocation manager (BAM) (red) in Barrett's similar system as shown in schematic form below.

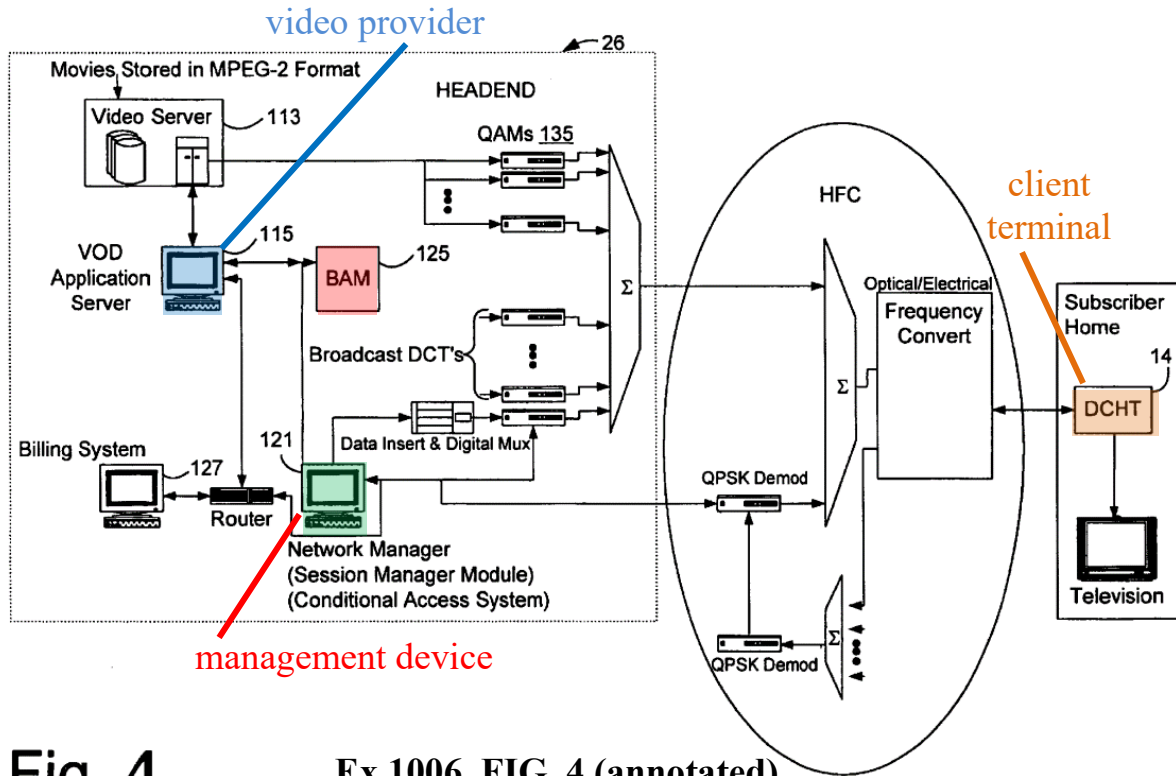


Fig. 4

Ex.1006, FIG. 4 (annotated).

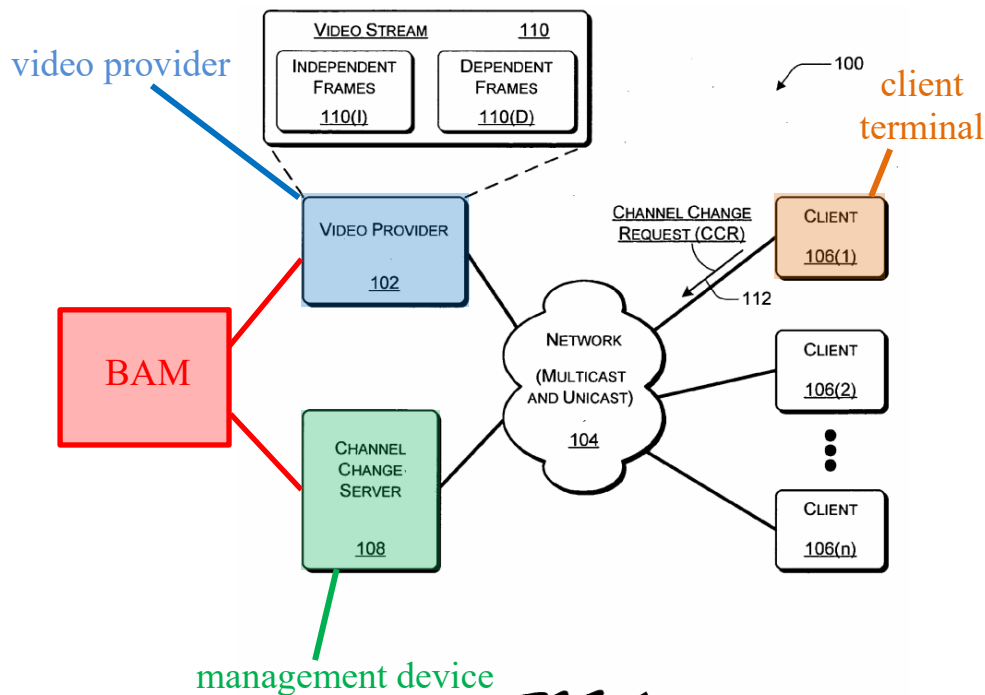


FIG. 1

Ex.1005, FIG. 1 (modified and annotated).

Ex.1003

103. Any modification needed to the system of Barrett, in order to accommodate the teachings of Rodriguez, including adding a BAM to Barrett's system and communicate messages between the various devices, would have been within the level of ordinary skill in the art. As already noted, the use of a bandwidth allocation manager (which may be referred to as a bandwidth broker, network resource manager, or by other names) was well-known in the art. Ex.1008, [0064]; Ex.1015, 17-20; Ex.1016, 7:9-12; Ex.1017, 7. Moreover, the reasonable expectation of success is evidenced by the fact that the '286 patent itself relies on the prior art network resource manager. *See* Ex.1001, 5:45-55.

104. Lastly, I note that the proposed combination relies on the teachings of the references, and I do not suggest that physical incorporation of Rodriguez's bandwidth allocation manager or signals into Barrett's system is required; however, it is permitted in the proposed combination.

4. Claim 7¹

- a. [7.0] *A method for an application framework connectable to an IP network, wherein the method comprises the steps of:***

105. To the extent the preamble is limiting, Barrett in combination with Rodriguez renders it obvious.

¹ Claims 1-3 are addressed in following Sections 9-11.

106. First, Barrett discloses a “**method**, system, approach, apparatus, server, device, media, procedure, arrangement, etc.,” and implementations thereof. Ex.1005, [0007]. Barrett’s method is performed in the context of a video distribution architecture 100 that includes “a video provider 102, a channel change server 108, and one or more clients 106(1), 106(2)... 106(n) [that] are coupled to network 104.”. Ex.1005, [0016]-[0017], Fig. 1. Barrett explains that “**video provider 102 and channel change server 108 separately or jointly comprise a video distribution headend.**” Ex.1005, [0021]. Barrett’s channel change server 108, separately or jointly with video provider 102 (which “jointly comprise a video distribution headend”), correspond to “*an application framework.*”

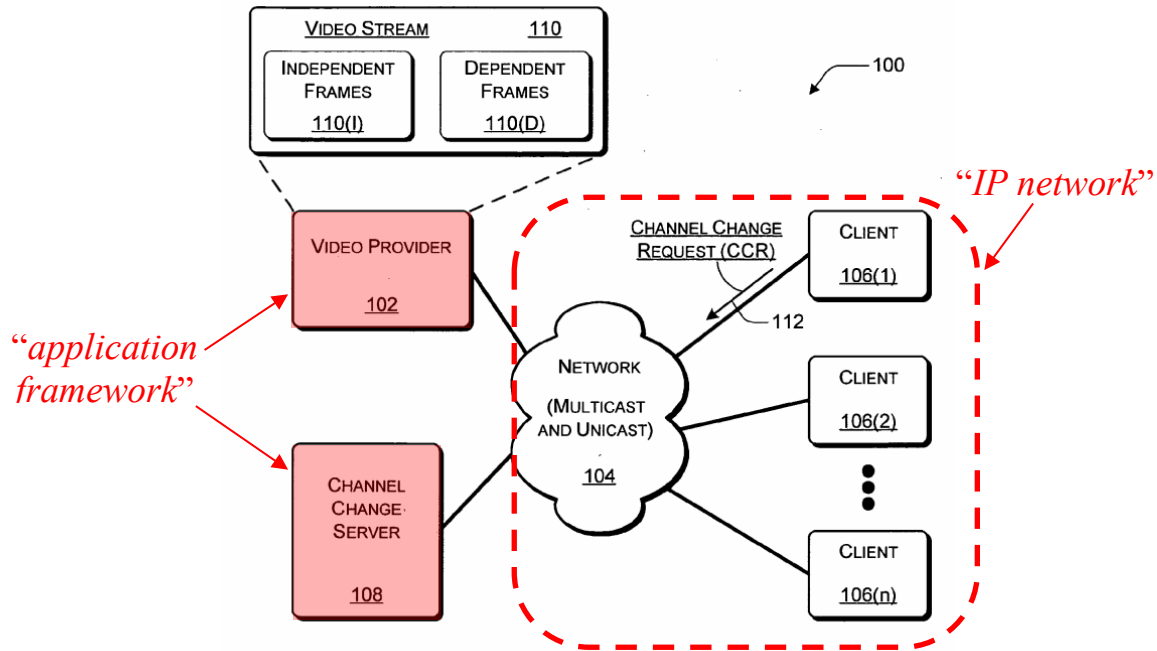
107. Second, Barrett discloses that the network 104 supports “communications in accordance with a multicast routing protocol (e.g., protocol independent multicast-sparse mode (PIM-SM)), in accordance with a group management protocol (e.g., **internet group management protocol (IGMP)**), and so forth.” Barrett [0027]. A POSITA would have understood that the network 104 includes the clients that it services. A POSITA would have understood that IGMP is a protocol that allows for communicating requests to join a multicast group and receive multicast traffic in an IP network. Ex.1020, 2:22-24, 3:5-30; Ex.1035, 7 (“IGMP messages are encapsulated in IPv4 datagrams”), 17 (“valid IP source address.”). Barrett’s network 104 and the clients that it services, which utilize

Ex.1003

IGMP, among other internet-based protocols, separately and together correspond to “*an IP network*.”

108. This is consistent with the ’286 patent’s exemplary IP network, which also uses communicates using IGMP. Ex.1001, 6:39-45 (“By participating in multicast control protocols such as **Internet Group Management Protocol (IGMP)** signal[ing] or acting as an intermediate (proxy) in IGMP snooping or by interaction with the application framework.”).

109. Barrett’s Figure 1, reproduced below, illustrates that channel change server 108 and video provider102 (separately and jointly “*an application framework*”) have a link (“*connectable*”) to network 104 and clients 106 (separately and together “*IP network*”).



799. 1

Ex.1005, FIG. 1 (annotated).

110. Thus, Barrett discloses a method for an application framework (channel change server 108, separately and jointly with video provider 102) connectable to an IP network (IP network 104 separately and together with clients 106), which teaches “[a] method for an application framework connectable to an IP network,” as recited in the preamble.

111. To the extent Patent Owner argues the claimed “IP network” should be construed to comprise an access network, it would have been obvious to a POSITA for Barrett's network 104 to include an access network. It was common for a service provider network to include both an access network portion and a core network

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portion. The access network portion would provide so-called “last mile” connectivity to the subscriber endpoints (e.g., clients 106), while the service provider’s main services (such as video services) would be provided from servers located in another portion of the service provider network. Barrett recognizes that network 104 includes a variety of additional components: “Network 104 is implemented with multiple network elements (not separately shown in FIG. 1).” Ex.1005, [0016]. A POSITA would have found it obvious for network 104 to include networking components capable of providing network connectivity to clients 106, such as a cable modem termination server (CMTS) or digital subscriber line access modem (DSLAM) that were commonly considered to be part of a service provider access network. *See e.g.*, Ex.1008, [0002], [0041], [0060]-[0061]; Ex.1009, 5:18-25, 6:35-37; Ex.1010, 4:35-55; Ex.1033, 3:13-22. Nevertheless, to remove any doubt, Rodriguez discloses an “**access network**” through which the subscribers have access to receive content from anywhere in the world. Ex.1006, 4:51-57, 5:8-13, Fig. 1.

112. It would have been obvious to a POSITA to include an access network in Barrett’s system to provide clients 106 access to network services. Rodriguez’s access network, which utilizes hybrid/fiber coaxial connections, is not incompatible with using IP communications. *See e.g.*, Ex.1006, 4:51-5:4, 6:42, 7:12-13. It would have been obvious to a POSITA, when applying Rodriguez’s teachings, to

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implement the access network in Barrett's system with IP (e.g., using DSLAM, CMTS) since Barrett's system utilizes IP for communication. *See e.g.*, Ex.1008, [0002], [0041], [0060]-[0061]; Ex.1009, 5:7-25, 6:35-37; Ex.1010, 4:35-55. Such an implementation (i.e., to use an IP access network) would have been considered conventional and well-known in the art. *See e.g.*, Ex.1009, 5:7-25 ("A user 42 is connected to router 48 via a multicast-enabled DSLAM device 50 using...IP... protocols..."); Ex.1032, [0049] ("[C]apacity planning for an IP access network must include the traffic demands for video, voice and data applications, video is likely to be the dominant bandwidth user."); Ex.1033, 3:36-40 ("[A]ccess IP network 34 provide the basic transmission, local control and management functions needed for the subscriber devices 31, 36 to access the resources of the IP core network 21 and the end user services network 25."), Fig. 2; Ex.1034, 1 ("Multimedia system, comprising a public IP based multimedia network (1) and an access network for connecting local subscriber's premises. The access network is an IP-based local access network (2).").

113. In the proposed combination of Barrett and Rodriguez, a portion of network 104, through which clients 106 connect into for access, corresponds to an IP access network.

114. As I further analyze below, Barrett and Rodriguez render obvious the method "*comprising*" the claimed steps.

- b. [7.1] *receiving a request for a media distribution requiring a multicast distribution from a client in said IP network,*

115. Barrett in combination with Rodriguez renders obvious this limitation.

116. **First**, as discussed at [7.0], channel change server 108, separately and together with video provider 102 corresponds to an “*application framework*” and network 104 (including an access network) with the clients corresponds to an “*IP network*.”

117. **Second**, Barrett discloses, in the context of Figures 1 to 3B (of which Figure 1 is reproduced below), that the channel change server 108 receives a channel change request 112 requiring multicast distribution from a client 106 in the IP network 104. Ex.1005, [0021], Fig. 1.

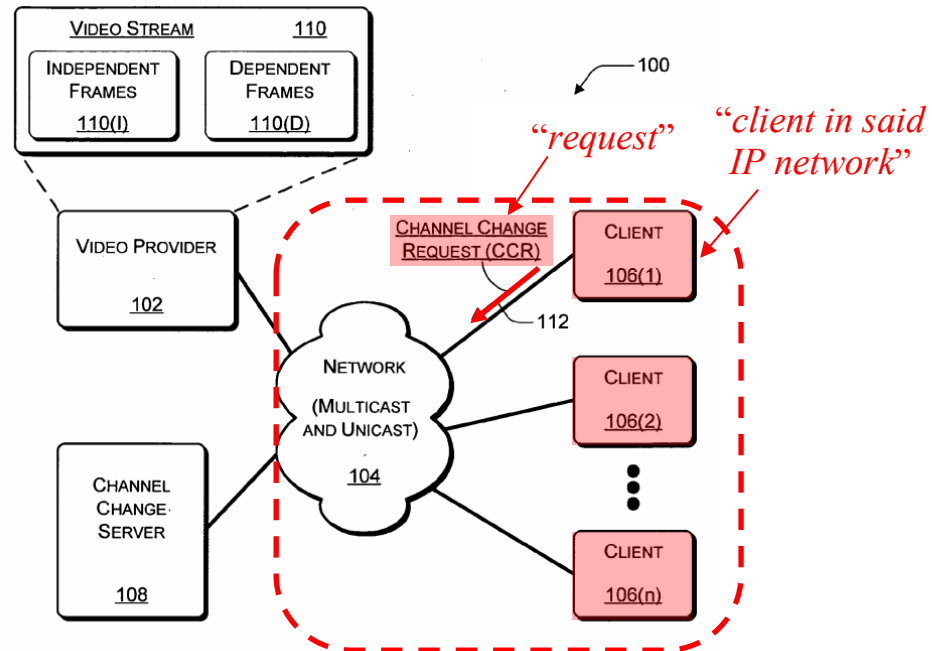


Fig. 1

Ex.1005, FIG. 1 (annotated).

118. Barrett discloses that “client 106(1) transmits a channel change request (CCR) 112 toward a video distribution headend or similar server or system.” Ex.1005, [0021]. CCR 112 is for “fast channel changing in a multicast video distribution architecture,” whereby “the requested channel correspond[s] to a multicast group.” Ex.1005, [0006]; *see also* [0021] (“Channel change request 112 precipitates a multicast group change to a multicast group corresponding to the requested video channel.”); claim 1 (“detecting a channel change request that indicates a requested channel, the requested channel corresponding to a multicast group”); Figs. 2, 3A, 3B (illustrating CCR 112 being transmitted to channel change

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server 108). Barrett's video distribution architecture supports "on-demand video, as well as other interactive services," "add-on services (e.g., extra channels, pay-per-view, etc.) in conjunction with digital network services." Ex.1005, [0002]-[0005]. It would have been obvious to a POSITA for the requested video channel to correspond to any one of video-on demand, different video channels, pay-per-view.

119. Barrett further explains that client 106(1) uses IGMP to communicate such multicast group membership changes. Ex.1005, [0028] ("IGMP is used by receiver hosts (e.g., at least clients 106) and replication points 202 to notify each other about conditions and changes to group membership."). A POSITA would have been familiar with IGMP, and thus would have known that IGMP messages are transmitted in Internet Protocol (IP) packets from sources with valid IP addresses. Ex.1035, 7 ("IGMP messages are encapsulated in IPv4 datagrams"), 17 ("valid IP source address."). A POSITA would have therefore understood that client 106, which receives access via the IP network 104 (see [7.0]) and communicates IP packets in the IP network 104, is part of the IP network 104. Thus, it would have been obvious to a POSITA that the client 106 is "*in the IP network.*" Accordingly, Barrett's video channel change request 112 requesting multicast video distribution (e.g., for video-on demand, pay-per-view, different channel) from a client 106 in the IP network 104 renders obvious "*a request for a*

media distribution requiring a multicast distribution from a client in said IP network.”

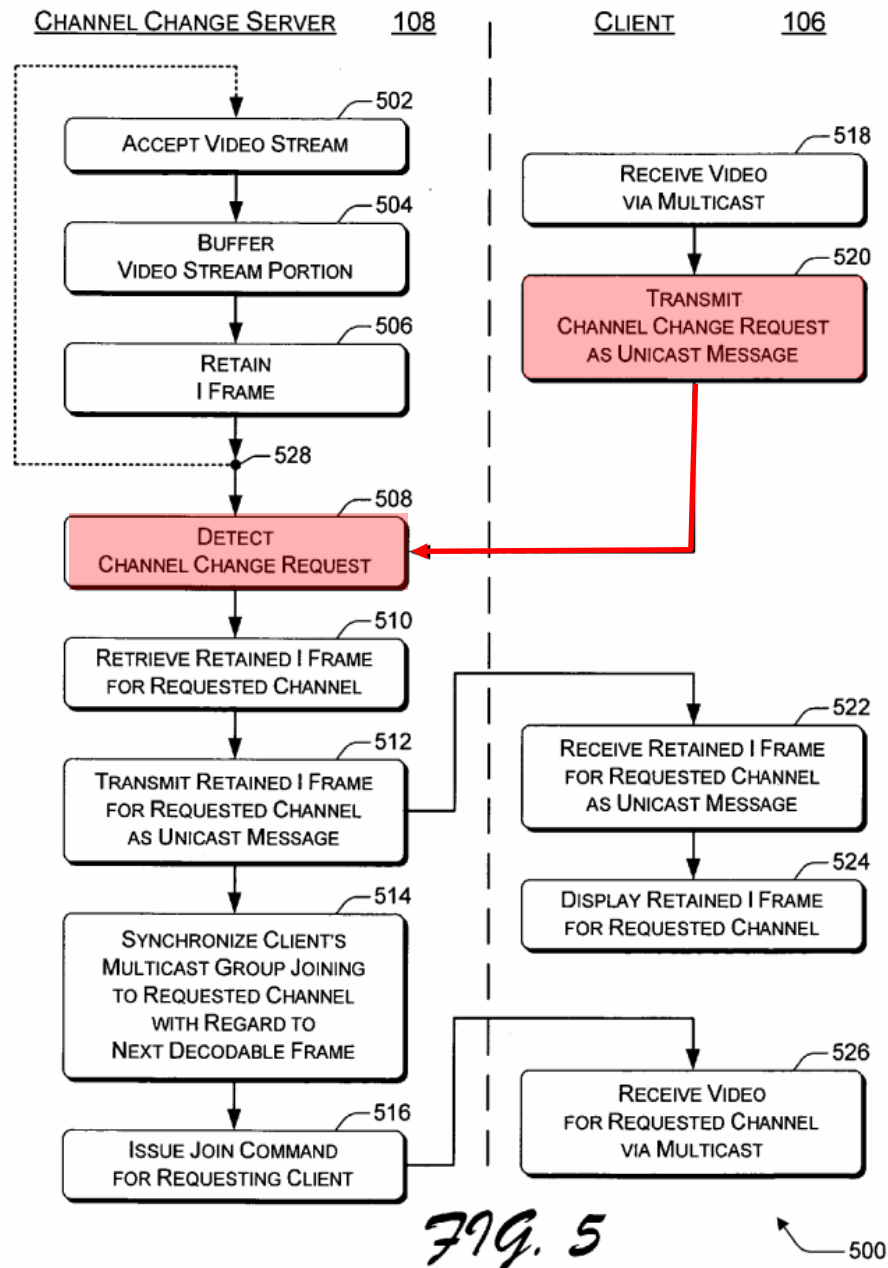
120. Third, Barrett teaches that the channel change server 108 receives the request.

At block 520, a channel change request is transmitted as a unicast message. For example, **client 106 may transmit a channel change request 112 as a unicast message toward channel change server 108. This channel change request 112 is effectively a request to switch from a first multicast group corresponding to a first video channel to a second multicast group corresponding to a second video channel, with the requested second video channel being indicated by channel change request 112.**

At block 508, a channel change request is detected. For example, **channel change request detector 218 of channel change server 108 may detect channel change request 112.**

Ex.1005, [0060]-[0061], Fig. 5; *see also* Ex.1005, [0023], Figs. 2, 3A, 3B (illustrating CCR 112 being received by channel change server 108 via a replication point 202). *See also* Ex.1005, [0061] (“...**channel change server 108 may be the intended recipient** of channel change requests 112...”).

121. As illustrated below at block 508 of Figure 5, the client 106 channel change request 112 is detected by the channel change server 108.



Ex.1005, FIG. 5 (annotated).

122. The channel change server 108 (intended recipient) detecting the channel change request 112 discloses “receiving” the request.

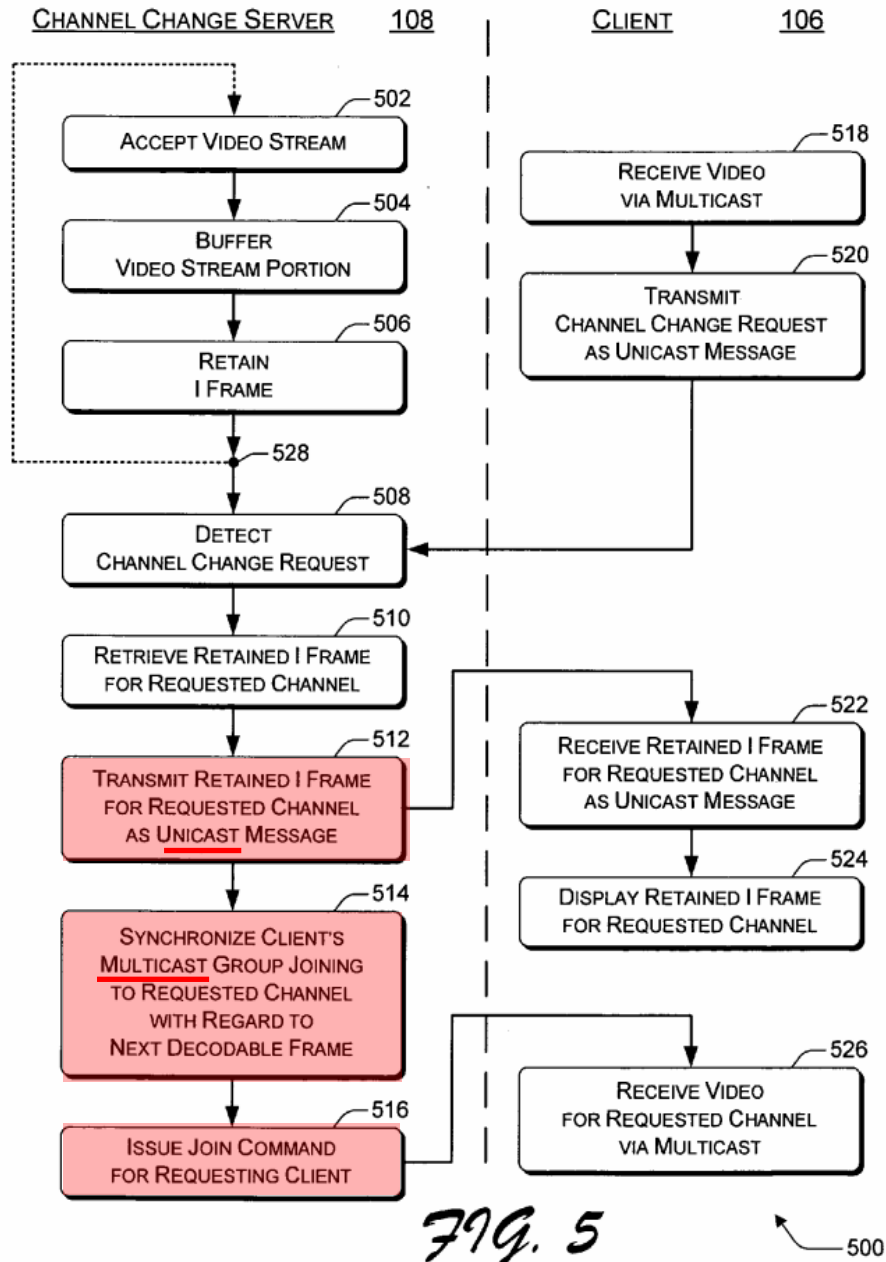
123. Thus, Barrett in combination with Rodriguez discloses that the channel change server 108 receives channel change request 112 requiring multicast video distribution from a client 106 in the IP network 104, which renders obvious “receiving a request for a media distribution requiring a multicast distribution from a client in said IP network,” as recited in the claim.

c. [7.2] *requesting network resources from a network resource manager for a Media Quick Start, to start the requested media distribution,*

124. Barrett in combination with Rodriguez renders obvious this limitation.

125. As I discussed in the Claim Construction (Section VII.A), an example embodiment of “Media Quick Start” includes using a unicast media distribution followed by a multicast distribution, such as for a fast channel change.

126. **First**, as discussed at limitation [7.1], Barrett discloses that the client sends a channel change request 112 to the channel change server 108. Barrett’s channel change request 112 is for “**fast channel changing**.” Ex.1005, Abstract, [0056], [0068]. To facilitate fast channel changing, Barrett’s system first sends a unicast video stream followed by a multicast video stream that the client joins. Ex.1005, [0056], [0061]-[0066]. The unicast allows for displaying the video “quickly without regard to other frames.” Ex.1005, [0023].



Ex.1005, FIG. 5 (annotated).

127. Barrett's "fast channel changing," which provides a client unicast followed by multicast video distribution for fast channel change, corresponds to a "Media Quick Start" as claimed. This is consistent with the '286 patent, which

discloses that “**fast media changes such as channel changes**...[are] referred to as ‘Media Quick Start’ in this description.” Ex.1001, 3:50-54.

128. Second, although Barrett provides the client the requested distribution, Barrett has limited information about determining if there are sufficient resources (e.g., bandwidth) for the distribution. A POSITA would have recognized that fast channel change may be technically problematic when there are multiple unicast streams because resource demands are magnified. Ex.1008, [0057] (“This is not always possible due to technical limitations or service provider operational constraints. This problem will magnify when many users will demand multiple unicast media storage services such as VoD, PVR, and fast channel change.”). One known solution to this problem was to utilize a bandwidth manager to check if there are sufficient network resources (e.g., bandwidth) before attempting to fulfill the client’s fast channel change request. Ex.1008, [0064] (“A separate user management system checks if there is sufficient bandwidth allocated for that user so that the request can be fulfilled (110) and if not, rejects the request (120).”); *see also* Ex.1015, 17-20; Ex.1016, 7:9-12; Ex.1017, 7. In view of the general understanding in the art, a POSITA would have looked to other references for relevant teachings.

129. In that regard, Rodriguez teaches a “**bandwidth allocation manager 125**” that keeps track of bandwidth allocation (e.g., with a schedule) and performs

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131. During operation, Rodriguez teaches that the network manager 121 transmits a subscribers reservation request (with corresponding bandwidth allocation criteria) to the bandwidth allocation manager 125.

The **network manager 121 then communicates the subscriber reservation request to the bandwidth allocation manager 125.** It will be appreciated that the bandwidth allocation manager 125 may be configured so as to communicate directly with the DHCT 14, thus eliminating the need for the message to be passed through the network manager 121. After the subscriber reservation request is received by the bandwidth allocation manager 125, it is stored by the bandwidth allocation manager 125 until such time as the bandwidth allocation manager 125 initiates a bandwidth allocation event.

Ex.1006, 16:64-17:10.

The bandwidth allocation manager determines a bandwidth allocation schedule for a predetermined bandwidth based on allocation criteria comprising a criteria received from a subscriber. The **allocation criteria received from the subscriber may comprise a subscriber reservation request which is processed by the bandwidth allocation manager to determine the bandwidth allocation schedule.**

Ex.1006, Abstract.

Referring still to FIG. 4, in one embodiment of the present invention, **the bandwidth allocation manager 125 is in communication with the VOD application server 115, the network manager 121,** and, preferably, the DHCT 14. It will be appreciated by one of ordinary skill

in the art, however, that such communication can be established in a number of ways and does not require that there be a direct connection between each of the components. For example, the band width allocation manager 125 may communicate with the VOD application server 115 indirectly by transmitting and receiving information to and from the network manager 121 which then communicates with the VOD application server 115. Similarly, the bandwidth allocation manager 125 may communicate with the DHCT 14 indirectly either through the network manager 121 or through the VOD application server 115. Likewise, any communication can be established with any headend component that interfaces a first VOD component to a second VOD component. **The bandwidth allocation manager 125 may receive one or more allocation criteria from any one of the above referenced components** in communication with the bandwidth allocation manager.

Ex.1006, 13:61-14:14.

132. A POSITA would have understood that the network manager 121 transmits the subscriber reservation request to thereby request that the bandwidth allocation manager 125 schedule network resources in accordance with bandwidth allocation criteria, which discloses “*requesting network resources from a network resource manager.*” See e.g., Ex.1006, 16:25-28 (“[T]he bandwidth allocation manager 125 uses the subscriber criteria received...to determine the bandwidth allocation schedule”), Abstract (“The bandwidth allocation manager determines a

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bandwidth allocation schedule...based on allocation criteria...compris[ing] a subscriber reservation request [] is processed by the bandwidth allocation manager to determine the bandwidth allocation schedule.”).

133. Also, a POSITA would have understood that the network manager 121 transmits the subscriber reservation request to the bandwidth allocation manager 125 in order “*to start the requested media distribution*” at least because the bandwidth allocation manager 125 determines if there are sufficient resources (e.g., bandwidth) available and schedules bandwidth to start the video. In one example, the bandwidth allocation manager 125 determines that there is sufficient bandwidth to meet the reservation request to start the media distribution and instructs the network manager to fulfil the request. *See* Ex.1006, 17:11-67 (“If...bandwidth is readily available, the bandwidth allocation manager 125 may communicate with the network manager and the VOD application server 115 to initiate a true VOD session.”). In another example, there is insufficient bandwidth to fulfill the reservation request and therefore it is denied and other options are utilized. Ex.1006, 17:9-42 (“On the other hand, if demand is high for a particular time period, the bandwidth allocation manager 125 may explore other content delivery options to fulfill the subscriber requests more efficiently.”); *see also* 17:60-67.

134. It would have been obvious to a POSITA, in view of Rodriguez, to include a bandwidth allocation manager in Barrett’s system and for the channel

change server 108 to send the client's request (with corresponding bandwidth criteria) to the bandwidth allocation manager. This would be analogous to how Rodriguez's network manager 121 communicates the subscriber reservation request to the bandwidth allocation manager 125. Ex.1006, 16:64-66. Such an implementation would allow a bandwidth allocation manager incorporated into Barrett's system to check whether the network has sufficient resources (e.g., bandwidth) available to fulfill the request and, in instances where resources are readily available, to schedule the requisite bandwidth and start the video channel. Implementing Barrett's system with a bandwidth allocation manager that checks resource availability before scheduling and fulfilling a fast channel change request provides numerous benefits, including reducing the risk of over-allocating bandwidth. *See* Reasons to Combine Barrett and Rodriguez.

135. In the combination with Rodriguez, Barrett's system would include a bandwidth allocation manager, as illustrated below in modified Figure 1. During operation, the channel change server 108 would send to the bandwidth allocation manager a client's request (with corresponding bandwidth criteria). The bandwidth allocation manager would process the received request to determine whether there are sufficient network resources available (e.g., bandwidth) to start the requested video channel and, if so, allocate bandwidth accordingly to start the video channel. Ex.1006, 23:29-43; *see also* analysis at limitations [7.4]-[7.5], analyzing how the

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prior art teaches that the requested fast channel change is allowed when there are sufficient resources and not allowed when resources are insufficient.

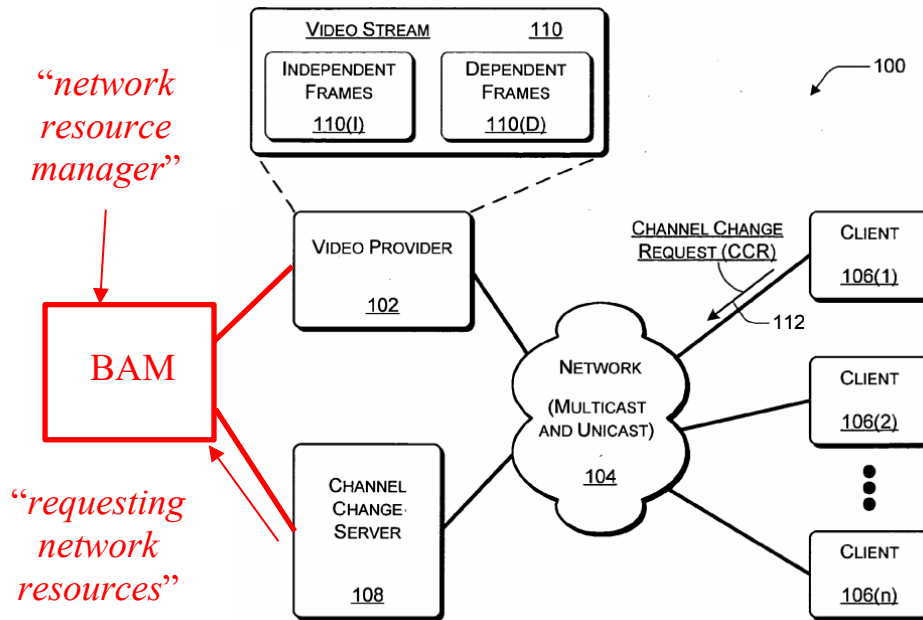


FIG. 1

Ex.1005, FIG. 1 (modified and annotated).

136. Thus, Barrett in combination with Rodriguez discloses that the channel change server 108 sends a client's request (with corresponding bandwidth criteria) to a bandwidth allocation manager for a fast channel change, to start the requested video channel, which render obvious *"requesting network resources from a network resource manager for a Media Quick Start, to start the requested media distribution,"* as recited in the claim.

d. [7.3] *receiving feedback information relating to network resource availability from the network resource manager, and*

137. Barrett in combination with Rodriguez renders obvious this limitation.

138. First, as discussed at limitation [7.2], Barrett in combination with Rodriguez discloses that the channel change server 108 sends a request for network resources to a bandwidth allocation manager.

139. Second, Rodriguez discloses that the bandwidth allocation manager communicates feedback information to the requesting network manager. As explained below, the feedback information may indicate the following: (1) that there are sufficient network resources (e.g., bandwidth) to fulfil the request; or (2) that the request cannot be fulfilled due to insufficient available network resources (e.g., bandwidth) and that alternative viewing options can be used.

(1) sufficient network resources

140. In one example, Rodriguez discloses that if “bandwidth is readily available, the bandwidth allocation manager 125 may communicate with the network manager and the VOD application server 115 to initiate” the requested media distribution. Ex.1006, 17:33-39; *see also* Ex.1006, 17:43-50.

141. Rodriguez explains that the notification from the bandwidth allocation manager 125 to the network manager 121 is for allocating network resources (e.g., bandwidth).

[T]he bandwidth allocation manager 125 communicates with the network manager 121 to allocate the predetermined bandwidth according to the bandwidth allocation schedule determined by the bandwidth allocation manager. This may be accomplished by transmitting the bandwidth allocation schedule to the network manager after each bandwidth allocation event. Thus, the bandwidth allocation manager may continually communicate with the network manager to dynamically allocate bandwidth according to each new bandwidth allocation schedule. **Bandwidth allocation entails an assignment of system resources** for a time interval for delivering a video service requested by a subscriber according to the bandwidth allocation schedule.

Ex.1006, 23:29-42.

142. Accordingly, Rodriguez discloses receiving a notification message from the bandwidth allocation manager 125 that there is sufficient network bandwidth available to fulfill the request, which teaches “*receiving feedback information relating to network resource availability from the network resource manager.*”

(2) insufficient network resources and alternative delivery can be used

143. Where there are insufficient network resources, Rodriguez discloses that if a “reservation request is not or cannot be fulfilled ... **the bandwidth allocation manager 125 may send a message** to the subscriber notifying them that their reservation could not be fulfilled.” Ex.1006, 17:60-65.

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144. Additionally, the bandwidth allocation manager 125 sends a notification message of alternative viewing options.

For instance, in the event that the bandwidth allocation manager determines that a particular subscriber reservation request cannot be fulfilled (such as when there is insufficient available bandwidth), **the bandwidth allocation manager may provide the subscriber the option** of viewing the movie at a different time. Alternatively, a subscriber may be asked to accept an NVOD delivery model with reduced random access functionality. Or a subscriber may be asked to delay or wait a certain period of time until the requested movie viewing can commence to capture a larger number of subscribers that have requested to view the same movie at approximately the same time.

Ex.1006, 19:44-56; *see also* Ex.1006, 15:63-16:66.

145. Rodriguez explains that the above noted notification messages may be sent to the “network manager 121,” which then communicates the information to the subscriber “DHCTs.” Ex.1006, 13:15-27; *see also* Ex.1006, 3:33-36 (“The network manager is in communication with the bandwidth allocation manager and the network manager allocates bandwidth in the digital broadband delivery system.”); 14:6-9 (“...the bandwidth allocation manager 125 may communicate with the DHCT 14 indirectly either through the network manager 121...”). A POSITA would have recognized that the network manager 121 of Rodriguez is

analogous to the channel changer server 108 of Barrett, in view of network position, interaction with a video server, and ability to interact with the subscriber.

146. The notification message that the request could not be fulfilled due to insufficient network resources, separately and together with the notification message of alternative viewing options that may be used, corresponds to “*feedback information,*” as claimed.

147. Accordingly, Rodriguez discloses receiving a notification message from the bandwidth allocation manager 125 that the request cannot be fulfilled due to insufficient network resources (e.g., bandwidth) and that alternative viewing options can be used, which teaches “*receiving feedback information relating to network resource availability from the network resource manager.*”

148. It would have been obvious to a POSITA, when modifying Barrett in view of Rodriguez as analyzed at limitation [7.2], in response to the request for the bandwidth allocation manager to transmit a notification message regarding the availability of network resources (e.g., bandwidth) and for the channel change server 108 to receive the notification message. The notification message, in certain instances, would beneficially inform the channel change server 108 that there is sufficient network bandwidth available, thereby allowing the client 106’s fast channel change request to be fulfilled. On the other hand, in circumstances where network bandwidth is insufficient, the channel change server 108 would be

informed that the request cannot be fulfilled but that alternative viewing options may be used. In such circumstances, the channel change server 108 would not initiate a fast channel change (thereby avoiding over-allocating bandwidth) but rather provide the client 106 notification and alternative viewing options. *See also* Reasons to Combine Barrett and Rodriguez; analysis at limitations [7.4]-[7.5].

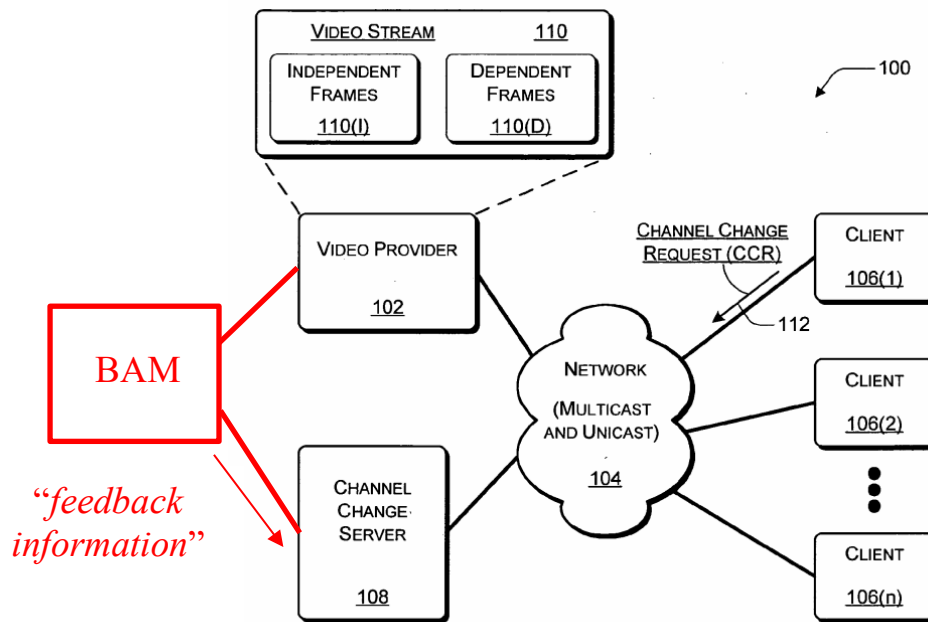


Fig. 1

Ex.1005, FIG. 1 (modified and annotated).

149. Thus, Barrett in combination with Rodriguez discloses that the channel change server 108 receives notification messages relating to network bandwidth availability from the bandwidth allocation manager, which render obvious

“receiving feedback information relating to network resource availability from the network resource manager,” as recited in the claim.

- e. **[7.4] *allowing the Media Quick start or using another behavior to start the requested media distribution based on the received feedback information,***

150. Barrett in combination with Rodriguez renders obvious this limitation.

151. As I discussed in the Claim Construction (Section VII.C), this limitation recites two distinct methods: a first method which claims what happens (*“allowing the Media Quick start”*) when the feedback information indicates that network resources are available; and a second method which claims what happens (*“using another behavior to start the requested media distribution”*) when network resources are insufficient. The limitation is satisfied if either one of the recited methods is performed. Nevertheless, to remove any doubt that the claimed features would have been obvious, I address below both distinct methods thereby rendering obvious the claim in two different ways.

(1) allowing the Media Quick Start

152. As discussed at limitation [7.2], Barrett’s fast channel changing, which provides a client unicast followed by multicast video distribution, corresponds to *“Media Quick Start.”* Further, as discussed at limitation [7.3], Barrett in combination with Rodriguez discloses that the channel change server 108 receives notification message indicating that there is sufficient bandwidth available to fulfill

the client's request. It would have been obvious for Barrett's channel change server 108 to subsequently provide the client with the requested unicast-then-multicast video distribution. *See e.g.*, Ex.1006, 17:30-39 ("If...bandwidth is readily available, the bandwidth allocation manager 125 may communicate with the network manager and the VOD application server 115 to initiate a true VOD session at the time of the subscribers reservation."); Ex.1006, 23:29-43 ("... the band width allocation manager 125 communicates with the network manager 121 to allocate the predetermined bandwidth according to the bandwidth allocation schedule determined by the bandwidth allocation manager.").

153. It would have been obvious to a POSITA, when implementing the combination of Rodriguez and Barrett, to allow the fast channel change to start, per the client 106 request, when the received notification message indicates that there is sufficient bandwidth available to fulfil the request, since the risk of over-allocating bandwidth is reduced. *See also* Reasons to Combine Barrett and Rodriguez.

154. In the proposed combination, Barrett's channel change server 108 (operating separately and together with the video provider 102) would allow the fast channel change (Barrett's unicast followed by multicast) based on the received notification message from the bandwidth allocation manager indicating that there is sufficient bandwidth available to fulfill the channel change request 112. *See*

Ex.1005, [0018]-[0022], [0034]-[0038], [0061], Figs. 1, 2, 3A, 3B, 5; Ex.1006, 17:30-39, 23:29-43.

155. Thus, Barrett in combination with Rodriguez discloses allowing the fast channel change to start based on the notification message, which renders obvious “*allowing the Media Quick start...based on the received feedback information.*”

(2) using another behavior

156. As discussed at limitation [7.3], Barrett in combination with Rodriguez discloses that, in certain instances, the channel change server 108 receives a notification message indicating that there is insufficient bandwidth available to fulfill the client’s request and that alternative viewing options may be used. *See e.g.*, Ex.1006, 16:17-66, 17:60-65.

157. Further, Rodriguez discloses “**send[ing] a message to the subscriber notifying them that their reservation could not be fulfilled**” and “**provid[ing] the subscriber the option of viewing the movie**” in three different ways. Ex.1006, 17:60-65, 19:44-56. Rodriguez’s three alternative viewing options include (1) fulfilling the request at a different time, (2) utilizing near video-on demand (NVOD) which aggregates subscriber request and transmits a particular video to a large number of subscribers at preset times, and (3) delaying the video so that it can be played to a larger number of subscribers at the same time.

For instance, in the event that the bandwidth allocation manager determines that a particular subscriber reservation request cannot be fulfilled (such as **when there is insufficient available bandwidth**), **[alternative 1]** the bandwidth allocation manager may provide the subscriber the option of viewing the movie at a different time. **[alternative 2]** Alternatively, a subscriber may be asked to accept an NVOD delivery model with reduced random-access functionality. **[alternative 3]** Or a subscriber may be asked to delay or wait a certain period of time until the requested movie viewing can commence to capture a larger number of subscribers that have requested to view the same movie at approximately the same time.

Ex.1006, 19:45-56; *see also* 1:59-63 (“One solution is a technique known as “near ideo-on demand” (NVOD)...[where] programs that are in high demand are broadcast on multiple channels with a short, preset interval between the starting time of each program broadcast.”), 16:5-25 (“The bandwidth allocation manager may also aggregate multiple subscriber requests for the same VOD service that are received at approximately the same time. Instead of allocating bandwidth to fulfill each subscriber request, the bandwidth allocation manager 125 may instead choose to fulfill the subscriber requests...[using] NVOD models.”), 18:40-47 (“For example, if the bandwidth allocation manager 125 receives a large number of requests for particular video...to be transmitted at the same time...NVOD delivery

[is used] so that the most highly requested video content is available without necessitating initiation of a VOD session” for each request.).

158. Rodriguez explains that the “network manager 121,” uses the notification from the bandwidth allocation manager to notify the subscriber “DHCTs” that there is insufficient bandwidth and that alternative viewing options may be used. Ex.1006, 3:33-36, 13:15-27, 14:6-9, 17:60-67. Sending to the subscriber DHCT 14 a message that the request could not be fulfilled and providing alternative viewing options corresponds to “*using another behavior.*” *See infra* [7.5].

159. It would have been obvious to a POSITA, when implementing the proposed combination of Rodriguez and Barrett, to use any one of the alternative viewing options when the received notification message indicates that there is insufficient bandwidth available.

160. Regarding alternative 1, it would have been obvious to a POSITA to implement Barrett such that client 106 is given the option of fulfilling the channel change request at a different time, without permanently denying the request. For example, if the request is for a video-on-demand channel or pay-per-view, it would have been obvious to allow the request with a slight time delay. A POSITA would have found it obvious for the NVOD alternative 2, which transmits a video channel to multiple clients at a preset time interval, to be implemented with multicast

distribution in Barrett, because multicast (which Barrett's system already uses) is specifically designed to deliver a video channel to a plurality of clients at the same time. Also, regarding alternative 3, it would have been obvious to a POSITA to implement Barrett such that client 106 is given the option of delaying or waiting a certain period of time until a larger number of clients can receive the same video channel at the same time using multicast distribution, because multicast is specifically designed for such operation. These two alternatives would be consistent with Barrett's architecture, which uses multicast distribution, and Barrett's disclosure of joining a client to a multicast group. *See e.g.*, Ex.1005, Ex.1005, [0016]-[0017] ("...network 104 may include some network elements that participate in both multicast and unicast communications and other network elements that participate in either multicast or unicast communications (but not necessarily both) ... Video provider 102 is capable of providing video for multiple channels to clients 106 utilizing a multicast scheme over network 104."), [0020] ("In operation, each given client 106 that requests to receive a particular video channel is joined to a multicast group corresponding to that particular video channel.").

161. Although the alternatives would introduce latency or delay in receiving the requested video channel, a POSITA would have recognized that latency or delay is preferable to (1) completely denying a request due to lack of resources or (2)

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overloading the network by allowing a request despite the lack of resources.

Completely denying would not only be undesirable from the client's perspective, but also from the service provider's perspective because fees (e.g., from video-on-demand, or pay-per-view) would be reduced. *See* Ex.1006, 12:54-60, 13:38-40.

Moreover, multicast distribution would have been recognized as efficient and a useful implementation when there is insufficient network bandwidth for unicast, because a large number of subscribers can simultaneously view the same video channel with little additional network load. *See* Ex.1006, 17:39-42 (“[I]f demand is high for a particular time period, the bandwidth allocation manager 125 may explore content delivery options to fulfill the subscriber requests **more efficiently**.”); Ex.1009, 1:48-57 (“Multicasting is a known ... technique for distributing content **more efficiently** between a single content server and multiple recipients... Multicasting can result in **significantly more efficient** use of overall network resources.”); *see also* Reasons to Combine Barrett and Rodriguez.

162. In the proposed combination, when the received notification message indicates that there is insufficient bandwidth available for fast channel change to the requested video (see [7.3]), Barrett's channel change server 108 (operating separately and together with the video provider 102) would use the notification message to send a signal informing client 106 that there are insufficient network resources for fast channel change and provide alternative viewing options (e.g., one

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or more of alternatives 1-3) to start receiving the requested video channel. *See* Ex.1005, [0018]-[0022], [0034]-[0038], [0061], Figs. 1, 2, 3A, 3B, 5.

163. Thus, Barrett in combination with Rodriguez discloses that the channel change server 108 sends a signal informing the client 106 that there are insufficient network resources for fast channel change and providing alternative viewing options to start the requested video channel, based on the received notification message, which renders obvious “*using another behavior to start the requested media distribution based on the received feedback information,*” as recited in the claim.

- f. **[7.5] *wherein said another behavior is to use the feedback information provided by the network resource manager to signal to the client that a Media Quick Start unicast stream for the requested media distribution is not available due to resource shortage in the IP network***

164. Barrett in combination with Rodriguez renders obvious this limitation. As discussed at limitation [7.3] Barrett in combination with Rodriguez discloses the channel change server 108 receiving a notification message provided by the bandwidth allocation manager. Further, as discussed at limitation [7.4], Barrett in combination with Rodriguez discloses that the channel change server 108 uses the notification message provided by the bandwidth allocation manager to notify the client 106 that there are insufficient network resources for fast channel change to

the requested video. As discussed at limitation [7.2], the fast channel change utilizes an initial unicast stream.

165. Consistent with the analysis at limitation [7.4], it would have been obvious to a POSITA to signal to client 106 that unicast for fast channel change is unavailable due to insufficient network resources, because this would inform the subscriber at client 106 that the requested channel is presently not available. Furthermore, coupled with the notification of alternative viewing options information (see [7.4]), it would have been obvious to a POSITA for the client 106 to be implemented with fallback behavior such that, upon notification that there are insufficient network resources, the client 106 automatically (or via subscriber interaction) switches to a multicast stream (e.g., using either alternative 2 or 3), while providing notification to the subscriber. *See also* Reasons to Combine Barrett and Rodriguez.

166. Thus, Barrett in combination with Rodriguez renders obvious “*wherein said another behavior is to use the feedback information provided by the network resource manager to signal to the client that a Media Quick Start unicast stream for the requested media distribution is not available due to resource shortage in the IP network,*” as recited in the claim.

a. [7.6] *but the client is still allowed to subscribe to the multicast distribution.*

167. Barrett in combination with Rodriguez renders obvious this limitation.

168. As discussed at limitation [7.4]-[7.5], Barrett in combination with Rodriguez discloses providing the client 106 alternative viewing options to start the requested video channel when there is insufficient available bandwidth.

169. As explained in the above analysis, alternative 2 (giving the subscriber the option to select to receive the requested video channel as a NVOD channel broadcast to multiple subscribers at the same time) and alternative 3 (giving the subscriber the option to select to delay or wait a period of time to capture a larger number of subscribers that view the requested video channel at the same time) each of which in the combination correspond to “*multicast distribution.*” Ex.1006, 19:44-56. Rodriguez’s teaching is consistent with Barrett’s embodiment where the multicast is joined with a changing delay. Ex.1005, [0022]. Rodriguez’s description is consistent with the ‘286 patent. *See e.g.*, Ex.1001, 2:60-64.

170. Consistent with the analysis at limitation [7.4], it would have been obvious to a POSITA to give Barrett’s client 106 the option to select to receive the multicast distribution of the requested video channel (using either alternative 2 or alternative 3) to “[a]dvantageously...provid[e] extraordinary flexibility in allocating finite bandwidth.” Ex.1006, 19:33-34. Also, utilizing multicast would be beneficial

because it utilizes network bandwidth more efficiently. *See* Ex.1006, 17:39-42 (“[I]f demand is high for a particular time period, the bandwidth allocation manager 125 may explore content delivery options to fulfill the subscriber requests **more efficiently**.”); Ex.1009, 1:48-55 (“Multicasting is a known ... technique for distributing content **more efficiently** between a single content server and multiple recipients... Multicasting can result in **significantly more efficient** use of overall network resources.”); *see also* Reasons to Combine Barrett and Rodriguez.

171. Thus, Barrett in combination with Rodriguez discloses that the client 106 is given the option to select to receive the multicast distribution of the requested video channel, which renders obvious that “*the client is still allowed to subscribe to the multicast distribution,*” as recited in the claim.

5. Claim 8

[8.1] *The method according to claim 7, wherein said another behavior further includes to temporarily deny the requested Media Quick Start.*

172. As discussed at [7.4], Barrett in combination with Rodriguez discloses sending the subscriber a message that the request could not be fulfilled and providing the subscriber a different option to view the video, including alternative (1) of temporarily denying the request and allowing the subscriber to view true VOD movie (which is unicast and corresponds to the subscribers request) at a

different time, which renders obvious that “*said another behavior further includes to temporarily deny the requested Media Quick Start.*” Ex.1006, 19:44-50.

6. Claim 9

[9.1] *The method according to claim 7, wherein said another behavior further includes to deny the requested Media Quick Start.*

173. As discussed at [7.4], Barrett in combination with Rodriguez discloses sending the subscriber a message that the request could not be fulfilled and providing the subscriber alternative viewing options, including alternatives (2) and (3) which only provide multicast distribution, which renders obvious that “*said another behavior further includes to deny the requested Media Quick Start.*” Ex.1006, 19:50-56.

7. Claim 10

[10.1] *A computer program product embodied on a non-transitory computer-readable medium comprising software code portions for performing the steps of claim 7.*

174. Barrett in combination with Rodriguez renders obvious this claim. For example, Barrett discloses executable instructions for a processor embodied in non-volatile media that is accessible by a computer comprising software for performing the above noted steps of claim 7.

Channel change server 108 includes one or more processors 206 and at least one memory 204. **Memory 204 includes processor-executable instructions that may be executed by processor 206 to perform**

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function(s) as described further below. These processor-executable instructions may comprise hardware, firmware, **software**, some combination thereof, and so forth.

Ex.1005, [0030].

FIGS. 1-5 are described and/or shown is not intended to be construed as a limitation, and any number of the blocks can be combined, rearranged, augmented, omitted, etc. in any manner **to implement one or more** systems, methods, devices, procedures, **media**, apparatuses, servers, arrangements, etc. for fast channel changing. Furthermore, although the description herein includes references to specific implementations, the illustrated and/or described implementations can be implemented in any suitable hardware, **software**, firmware, or combination thereof and using any suitable video distribution architecture(s), network element(s) and organization(s), video encoding standard(s), multicast and unicast scheme(s), and so forth.

Ex.1005, [0068].

With particular reference to FIGS. 2 and 3A-3B, a video provider 102 and/or a server 108 may include a variety of processor-accessible media. **Such media may be any available media that is accessible by a computing or other (e.g., electronic) device. Such media may include both volatile and non-volatile media**, removable and non-removable media, and **storage (e.g., memory 204)** and transmission media (e.g., links or nodes of network 104). **The media may include processor-executable instructions.**

Ex.1005, [0069], Figs. 2 and 3A-3B; *see also* Ex.1005, [0039], [0056].

175. A POSITA would have understood that the disclosed processor-executable instructions correspond to software that may be executed by processor 206 to perform function(s) as analyzed in the context of claim 7.

176. It would have been obvious to a POSITA for the memory 204 to be implemented as non-volatile media, so that the executable instructions stored therein as software would be available after power-down. Ex.1014, [0002] (“...memory [that] is non-volatile, retain[s] its stored data even after power is turned off.”). If the memory 204 was transitory the software would need to be reinstalled after power is turned off, which would be cumbersome and generally impractical. Furthermore, it would have been obvious to a POSITA, in the combination with Rodriguez, for the steps of “*requesting...*,” “*receiving...*,” and “*allowing...*” to be implemented as processor-executable instructions comprising software stored in non-volatile media of channel change server 108, consistent with Barrett’s implementation of using software to control operations.

177. Thus, Barrett in combination with Rodriguez discloses that the channel change server 108 includes processor-executable instructions stored in non-volatile computer-readable medium (e.g., memory 204) comprising software code for performing the functions analyzed in the context of claim 7, which renders obvious “*[a] computer program product embodied on a non-transitory computer-readable medium comprising software code portions for performing the steps of claim 7.*”

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8. Claim 11

[11.1] *A computer program product stored on a computer usable medium, comprising readable program for causing a computer, within an application framework in an IP network, to control an execution of the steps of claim 7.*

178. Barrett in combination with Rodriguez renders obvious this claim. For example, Barrett discloses processor-executable instructions stored on media (e.g., memory 204) that is accessible by a computer comprising software for causing the computer, within channel change server 108, to execute and perform the above noted steps of claim 7.

Channel change server 108 includes one or more processors 206 and at least one memory 204. Memory 204 includes processor-executable instructions that may be executed by processor 206 to perform function(s) as described further below. These processor-executable instructions may comprise hardware, firmware, **software**, some combination thereof, and so forth.

Ex.1005, [0030].

FIGS. 1-5 are described and/or shown is not intended to be construed as a limitation, and any number of the blocks can be combined, rearranged, augmented, omitted, etc. in any manner **to implement one or more** systems, methods, devices, procedures, **media**, apparatuses, servers, arrangements, etc. for fast channel changing. Furthermore, although the description herein includes references to specific implementations, the illustrated and/or described implementations can be implemented in any suitable hardware, **software**, firmware, or

combination thereof and using any suitable video distribution architecture(s), network element(s) and organization(s), video encoding standard(s), multicast and unicast scheme(s), and so forth.

Ex.1005, [0068].

With particular reference to FIGS. 2 and 3A-3B, a video provider 102 and/or a **server 108 may include a variety of processor-accessible media. Such media may be any available media that is accessible by a computing or other (e.g., electronic) device. Such media may include both volatile and non-volatile media**, removable and non-removable media, and **storage (e.g., memory 204)** and transmission media (e.g., links or nodes of network 104). **The media may include processor-executable instructions.**

Ex.1005, [0069], Figs. 2 and 3A-3B; *see also* Ex.1005, [0039], [0056].

179. Barrett's computer software corresponds to a computer readable program. This is consistent with the '286 patent's disclosure. *See* Ex.1001, 9:7-10 ("...computer program...comprise[] the software...").

180. It would have been obvious to a POSITA, in the combination with Rodriguez, for the steps of "*requesting...*," "*receiving...*," and "*allowing...*" to be implemented as processor-executable instructions comprising software stored in non-volatile media of channel change server 108, consistent with Barrett's implementation of using software to control operations.

181. Thus, Barrett in combination with Rodriguez discloses processor-executable instructions stored on media (e.g., memory 204) that is accessible by a

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computer, comprising software for causing the computer, within channel change server 108, to execute and perform the above noted steps of claim 7, which renders obvious “[a] computer program product stored on a computer usable medium, comprising readable program for causing a computer, within an application framework in an IP network, to control an execution of the steps of claim 7.”

9. Claim 1

182. Claim 1 is substantially similar to claim 7 except for the recitation of “means for” which are addressed below.

Claim 7	Claim 1
[7.0] A method for an application framework connectable to an IP network, wherein the method comprises the steps of: [7.1] receiving a request for a media distribution requiring a multicast distribution from a client in said IP network, [7.2] requesting network resources from a network resource manager for a Media Quick Start, to start the requested media distribution, [7.3] receiving feedback information relating to network resource availability from the network resource manager, and [7.4] allowing the Media Quick start or using another behavior to start the	[1.0] An application framework connectable to an IP network, the application framework comprises [1.1] <u>means for</u> receiving a request for a media distribution requiring a multicast distribution from a client in said IP network, [1.2] <u>means for</u> requesting network resources from a network resource manager for a Media Quick Start, to start the multicast distribution, [1.3] <u>means for</u> receiving feedback information relating to network resource availability from the network resource manager, and [1.4] <u>means for</u> allowing the Media Quick start or to use another behavior to start the

requested media distribution based on the received feedback information, [7.5] wherein said another behavior is to use the feedback information provided by the network resource manager to signal to the client that a Media Quick Start unicast stream for the requested media distribution is not available due to resource shortage in the IP network [7.6] but the client is still allowed to subscribe to the multicast distribution.	media distribution based on the received feedback information, [1.5] wherein said another behavior is to use the feedback information provided by the resource manager to signal to the client that a Media Quick Start unicast stream for the requested media distribution is not available due to resource shortage in the IP network [1.6] but the client is still allowed to subscribe to the multicast distribution.
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a. Means limitations [1.1] – [1.4]

183. As analyzed in the claim construction section, the corresponding structure of each means-plus-function term is either a router or a server and software or, alternatively, an ASIC.

184. As discussed at claim 7, Barrett in combination with Rodriguez renders obvious limitation [7.1] “*receiving a request for a media distribution...*,” limitation [7.2] “*requesting network resources...*,” limitation [7.4] “*receiving feedback information...*,” and limitation [7.4] “*allowing the Media Quick start or using another behavior...*” Furthermore, as discussed at claim 10, Barrett in combination with Rodriguez discloses that the channel change server 108 (“*application framework*”) includes processor-executable instructions stored in non-volatile

computer-readable medium (e.g., memory 204) comprising software code for performing the functions analyzed in the context of claim 7.

185. Thus, the prior art's disclosure of channel change server 108 and software for performing the claimed functions, renders obvious the “*means for*” recited in limitations [1.1] (“*means for receiving...*”), [1.2] (“*means for requesting...*”), [1.3] (“*means for receiving...*”), and [1.4] (“*means for allowing the Media Quick start or to use another behavior...*”).

10. Claim 2

[2.1] *The application framework according to claim 1, wherein said another behavior further includes to temporarily deny the requested Media Quick Start.*

186. See analysis at limitation [8.1].

11. Claim 3

[3.1] *The application framework according to claim 1, wherein said another behavior further includes to deny the use of Media Quick Start to start the media distribution.*

187. See analysis at limitation [9.1].

B. Ground 2: Claims 4-6 are Obvious over Barrett, Rodriguez, and Norrgard

1. Summary of Norrgard

188. U.S. Patent Publication 2004/0082338A1 to Norrgard *et al.* (Ex.1021, “Norrgard”), was filed as a PCT on December 20, 2001, and published on April 29, 2004.

189. Norrgard generally relates to network communication systems that utilize a network resource manager. Ex.1021, [0001]-[0002]. The network resource manager “can be implemented in software or hardware and it can run as a standalone node” for “monitoring resources within the IP network in order to provide feedback” regarding resource availability. Ex.1021, [0036], [0052], claim 18. Norrgard further discloses that the network resource manager creates a “resource map [that] contains information on how much resources (e.g. bandwidth) that are available and reserved over time on a per link basis.” Ex.1021, [0055]. The network resource manager “uses the resource map to decide whether there are resources available or not” for admission control within an “IP network.” Ex.1021, [0054]-[0055]; *see also* Ex.1021, Abstract (“Network Resource Manager (NRM) comprising a resource map is monitoring and/or controlling resources within the IP network.”).

2. Reasons to Combine Barrett, Rodriguez, and Norrgard

190. A POSITA would have been motivated to combine the teachings of Barrett, Rodriguez, and Norrgard as detailed below.

a. Analogous Art

191. A POSITA when considering the teachings of Barrett (as modified in view of Rodriguez) would have also considered the teachings of Norrgard. As noted above, Barrett and Rodriguez are generally in the network communications field of

endeavor and, in the proposed combination, teach a network resource manager that performs admission control, as the '286 patent. *See* Analysis of Claim 7, limitations [7.2]-[7.3]. Similarly, Norrgard generally addresses network communication systems that utilize a network resource manager for performing admission control. Ex.1021, [0001]-[0002], [0054]-[0055]. Thus, a POSITA considering Barrett (as modified in view of Rodriguez) would have also considered the teachings of Norrgard, which is in the same filed of endeavor.

b. Motivation to combine

192. A POSITA would have combined the teachings of Norrgard with Barrett (as modified in view of Rodriguez) to produce numerous predictable and beneficial results.

193. As noted in the context of Barrett in combination with Rodriguez, it would have been obvious to a POSITA to include a bandwidth allocation manager in Barrett's system to keep track of bandwidth allocation (e.g., with a schedule) and perform admission control (e.g., by fulfilling or denying a subscriber reservation request). *See* Reasons to Combine Barrett and Rodriguez. However, the combination of Barrett and Rodriguez provides limited details pertaining to how the bandwidth allocation manager keeps track of the bandwidth to perform admission control.

194. Norrgard supplements and discloses that the entity that manages the resources in the IP network includes a resource map. In more detail, Norrgard discloses that a “NRM [network resource manager] gains its dynamic topology awareness by retrieving routing information concerning the IP network, i.e. the topology of the IP network.” Ex.1021, [0053]. The network resource manager “combines the routing information [i.e., the topology of the IP network] and resource information it receives...to create resource map...[that] contains information on how much resources (e.g. bandwidth) that are available and reserved over time on a per link basis.” Ex.1021, [0055]. During operation, “[t]he NRM [network resource manager] uses the resource map to decide whether there are resources available or not” for admission control within the “IP network.” Ex.1021, [0054]-[0055]; *see also* Ex.1021, Abstract (“Network Resource Manager (NRM) comprising a resource map is monitoring and/or controlling resources within the IP network.”).

195. It would have been obvious to a POSITA to implement the bandwidth allocation manager in Barrett’s system (per the combination with Rodriguez) to include a resource map because the resource map would be readily used to decide whether there are resources available or not on specific links in the IP network to fulfil a request. This is because the resource map would provide useful information (e.g., how much bandwidth is available and how much bandwidth has been

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scheduled over time, Ex.1006, 23:29-43, Abstract; Ex.1021, [0055]) on a per link basis in the IP network of Barrett, thereby allowing the bandwidth allocation manager to identify links that are underutilized and assigned new reservations to such links.

196. The proposed implementation would also beneficially improve network utilization because the bandwidth allocation manager would be able to allocate resources for new requests to underutilized links. Additionally, the resource map information would enable the bandwidth allocation manager to determine if fulfilling a request would result in over-allocating resources on a specific link and whether it should choose an alternative path if available. Also, the resource map facilitates load balancing and real time accounting in Barrett's system since the allocated and available bandwidth on the various links are maintained over time. Ex.1019, 4:23-33. Another benefit of the resource map is that it may be used by the bandwidth allocation manger to control congestion. Ex.1022, 14:48-65.

197. The above noted benefits, separately and together, would have motivated a POSITA to include a resource map in the bandwidth allocation manager added to Barrett's system (per Rodriguez).

198. Additionally, Norrgard discloses that the network resource manager "can be implemented in software or hardware and it can run as a standalone node" for "monitoring resources within the IP network in order to provide feedback."

Ex.1021, [0036], [0052]; claim 15 (“A computer program product directly loadable into a processing means within a server and/or a router in an IP network...”); claim 18. A POSITA would have recognized that a server with software is a suitable option to facilitate the functions of a bandwidth allocation manager as implemented in Barrett’s system (per Rodriguez). Thus, it would have been obvious to a POSITA, in view of Norrgard, for a bandwidth allocation manger in Barrett’s system (per the combination with Rodriguez) to correspond to a server that includes software for performing its various functions, including providing the notification message to the channel change server 108 (see analysis at limitation [7.3]), because this would be a suitable implementation option.

199. The combination of Barrett, Rodriguez, and Norrgard is merely combining prior art elements (e.g., including a resource map per Norrgard, with the bandwidth allocation manager in Barrett’s system, per the combination with Rodriguez) according to known methods (e.g., Norrgard describes how to create the resource map) to yield predictable results (e.g., enable the bandwidth allocation manager to perform admission control, more efficiently allocate resources based on link utilization over time, perform load balancing, real time accounting, and control congestion).

200. Additionally, the combination is nothing more than applying a known technique (e.g., implementing the bandwidth allocation manager, represented by the

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combination of Barrett and Rodriguez, as a server with software, per Norrgard) to provide a predictable result (e.g., the bandwidth allocation manager performing its functions).

c. Reasonable expectation of success

201. I also note that the results would have been predictable and there would have been a reasonable expectation of success in the combination given that the system of Barrett already would include a bandwidth allocation manager (per Rodriguez) and that Norrgard's network resource manager is similar. A POSITA would have expected to be able to successfully implement a resource map in view of Norrgard's detailed teachings (Ex.1021, [0053]-[0055]) and a POSITA would have known how to implement the bandwidth allocation manager as a server that includes software, as Norrgard teaches. This is evidenced by others that had implemented similar network resource managers. *See e.g.*, Ex.1015, 17; Ex.1022, 7:39-43.

202. Indeed, the '286 patent itself relies on the knowledge of a POSITA to implement its network resource manager as a server with software. *See* Ex.1001, 9:6-14 (simply disclosing that the "methods are [] implemented... with a router or server in the IP network, comprising the software code.").

203. Lastly, I note that the proposed combination relies on the teachings of the references, and not on a physical incorporation of Norrgard's resource map,

server, or software into the bandwidth allocation manager included in Barrett's system (per Rodriguez); such implementation, however, is permitted in the proposed combination as well.

3. Claim 4

204. Claim 4 is substantially similar to claim 7 except for the recitation of “*means for*,” and minor differences that are addressed below.

Claim 7	Claim 4
[7.0] A method for an application framework connectable to an IP network, wherein the method comprises the steps of: [7.1] receiving a request for a media distribution requiring a multicast distribution from a client in said IP network, [7.2] requesting network resources from a network resource manager for a Media Quick Start, to start the requested media distribution, [7.3] receiving feedback information relating to network resource availability from the network resource manager, and	[4.0] A <u>system comprises a network resource manager comprising a resource utilization map adapted to manage network resources in</u> an IP network, an application framework comprising [4.1] <u>means for</u> receiving a request for a media distribution requiring a multicast distribution from a client in said IP network, and [4.2] <u>means for</u> requesting network resources from a network resource manager for a Media Quick Start, to start the requested media distribution, [4.3] <u>the network resource manager comprises means for providing the application framework with</u> feedback information relating to network resource availability from the network resource manager, and the application framework comprises <u>means for</u> receiving said feedback information and

[7.4] allowing the Media Quick start or using another behavior to start the requested media distribution based on the received feedback information, [7.5] wherein said another behavior is to use the feedback information provided by the network resource manager to signal to the client that a Media Quick Start unicast stream for the requested media distribution is not available due to resource shortage in the IP network [7.6] but the client is still allowed to subscribe to the multicast distribution.	[4.4] <u>means for</u> allowing the Media Quick start or to use another behavior to start the requested media distribution based on the received feedback information, [4.5] wherein said another behavior is to use the feedback information provided by the network resource manager to signal to a client that a Media Quick Start unicast stream for the requested media is not available due to resource shortage in the IP network [4.6] but the client is still allowed to subscribe to a multicast <u>version of the media.</u>
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a. Preamble [4.0]

205. To the extent the preamble is limiting, Barrett in combination with Rodriguez and Norrgard renders obvious “[a] *system comprises a network resource manager comprising a resource utilization map adapted to manage network resources in an IP network, an application framework comprising.*”

206. First, as discussed at limitation [7.0], Barrett discloses that its “**system**” includes a video distribution architecture 100, which corresponds to the recited “*system.*” As discussed at [7.0], Barrett’s system (as modified in view of Rodriguez) includes an IP network (IP network 104 separately and together with clients 106) and a connected application framework (channel change server 108,

separately or jointly with video provider 102), which corresponds to “*an IP network*” and “*an application framework*,” respectively. Further, as discussed at limitation [7.2], Barrett in combination with Rodriguez discloses a system that includes a bandwidth allocation manager, which renders obvious “[*a*] system comprises a network resource manager... adapted to manage network resources” in the IP network.

207. Second, as discussed at limitation [7.2], Barrett in combination with Rodriguez discloses that the bandwidth allocation manager keeps track of bandwidth allocation (e.g., with a schedule) and performs admission control (e.g., by fulfilling or denying a subscriber reservation request). The combination of Barrett and Rodriguez provides limited details pertaining to how the bandwidth allocation manager keeps track of the bandwidth to perform admission control.

208. Norrgard supplements and discloses that the network resource manager comprises “*a resource utilization map*” for managing resources in the IP network. In more detail, Norrgard discloses that a “NRM [network resource manager] gains its dynamic topology awareness by retrieving routing information concerning the IP network, i.e. the topology of the IP network.” Ex.1021, [0053]. The network resource manager “combines the routing information [i.e., the topology of the IP network] and resource information it receives...to create **resource map [that] contains information on how much resources (e.g. bandwidth) that are**

available and reserved over time on a per link basis.” Ex.1021, [0055]. During operation, “[t]he **NRM [network resource manager] uses the resource map to decide whether there are resources available or not**” for admission control within the **“IP network.”** Ex.1021, [0054]-[0055]; *see also* Ex.1021, Abstract (**“Network Resource Manager (NRM) comprising a resource map is monitoring and/or controlling resources within the IP network.”**).

209. It would have been obvious to a POSITA to implement the bandwidth allocation manager in Barrett’s system (per the combination with Rodriguez) to include a resource map (e.g., a map of available resources (e.g. bandwidth) and reserved over time per link in the IP network) and to use the resource map to decide whether there are resources available or not in the IP network. The resource map would allow for managing network resources by providing visibility (e.g., how much bandwidth is available and how much bandwidth has been scheduled over time, see Ex.1006, 23:29-43, Abstract; Ex.1021, [0055]) on a per link basis in the IP network of Barrett, thereby allowing the bandwidth allocation manager to identify links that are underutilized. Such an implementation would beneficially improve network utilization because the bandwidth allocation manager would be able to allocate resources for new requests to underutilized links. *See also* Reasons to Combine Barrett, Rodriguez, and Norrgard.

210. Thus, Barrett in combination with Rodriguez and Norrgard renders obvious “[a] system comprises a network resource manager comprising a resource utilization map adapted to manage network resources in an IP network, an application framework,” as recited in the preamble.

b. Limitation [4.3]

211. As discussed at limitation [7.3], Barrett in combination with Rodriguez discloses that in response to the request for network resources (see limitation [7.2]), the bandwidth allocation manager transmits a notification message regarding the availability of network resources (e.g., bandwidth) and the channel change server 108 receives the notification message from the bandwidth allocation manager. Thus, the combination of Barrett and Rodriguez renders obvious that “*the network resource manager ... provid[es] the application framework with feedback information relating to network resource availability from the network resource manager and the application framework ... receiv[es] said feedback information.*”

c. Means limitations [4.1] – [4.4]

212. As analyzed in the claim construction section, the corresponding structure of each means-plus-function term is either a router or a server and software or, alternatively, an ASIC.

213. Consistent with the analysis at claim 1, Barrett in combination with Rodriguez renders obvious the “*means for*” recited in limitations [4.1] (“*means for receiving...*”), [4.2] (“*means for requesting...*”), [4.3] (“*means for receiving...*”), and [4.4] (“*means for allowing the Media Quick start or to use another behavior...*”).

214. Additionally, as discussed at limitation [4.3], Barrett in combination with Rodriguez renders obvious “*the network resource manager ... providing the application framework with feedback information.*” Norrgard supplements the proposed combination by disclosing how to implement a network resource manager to perform this function. In particular, Norrgard discloses that the network resource manager “**can be implemented in software or hardware and it can run as a standalone node**” for “**monitoring resources within the IP network in order to provide feedback.**” Ex.1021, [0036], [0052], claim 15 (“A computer program product directly loadable into a processing means within a server and/or a router in an IP network...”); claim 18 (“A Network Resource Manager (NRM) comprising a resource map.”). It would have been obvious to a POSITA, in view of Norrgard, for the bandwidth allocation manger in Barrett’s system (per the combination with Rodriguez) to correspond to a node or a server and include software for providing the notification message to the channel change server 108, because this would be a

suitable option of implementing the bandwidth allocation manger in Barrett's system. *See also* Reasons to Combine Barrett, Rodriguez, and Norrgard.

215. Thus, the prior art's disclosure of the bandwidth allocation manager includes software for performing the claimed function, which renders obvious the "*means for providing*" recited in limitation [4.3].

d. Limitation [4.6]

216. As discussed at limitation [7.6], Barrett in combination with Rodriguez discloses that the client 106 is given the option to select to receive a multicast distribution of the requested video channel, which renders obvious that the client is still allowed to subscribe to a multicast "*version of the media.*"

4. Claim 5

[5.1] *The system according to claim 4, wherein said another behavior further includes to temporarily deny the Media Quick Start.*

217. See analysis at limitation [8.1].

5. Claim 6

[6.1] *The system according to claim 4, wherein said another behavior further includes to deny the Media Quick Start.*

218. See analysis at limitation [9.1].

C. Ground 3: Claims 12 is Obvious over Barrett, Rodriguez, and Chen

1. Summary of Chen

219. U.S. 6,487,170 to Chen *et al.* (Ex.1024, “Chen”), was filed on November 18, 1998, and issued on November 26, 2002.

220. Chen generally relates to computer networking. Ex.1024, 1:16-20. In this context, Chen discloses a method and apparatus that supports unicast and multicast flows, interactive multimedia, real time video, among other communications. Ex.1024, 1:22-30, 4:26-33, 9:45-12:5, Abstract. Chen’s apparatus includes admission control and policy management functional units (Ex.1024, 7:6-46), which may be implemented in with software or an ASIC.

Importantly, the present invention is not limited to a particular implementation of these functional units. The functional units may be implemented with one or more logic circuits, **Application Specific Integrated Circuits (ASICs)**, other programmable or hardcoded logic, such as FPGAS or TTL logic, a processor or other components of a programmed computer that perform a series of operations dictated by software or firmware, or a combination thereof.

Ex.1024, 7:46-55.

2. Reasons to Combine Barrett, Rodriguez, and Chen

221. A POSITA would have been motivated to combine the teachings of Barrett, Rodriguez, and Chen as detailed below.

a. Analogous Art

222. A POSITA when considering the teachings of Barrett (as modified in view of Rodriguez) would have also considered the teachings of Chen. As noted above, Barrett and Rodriguez are generally in the network communications field of endeavor and, in the proposed combination, teach a network resource manager that performs admission control, as the '286 patent. *See* Analysis of Claim 7, limitations [7.2]-[7.3]. Similarly, Chen generally addresses network communication systems that utilize a network resource manager (i.e., bandwidth broker) for performing admission control. Ex.1024, 7:6-55. Thus, a POSITA considering Barrett (as modified in view of Rodriguez) would have also considered the teachings of Chen, which is in the same field of endeavor.

b. Motivation to combine

223. A POSITA would have combined the teachings of Chen with Barrett (as modified in view of Rodriguez) to produce numerous predictable and beneficial results.

224. Barrett discloses that the channel change server 108 includes processor-executable instructions stored in non-volatile computer-readable medium

(e.g., memory 204) comprising software code for performing its functions. Ex.1005, [0030], [0039], [0056], [0068]-[0069]; *see also* analysis at claim 10.

225. It was well-known in the art that a suitable design alternative, to software implementations, is to use an ASIC designed to perform the desired functionality. *See e.g.*, Ex.1022, 7:39-50 (“The information bases, managers...may be implemented in hardware, software stored in a computer-readable medium and/or a combination of hardware and software...[or] an **application specific integrated circuit (ASIC) designed to perform functionality.**”); Ex.1023, 6:49-65 (“...the resource manager 26 includes a server 40, a supply manager 42, a demand manager 44, a pricing manager 46, a policy manager 48, and a work flow manager 50...Each of the server and managers 40, 42, 44, 46, 48 and 50 may be implemented in hardware, software stored in a computer-readable medium, a combination of hardware and software or ... an **application specific integrated circuit (ASIC) designed to perform some or all of the functionality.**”); Ex.1025, [0079] (“...data management service 24 and a network resource manager 26...”); [0144] (“**[I]t will be apparent to a skilled artisan that all logic described herein can be embodied using...integrated circuitry such as an Application Specific Integrated Circuit (ASIC),** programmable logic used in conjunction with a programmable logic device such as a Field Programmable Gate Array (FPGA) or microprocessor, or any other device including any combination thereof.”).

Ex.1003

226. It would have been obvious to a POSITA to implement Barrett's channel change server 108 with an ASIC, per Chen, (instead of software) because such an implementation would generally improve performance over Barrett's processor and software implementation. Ex.1029, 1 ("**ASICs are very effective at improving performance**, typically yielding several orders of magnitude speedup along with reduced energy consumption."). Improved performance would be understood as important to Barrett's system, which seeks to provide fast channel change. Ex.1005, [0009], Abstract. Accordingly, a POSITA looking to improve performance of Barrett's system would have implemented channel change server 108 with an ASIC that is designed to perform its functions.

227. The combination of Barrett, Rodriguez, and Chen is merely a simple substitution of one known element for another (e.g., using an ASIC instead of a processor and software implementation) to obtain predictable results (e.g., allow the channel change server 108 to perform its functions).

c. Reasonable expectation of success

228. The results would have been predictable and there would have been a reasonable expectation of success in implementing Barrett's channel change server 108 with an ASIC given that utilizing ASIC was a common method. See e.g., Ex.1029, 1 ("In embedded computing, **a common method** for providing performance improvement is to create customized hardware solutions for particular

applications. For example, embedded systems often have one or more **application specific integrated circuits (ASICs).**”). The reasonable expectation of success is also demonstrated by others that had implemented similar systems with ASICs. *See e.g.,* Ex.1022, 7:39-50, Ex.1023, 6:49-65, Ex.1025, [0079], [0144].

229. Indeed, the ’286 patent itself relies on the knowledge of a POSITA to implement its claimed ASIC. *See* Ex.1001, 9:15-18 (simply stating, without further elaboration, that the “the methods may also be implemented by Application-Specific Integrated Circuits (ASICs) which are chips designed for the particular methods according to the invention.”).

230. Lastly, I note that the proposed combination relies on the teachings of the references, and not on a physical incorporation of Chen’s ASIC into Barrett.

3. Claim 12

231. Claim 12 is substantially similar to claim 7 except for the recitation of an “*Application-Specific Integrated Circuit*” and “*means for,*” which are addressed below.

Claim 7	Claim 12
[7.0] A method for an application framework connectable to an IP network, wherein the method comprises the steps of:	[12.0] <u>An Application-Specific Integrated Circuit for starting a multicast media distribution in an IP network, wherein the Integrated Circuit comprises</u>

[7.1] receiving a request for a media distribution requiring a multicast distribution from a client in said IP network, [7.2] requesting network resources from a network resource manager for a Media Quick Start, to start the requested media distribution, [7.3] receiving feedback information relating to network resource availability from the network resource manager, and [7.4] allowing the Media Quick start or using another behavior to start the requested media distribution based on the received feedback information, [7.5] wherein said another behavior is to use the feedback information provided by the network resource manager to signal to the client that a Media Quick Start unicast stream for the requested media distribution is not available due to resource shortage in the IP network [7.6] but the client is still allowed to subscribe to the multicast distribution.	[12.1] <u>means for</u> receiving a request for a media distribution requiring a multicast distribution from a client in said IP network, [12.2] <u>means for</u> requesting network resources from a network resource manager for a Media Quick Start, to start the requested media distribution, [12.3] <u>means for</u> receiving feedback information relating to network resource availability from the network resource manager, and [12.4] <u>means for</u> allowing the Media Quick start or to use another behavior to start the requested media distribution based on the received feedback information, [12.5] wherein said another behavior is to use the feedback information provided by the resource manager to signal to the client that a Media Quick Start unicast stream for the requested media distribution is not available due to resource shortage in the IP network [12.6] but the client is still allowed to subscribe to the multicast distribution.
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232. As analyzed in the claim construction section, the corresponding structure of each means-plus-function term is an ASIC.

a. Preamble [12.0]

233. Barrett in combination with Rodriguez and Chen renders obvious “[a]n *Application-Specific Integrated Circuit for starting a multicast media distribution in an IP network, wherein the Integrated Circuit comprises.*”

234. First, Barrett discloses that the channel change server 108 includes processor-executable instructions stored in non-volatile computer-readable medium (e.g., memory 204) comprising software code for performing its functions. Ex.1005, [0030], [0039], [0056], [0068]-[0069]; *see also* analysis at claim 10.

235. It would have been readily apparent to POSITA that Barrett’s system (as modified in view of Rodriguez) may be implemented with a processor and software as well as specific hardware such as ASICs. *See e.g.*, Ex.1022, 7:39-50, Ex.1023, 6:49-65, Ex.1025, [0079], [0144]. A POSITA would have understood that there are various design tradeoffs for each implementation and would have utilized either based on design criteria. *See e.g.*, Ex.1029, 1 (describing general benefits and potential tradeoffs to ASIC implementations).

236. Second, Chen discloses a method and apparatus that supports unicast and multicast flows, interactive multimedia, real time video, among other communications in an IP network. Ex.1024, 1:16-30, 4:26-33, 9:45-12:5, Abstract. Chen’s apparatus includes admission control and policy management functional units (Ex.1024, 7:6-46), which may be implemented with software or an ASIC.

Ex.1003

Importantly, the present invention is not limited to a particular implementation of these functional units. The functional units may be implemented with one or more logic circuits, **Application Specific Integrated Circuits (ASICs)**, other programmable or hardcoded logic, such as FPGAS or TTL logic, a processor or other components of a programmed computer that perform a series of operations dictated by software or firmware, or a combination thereof.

Ex.1024, 7:47-55.

237. It would have been obvious to a POSITA to implement Barrett's channel change server 108 with an ASIC, per Chen, because this modification merely represents a simple substitution of one known element for another (e.g., using an ASIC instead of a processor and software implementation) to obtain predictable results (e.g., allow the channel change server 108 to perform its functions, see analysis at limitations [1.1]-[1.4]). *See also* Reasons to Combine Barrett, Rodriguez, and Chen. Thus, Barrett in combination with Rodriguez and Chen renders obvious “[a]n *Application-Specific Integrated Circuit for starting a multicast media distribution in an IP network, wherein the Integrated Circuit comprises.*”

b. Means limitations [12.1] – [12.4]

238. As analyzed in the claim construction section, a POSITA would have understood that ASIC circuitry performs the claimed functions recited in the “*means*” limitations [12.1] – [12.4].

239. Consistent with the analysis at preamble [12.0], the prior art’s disclosure of implementing the channel change server 108 with an ASIC for performing the claimed functions, renders obvious the “*means for*” limitations in claim 12.

IX. DECLARATION

240. I declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true, and that these statements were made with knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under section 1001 of Title 18 of the United States Code.

A. C. Narasimha Reddy

Dated: 25th October 2023

Narasimha Reddy, Ph.D.