

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

ARISTA NETWORKS, INC.
Petitioner

v.

CORRIGENT CORPORATION,
Patent Owner

IPR2023-00515
U.S. Patent No. 7,330,431

**DECLARATION OF TAL LAVIAN, PH.D.,
UNDER C.F.R. § 1.68 IN SUPPORT OF PETITION
FOR *INTER PARTES* REVIEW**

Declaration of Tal Lavian, Ph.D.
Inter Partes Review of U.S. 7,330,431

Contents

I.	INTRODUCTION	5
A.	Qualifications	5
B.	Documents and Information Considered	11
C.	Summary of Opinions	11
II.	LEGAL STANDARDS TO BE APPLIED	12
III.	STATE OF THE ART	20
A.	Concepts of the '431 Patent were the Industry's Mainstream. They were Well-published, Disclosed, Discussed, and Standardized in Different Standard Bodies.	21
B.	Networking standards, Interoperability, and Mainstream Technologies	22
IV.	OVERVIEW OF THE '431 PATENT	26
V.	A PERSON OF ORDINARY SKILL IN THE ART	27
VI.	CLAIM CONSTRUCTION	29
VII.	SUMMARY OF THE PRIOR ART	30
A.	Baker Overview	30
B.	Wright Overview	31
C.	Holender '699 Overview	32
D.	Zheng Overview.....	33
E.	Holender '894 Overview	33
VIII.	GROUND 1: THE COMBINATION OF BAKER, WRIGHT AND HOLENDER '699 RENDERS OBVIOUS CLAIMS 1-5, 7-11, AND 25-26	34
A.	Motivation to Combine Baker with Wright and Holender '699.....	34
B.	Detailed Analysis of the Claims	43
X.	GROUND 2: THE COMBINATION OF BAKER, WRIGHT, HOLENDER '699, AND HOLENDER '894 RENDERS OBVIOUS CLAIMS 12-16, 18- 24, AND 27-30	58
A.	Motivation to Combine Baker with Wright, Holender '699 and Holender '894 58	
B.	Detailed Analysis of the Claims	59
XI.	GROUND 3: THE COMBINATION OF BAKER, WRIGHT, HOLENDER '699 AND ZHENG RENDERS OBVIOUS CLAIM 6.....	79

Declaration of Tal Lavian, Ph.D.
Inter Partes Review of U.S. 7,330,431

A. Motivation to Combine Baker with Wright, Holender '699 and Zheng 79

B. Detailed Analysis of Claim 6.....82

XII. GROUND 4: THE COMBINATION OF BAKER, WRIGHT, HOLENDER '699, HOLENDER '894 AND ZHENG RENDERS OBVIOUS CLAIM 17 83

A. Motivation to Combine Baker with Wright, Holender '699, Holender '894 and Zheng 83

B. Detailed Analysis of Claim 17.....86

XIII. CONCLUSION.....88

Declaration of Tal Lavian, Ph.D.
Inter Partes Review of U.S. 7,330,431

EXHIBIT LIST

Exhibit	Description
1001	U.S. Patent No. 7,330,431 (“’431 Patent”)
1002	Prosecution History for U.S. Patent No. 7,330,431 (“’431History”)
1003	Declaration of Henry Houh, Ph.D. under 37 C.F.R. § 1.68
1004	<i>Curriculum Vitae</i> of Henry Houh, Ph.D.
1005	U.S. Pub. 2004/0095946 by Baker
1006	U.S. Pub. 2004/0174884 by Wright
1007	U.S. 6,104,699 to Holender
1008	U.S. 6,757,247 to Zheng
1009	U.S. Pub. 2003/0147400 by Devi
1010	U.S. 6,430,150 to Azuma
1011	U.S. Pub. 2007/0038753 by Jorgensen
1012	U.S. 7,675,926 to Olsen
1013	U.S. 7,953,888 to Ricciulli
1014	U.S. 7,450,598 to Chen
1015	Houh, Henry H., “Designing Networks for Tomorrow’s Traffic,” Thesis for the degree of Doctor of Philosophy at the Massachusetts Institute of Technology, February 1998
1016	
1017	
1018	
1019	
1020	U.S. 6,069,894 to Holender ’894
1021	Declaration of Dr. Tal Lavian, Ph.D., under 37 C.F.R. § 1.68
1022	<i>Curriculum Vitae</i> of Tal Lavian, Ph.D.
1023	
1025	IETF RFC-2638 (1999)
1025	IETF RFC-2386 (1998)
1026	IETF RFC-3272 (2002)

Declaration of Tal Lavian, Ph.D.
Inter Partes Review of U.S. 7,330,431

Exhibit	Description
1027	IETF RFC-3644 (2003)
1028	IEEE 802.17 Resilient Packet Ring Tutorial, November 7, 2003
1029	Raj Sharma, "Introduction to Resilient Packet Rings," March 2001
1030	Enhanced ATM Port Adapter (ATM PA-A3) OC-12c, STM4, OC3c, STM1, DS3, E3, IMA, 2001
1031	Tim Sziget, "QoS Best Practices," October 5, 2004.
1032	Stein Gjessing and Fredrik Davik, "Performance Evaluation of Back-Pressure Fairness in RPR"
1033	Lim Wong, "Metro Ethernet Standards," May 2003
1034	Maly et. al, "Dynamic Bandwidth Allocation in a Network," 1988

Declaration of Tal Lavian, Ph.D.
Inter Partes Review of U.S. 7,330,431

I, Tal Lavian, Ph.D., do hereby declare as follows:

I. INTRODUCTION

1. My name is Dr. Tal Lavian. I understand that I am submitting a declaration in connection with *inter partes* review (“IPR”) proceedings before the United States Patent and Trademark Office for U.S. Patent No. 7,330,431 (“the ’431 Patent”) to Rao et. al.

2. I have been retained on behalf of Arista Networks, Inc. (“Arista” or “Petitioner”) to offer technical opinions with respect to the ’431 Patent and the prior art relied on to show obviousness. I have been asked to provide my opinions as to whether the inventions claimed in claims 1-30 (“the Challenged Claims”) of the ’431 Patent would have been obvious to a person with ordinary skill in the art (“POSITA”) at the time of the alleged invention, considering the prior art.

3. 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.

A. Qualifications

4. Based on my qualifications, education, knowledge, expertise, and experience, I believe I am qualified to offer opinions relating to the technology described in the ’431 Patent.

Declaration of Tal Lavian, Ph.D.
Inter Partes Review of U.S. 7,330,431

5. I am the Principal Scientist for TelecommNet Engineering, Inc. I have been with the company since 2008. In my role at TelecommNet, I provide consulting and expert services in network communications, telecommunications, internet protocols, and smartphone mobile wireless devices. At TelecommNet, I also provide system architecture and technology analysis for computer networks, mobile wireless devices, and web-technology projects.

6. Further, I am the CEO and CTO of Aybell (previously VisuMenu, Inc.). I founded VisuMenu, Inc. in 2010. At VisuMenu, Inc., I led the software design and development of a visual interactive voice response system for smartphones and mobile devices based on innovative wireless and network communications technologies.

7. In 2016, VisuMenu, Inc. was rebranded as Aybell. At Aybell, I have facilitated the design, architectural development, and implementation of a cloud data center for connecting any smartphone user to any company and service by digitizing interactive voice systems and exposing them through cloud-service application programming interfaces to other applications.

8. In 2008, I was a Network Communications Consultant for Ixia, a computer and wireless networking company. At Ixia, I researched and developed advanced network communications technologies.

Declaration of Tal Lavian, Ph.D.
Inter Partes Review of U.S. 7,330,431

9. From 1996 to 2007, I held several roles for Nortel Networks, a telecommunications and networking equipment company. I was a Principal Scientist, Principal Architect, Principal Engineer, and Senior Software Engineer. And I was the Principal Investigator for the U.S. Department of Defense Projects. In this role, I conceived, proposed, and completed three research projects—active networks, DWDM-RAM, and a networking computation project for the Air Force Research Lab.

10. At Nortel Networks, I was also an Academic and Industrial Researcher. In this role, I designed software for switches, routers, and network communications devices and developed systems and architectures for switches, routers, and network management.

11. From 1987 to 1995, I worked for three voice and data communication and software/hardware companies—Aptel Communications, Scitex Ltd., and Shalev. In these roles, I developed a mobile wireless device, designed and managed a personal communication network and personal communication system, invented and implemented a two-way paging product, developed system and network communications in C/C++, and developed real-time software and algorithms in C/C++ and Pascal.

Declaration of Tal Lavian, Ph.D.
Inter Partes Review of U.S. 7,330,431

12. Further, I have served as an industry fellow and lecturer at the UC Berkeley College of Engineering, Sutardja Center for Entrepreneurship. I have co-authored over 25 scientific publications, journal articles, and peer-reviewed papers.

13. I am a member of several professional organizations, including the Association of Computing Machinery (“ACM”) and the Institute of Electrical and Electronics Engineers (“IEEE”) (senior member). I am also certified under the IEEE Wireless Communications Engineering Technologies (“WCET”) 2012 Program, specifically designed by the IEEE Communications Society (“ComSoc”) to address the worldwide wireless industry’s growing and ever-evolving need for qualified communications professionals.

14. I received a B.S. degree in Mathematics and Computer Science from Tel Aviv University in 1987, an M.S. degree in Electrical Engineering from Tel Aviv University in 1996, and a Ph.D. in Computer Science specializing in network communications from UC Berkeley in 2006.

15. I have testified in Federal courts, the PTAB, and the ITC on behalf of leading companies such as Amazon, LinkedIn, AT&T, Sprint, Cisco Systems, Juniper Networks, ZTE, Huawei, Motorola, HP, LG, Microsoft, Facebook, and Apple. I testified in over 80 depositions on network communications and telecommunications, including telecommunications, network communications,

Declaration of Tal Lavian, Ph.D.
Inter Partes Review of U.S. 7,330,431

network architecture, communications design, Internet protocols, and technologies.

Furthermore, I have served as an expert witness in over 120 patent-related cases.

16. I am an inventor of over 120 patents, 60 of which I prosecuted pro se in front of the USPTO. A number of these issued patents are relevant or contemporaneous to the '431 Patent.

17. I have published many peer-reviewed articles and publications on network technology, a relevant sampling of which includes: "Implementation of a Quality of Service Feedback Control Loop on Programmable Routers" at the 12th IEEE International Conference on Networks 2004, "Practical Active Network Services within Content-Aware Gateways" at the proceeding of the DARPA Active Networks Conference and Exposition, 2002, and "Active Networking on a Programmable Network Platform" at the Fourth IEEE Conference on Open Architectures and Network Programming.

18. I have spent over a decade as an academic and industrial researcher. I have worked researching and developing many projects during that time, partly through heading research collaboration with leading universities and professors at UC Berkeley, Northwestern University, University of Amsterdam, and the University of Technology, Sydney. Some of these projects include Data-Center Communications: network and server orchestration, Network resource orchestration

Declaration of Tal Lavian, Ph.D.
Inter Partes Review of U.S. 7,330,431

for Web services workflows, and Packet capturing and forwarding service on IP and Ethernet.

19. I am a member of several professional organizations, including the IEEE Communications Society (COMMSOC), the ACM Special Interest Group on Data Communication (SIGCOM), the IEEE Consultants' Network (CNSV), and the Global Member of the Internet Society (ISOC).

20. I have many accomplishments in the field of network technology, such as leading the development of the first network resource scheduling service for grid computing, managing and engineering the first demonstrated dynamic transatlantic allocation of 10Gbs Lambdas as a grid service, and successful demonstration of the first wire-speed active network on commercial hardware.

21. Based on my above-described over three decades of experience in network communications techniques, network architectures, network topologies, quality of service, network resource allocation, and the acceptance of my publications and professional recognition by societies in my field, I believe that I am qualified to be an expert in the field of network technology.

22. Based on my knowledge, education, training, experience, and expertise described above, and as indicated in my curriculum vitae, I am qualified to provide the following opinions with respect to the patents in this case. Additionally, I am at least a person having ordinary skill in the art as of the priority date of the '431 Patent.

Declaration of Tal Lavian, Ph.D.
Inter Partes Review of U.S. 7,330,431

23. My *curriculum vitae* contains further details on my education, experience, publications, and other qualifications to render an expert opinion.

B. Documents and Information Considered

24. I have reviewed the '431 Patent, including the claims of the patent in view of the specification. In addition, I have reviewed the '431 Patent's prosecution history, the prior art discussed herein, and the remaining exhibits listed herein. I understand that defendants in a district court case filed by Corrigent Corporation, Cisco Systems Inc., Dell Technologies Inc., and Dell Inc. ("Cisco"), have also filed an IPR challenging the validity of the '431 Patent. I have reviewed the petition filed by Cisco. I have also reviewed the declaration by Cisco's expert, Dr. Houh, attached as Ex.1003. I have never met with or discussed the validity of the '431 Patent with Dr. Houh. I have incorporated the totality of Dr. Houh's declaration by reference in my declaration in support of the invalidity grounds raised in my declaration.

C. Summary of Opinions

25. In my opinion, claims 1-30 of the '431 Patent are rendered obvious by the prior art. In the remainder of this declaration, I demonstrate that:

- The combination of Baker in view of Wright, and Holender '699 renders obvious claims 1-5, 7-11, and 25-26;
- The combination of Baker in view of Wright, Holender '699, and Holender '894 renders obvious claims 12-16, 18-24, and 27-30;
- The combination of Baker in view of Wright, Holender '699, and Zheng

Declaration of Tal Lavian, Ph.D.
Inter Partes Review of U.S. 7,330,431

renders obvious claim 6; and

- The combination of Baker in view of Wright, Holender '699, Holender '894, and Zheng renders obvious claim 17.

26. In summary:

Claims	Baker in view of:
1-5, 7-11, and 25-26	Wright, and Holender '699
12-16, 18-24, and 27-30	Wright, Holender '699, and Holender '894
6	Wright, Holender '699, and Zheng
17	Wright, Holender '699, Holender '894, and Zheng

II. LEGAL STANDARDS TO BE APPLIED

27. I am a technical expert and do not offer any legal opinions. However, counsel informed me about certain legal principles regarding patentability and related matters under United States patent law, which I have applied in performing my analysis and arriving at my technical opinions in this matter.

28. I understand that there are two ways in which prior art may render a patent claim unpatentable. First, the prior art can “anticipate” the claim. Second, the prior art can render the claim “obvious” to a person of ordinary skill in the art (“POSITA”). I understand that for an invention claimed in a patent to be patentable,

Declaration of Tal Lavian, Ph.D.
Inter Partes Review of U.S. 7,330,431

it must not be anticipated and must not be obvious based on what was known before the invention was made.

29. I understand that a patent claim may be invalid as anticipated under 35 U.S.C. § 102 if a prior art reference discloses each element of the claimed subject matter.

30. I understand that a person cannot obtain a patent on an invention if the differences between the 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. A conclusion of obviousness may be founded upon more than a single item of prior art. In determining whether prior art references render a claim obvious, counsel has informed me that courts consider the following factors: (1) the scope and content of the prior art, (2) the differences between the prior art and the claims at issue, (3) the level of skill in the pertinent art, and (4) secondary considerations of non-obviousness. Additionally, I understand the obviousness inquiry should not be done in hindsight. Instead, the obviousness inquiry should be done through the eyes of a POSITA at the time of the alleged invention.

31. In considering whether certain prior art renders a particular patent claim obvious, I understand that courts allow a technical expert to consider the scope and content of the prior art, including the fact that one of skill in the art would regularly look to the disclosures in patents, trade publications, journal articles, industry

Declaration of Tal Lavian, Ph.D.
Inter Partes Review of U.S. 7,330,431

standards, product literature and documentation, texts describing competitive technologies, requests for comment published by standard setting organizations, and materials from industry conferences. I understand that for a prior art reference to be proper for use in an obviousness analysis, the reference must be “analogous art” to the claimed invention. I understand that a reference is analogous art to the claimed invention if: (1) the reference is from the same field of endeavor as the claimed invention (even if it addresses a different problem); or (2) the reference is reasonably pertinent to the problem faced by the inventor (even if it is not in the same field of endeavor as the claimed invention). In determining whether a reference is reasonably pertinent, one should consider the problem faced by the inventor, as reflected either explicitly or implicitly, in the specification. I believe that all of the references I considered in forming my opinions in this IPR are well within the range of references a POSITA would have consulted to address the type of problems addressed by the claimed inventions of the challenged patent.

32. In determining whether the subject matter of a patent claim is obvious, I understand neither the particular motivation nor the avowed purpose of the patentee controls. Instead, the important consideration is the objective reach of the claim. In other words, if the claim extends to what is obvious, then the claim is invalid. I further understand the obviousness analysis often necessitates consideration of the interrelated teachings of multiple patents, the effects of demands known to the

Declaration of Tal Lavian, Ph.D.
Inter Partes Review of U.S. 7,330,431

technological community or present in the marketplace, and the background knowledge possessed by a POSITA. All of these issues may be considered to determine whether there was an apparent reason to combine the known elements in the fashion claimed by the patent.

33. I understand that, in order to establish that a claimed invention was obvious based on a combination of prior art elements, a clear articulation of the reason(s) why a claimed invention would have been obvious must be provided. Specifically, I understand that, under the U.S. Supreme Court's decision in *KSR Int'l Co. v. Teleflex Inc.*, 550 U.S. 398, 401 (2007), a combination of multiple items of prior art renders a patent claim obvious when there was an apparent reason for a POSITA, at the time of the invention, to combine the prior art, which can include, but is not limited to, any of the following rationales: (A) combining prior art methods according to known methods to yield predictable results; (B) substituting one known element for another to obtain predictable results; (C) using a known technique to improve a similar device in the same way; (D) applying a known technique to a known device ready for improvement to yield predictable results; (E) trying a finite number of identified, predictable potential solutions, with a reasonable expectation of success; (F) identifying that known work in one field of endeavor may prompt variations of it for use in either the same field or a different one based on design incentives or other market forces if the variations are predictable to one of ordinary

Declaration of Tal Lavian, Ph.D.
Inter Partes Review of U.S. 7,330,431

skill in the art; or (G) identifying an explicit teaching, suggestion, or motivation in the prior art that would have led one of ordinary skill to modify the prior art reference or to combine the prior art references to arrive at the claimed invention. I also understand that where there is a motivation to combine, claims may be rejected as prima facie obvious provided a POSITA would have had a reasonable expectation of success regarding the proposed combination.

34. I am informed that the existence of an explicit teaching, suggestion, or motivation to combine known elements of the prior art is a sufficient, but not a necessary, condition to a finding of obviousness. This so-called “teaching-suggestion- motivation” test is not the exclusive test and is not to be applied rigidly in an obviousness analysis. In determining whether the subject matter of a patent claim is obvious, neither the particular motivation nor the avowed purpose of the patentee controls. Instead, the important consideration is the objective reach of the claim. In other words, if the claim extends to what is obvious, then the claim is invalid. I further understand that the obviousness analysis often necessitates consideration of the interrelated teachings of multiple patents, the effects of demands known to the technological community or present in the marketplace, and the background knowledge possessed by a POSITA. All of these issues may be considered to determine whether there was an apparent reason to combine the known elements in the fashion claimed by the patent.

Declaration of Tal Lavian, Ph.D.
Inter Partes Review of U.S. 7,330,431

35. I also understand that in conducting an obviousness analysis, a precise teaching directed to the specific subject matter of the challenged claim need not be sought out because it is appropriate to take account of the inferences and creative steps that a POSITA would employ. I understand that the prior art considered can be directed to any need or problem known in the field of endeavor at the time of the invention and can provide a reason for combining the elements of the prior art in the manner claimed. In other words, the prior art need not be directed towards solving the same specific problem as the problem addressed by the patent. Further, the individual prior art references themselves need not all be directed towards solving the same problem. I understand that common sense is important and should be considered. Common sense teaches that familiar items may have obvious uses beyond their primary purposes.

36. I also understand that a particular combination of prior art elements being “obvious to try” may indicate that the combination was obvious even if no one attempted the combination. If the combination was obvious to try (regardless of whether it was tried) or leads to anticipated success, then it is likely the result of ordinary skill and common sense rather than innovation. I further understand that in many fields it may be that there is little discussion of obvious techniques or combinations, and it often may be the case that market demand, rather than scientific literature or knowledge, will drive the design of an invention. I understand that an

Declaration of Tal Lavian, Ph.D.
Inter Partes Review of U.S. 7,330,431

invention that is a combination of prior art must do more than yield predictable results to be non-obvious.

37. I understand that for a patent claim to be obvious, the claim must be obvious to a POSITA at the time of the invention. I understand the factors to consider in determining the level of ordinary skill in the art include: (1) educational level and experience of people working in the field at the time the invention was made, (2) types of problems faced in the art and solutions found to those problems, and (3) sophistication of the technology in the field.

38. I am informed that it is improper to combine references where the references teach away from their combination. I am informed that a reference may be said to teach away when a POSITA, upon reading the reference, would be discouraged from following the path set out in the reference, or would be led in a direction divergent from the path that was taken by the patent applicant. In general, a reference will teach away if it suggests that the line of development flowing from the reference's disclosure is unlikely to be productive of the result sought by the patentee. I am informed that a reference teaches away, for example, if (1) the combination would produce a seemingly inoperative device, or (2) the references leave the impression that the product would not have the property sought by the patentee. I also understand that a reference does not teach away if it merely expresses

Declaration of Tal Lavian, Ph.D.
Inter Partes Review of U.S. 7,330,431

a general preference for an alternative invention but does not criticize, discredit, or otherwise discourage investigation into the invention claimed.

39. I am informed that even if a prima facie case of obviousness is established, the final determination of obviousness must also consider “secondary considerations” if presented. In most instances, the patentee raises these secondary considerations of non-obviousness. In that context, the patentee argues an invention would not have been obvious in view of these considerations, which include: (a) commercial success of a product due to the merits of the claimed invention, (b) a long-felt, but unsatisfied need for the invention, (c) failure of others to find the solution provided by the claimed invention, (d) deliberate copying of the invention by others, (e) unexpected results achieved by the invention, (f) praise of the invention by others skilled in the art, (g) lack of independent simultaneous invention within a comparatively short space of time, (h) teaching away from the invention in the prior art.

40. I further understand that secondary considerations evidence is only relevant if the offering party establishes a connection, or nexus, between the evidence and the claimed invention. The nexus cannot be based on prior art features. The establishment of a nexus is a question of fact. While I understand that Patent Owner has not offered any secondary considerations at this time, I will supplement

Declaration of Tal Lavian, Ph.D.
Inter Partes Review of U.S. 7,330,431

my opinions in the event that the Patent Owner raises secondary considerations during the course of this proceeding.

41. I understand that, in IPR proceedings, patent claim terms are given their ordinary and customary meaning in view of the specification and prosecution history, unless those sources show an intent to depart from such meaning.

III. STATE OF THE ART

42. Prior to the earliest priority date of the '431 Patent, data communications within a network was a well-developed field of technology, including optimizing bandwidth allocations for the data in the network. It was well known to allocate bandwidth to make more efficient use of the guaranteed bandwidth available on the network. Mapping logical topologies on top of physical topologies such as ring were commonly used in the industry.

43. By the time of the earliest possible priority date, the field of bandwidth allocations, quality of service, and service level agreements were well-established in business, academic, and governmental settings; well published and described in many articles, academic publications, patents, and product literature. Such concepts and ideas were well discussed in standardized in standard bodies.

44. The following section describes the state of the art for as of September 2004. The prior art references and the discussions of what was known to a POSITA provide the factual support for the general description of the state of the art at the

Declaration of Tal Lavian, Ph.D.
Inter Partes Review of U.S. 7,330,431

time of the invention and provide additional motivation to modify or combine the references. Accordingly, these references should be considered by the Board.

**A. Concepts of the '431 Patent were the Industry's Mainstream.
They were Well-published, Disclosed, Discussed, and
Standardized in Different Standard Bodies.**

45. Prior to the filing date of the '431 Patent, "bandwidth allocations" was a well-developed technology field. It was well known to "make more efficient use of the guaranteed bandwidth available on the ring network"

46. The ideas contained therein were mainstream at the time of the invention, including products, markets, businesses, networking vendors, networking service providers, publications, books, academic education, and industry standards.

47. Indeed, the concepts of dynamic network research allocation, policy, and charging control architecture were collaborated by the entire industry via standard bodies such as IETF, IEEE, ETSI, ITU, and many more around the globe. The core components were integral parts of network communication technologies. Technical specifications, IEEE Standards documents, and IEFRT RFCs were well-known and well-published. These concepts were essential components of network communications, telecommunications, wireless, cellular, and the core architecture of the Internet.

48. Standard bodies working groups developed and published standard documents, including the technologies, concepts, architectures, protocols, components, and services described in the '431 Patent. The vast majority of this

Declaration of Tal Lavian, Ph.D.
Inter Partes Review of U.S. 7,330,431

work is open, public, published, archived, and presented publicly in different standard bodies and academic/professional publications. These standards bodies include, among others, the Standard Working Group, the IETF RFC Working Group, and the IEEE Standard Working Group.

49. Bandwidth allocations, bandwidth requirements, resource allocations, and Quality of Service (QoS) are well-known in technologies like Ethernet, LAN, MAN, WAN, and wireless. The IEEE 802.17 Resilient Packet Ring (RPR) is one of the IEEE standards that address related technologies in different standards, such as IEEE 802.1, IEEE 802.3, IEEE 802.11, IEEE 802.16.

B. Networking standards, Interoperability, and Mainstream Technologies

50. In network communications, interoperability, in most cases, is a must to have; products, features, and technologies from different vendors and product lines must comply with interoperability to work together; or they will not work as expected.

51. The '431 Patent focuses on “methods and systems for bandwidth allocation that make[s] more efficient use of the guaranteed bandwidth available on the ring network.” '431 Patent, 2:7-10. Such rings were standardized in IEEE 802.17 as Resilient Packet Rings (RPR). The features and technologies were published extensively as part of networking standards. Such bandwidth allocation services in the RPR ring could not work without interoperability.

Declaration of Tal Lavian, Ph.D.
Inter Partes Review of U.S. 7,330,431

52. **Interoperability and networking standards.** The interoperability of products in network communications dictates that the features and functionality must work together according to the networking standards. They must comply with the networking standards to work together, or they will not work as expected. The above technologies were part of the mainstream industry, commercially available products in the market, and part of standard documents. These features and technologies are published extensively as part of networking standards.

53. **Related Standard Bodies work.** The '431 Patent's core technological concepts were also part of global industrial collaboration by different standard bodies. Standard bodies working groups developed and published standard documents, including the technologies, concepts, architectures, protocols, components, and services. These publications include many documents proposed, debated, discussed, published, and standardized by almost all the key industrial players. Most of this work is open, public, published, archived, and presented publicly in different standard bodies and academic/professional publications.

54. Below is a short list of documents addressing similar issues in standards and the industry before the priority date:

55. "A Bandwidth Guaranteed Polling MAC Protocol for Ethernet Passive Optical Networks" is a scientific paper published and presented in IEEE INFOCOM,

Declaration of Tal Lavian, Ph.D.
Inter Partes Review of U.S. 7,330,431

(April 2003), (I personally participated in this conference.) This publication focuses on the issue of bandwidth guaranteed for Ethernet PON (EPON).

56. A “IEEE 802.17 Resilient Packet Ring Tutorial” paper was published in the IEEE Communications Magazine in July 2000. The Abstract of this paper discloses:

“Abstract— The IEEE Working group 802.17 is standardizing a new ring topology network architecture, called the Resilient Packet Ring (RPR), to be used mainly in metropolitan and wide area networks. This paper presents a technology background, gives an overview, and explains some of the design choices behind RPR. Some major architectural features are illustrated.”

57. As part of this IEEE 802.17 standard tutorial, this paper discussed and analyzed very similar issues as disclosed in the '431 Patent. For example:

In order to fulfill the service guarantees for class A0, A1 and B-CIR traffic, bandwidth needed for these traffic classes is pre-allocated. Bandwidth pre-allocated for class A0 traffic is called “reserved” and can only be utilized by the station holding the reservation. Bandwidth pre-allocated for class A1 and B-CIR traffic is called “reclaimable”. Reserved bandwidth not in use is wasted. Bandwidth not pre-allocated and reclaimable bandwidth not in use, may be used to send FE traffic.

A station’s reservation of class A0 bandwidth is broadcasted on the ring using topology messages (topology discovery is discussed in section V). Having received such topology messages from all other stations on the ring, every station calculates how much bandwidth to reserve for class A0 traffic. The remaining bandwidth, called “unreserved rate” can be used for all other traffic

Declaration of Tal Lavian, Ph.D.
Inter Partes Review of U.S. 7,330,431

classes. Section V, Topology Discovery, 802.17 Tutorial,
Col 2 lines 23-39; Col 7 lines 1-41.

58. “Dynamic Bandwidth Allocation in a Network” is a scientific paper published by ACM SIGCOMM Computer Communication Review Volume 18 Issue 4, (August 1988). This paper proposes a distributed algorithm for dynamic allocation of bandwidth for IEEE 802.3 Ethernet in LAN Groups. The concepts of dynamic bandwidth allocations were well published, discussed, and presented in the industry.

59. Cisco Systems Inc. offered products that include configuration and management to support such services. As an example, Cisco’s Enhanced ATM Port Adapter (ATM PA-A3) offered “Advanced Bandwidth Management Feature” and “Operations and Management (OAM)” of such services. (Cisco Enhance ATM Port Adapter PA-A3 Data Sheet (2004)). This product was available in the market at that time.

60. An “Introduction to Resilient Packet Rings” was presented by Mr. Raj Sharma from Luminous Networks Inc in the IEEE 802.17 Working Group on March 2001. Mr. Sharma presented and explained “Why RPR needed?” and that “Circuit oriented static bandwidth allocations are inefficient for data packet transfer”, and that “Non-working, protection bandwidth reservation is wasteful” (page 4). These are very similar issues that the ’431 Patent focuses on, e.g., “methods and systems for bandwidth allocation that make more efficient use of the guaranteed bandwidth available on the ring network.” Ex.1001, ’431 Patent at 2:7-10.

Declaration of Tal Lavian, Ph.D.
Inter Partes Review of U.S. 7,330,431

61. The “IEEE Standard 802.16: A Technical Overview of the WirelessMAN™ ir Interface for Broadband Wireless Access” is a scientific publication published in the IEEE Communications Magazine (June 2002) by Carl Eklund from Nokia Research Center. This paper addresses similar issues in different standard IEEE 802.16.

62. 61. IETF RFC-2386 (1998), IETF RFC-2638 (1999), IETF RFC-3272 (2002), IETF RFC-3644 (2003) are just a few RFCs that addressed similar concepts.

IV. OVERVIEW OF THE '431 PATENT

63. The '431 Patent was filed September 3, 2004, and does not claim priority to any earlier application. Counsel advised me to use this date as a priority date in my analysis.

64. The '431 Patent relates to data communications within a network, and specifically to optimizing bandwidth allocation for the data in the network.” The '431 Patent discloses a “method to allocate guaranteed bandwidth in multipoint cases is to allocate the full required bandwidth for all possible paths that packets may travel.” The '431 Patent focuses on “methods and systems for bandwidth allocation that make more efficient use of the guaranteed bandwidth available on the ring network.”

Declaration of Tal Lavian, Ph.D.
Inter Partes Review of U.S. 7,330,431

65. Paragraphs 25-27 of Ex.1003, Houh Declaration, are incorporated by reference.

V. A PERSON OF ORDINARY SKILL IN THE ART

66. It is my understanding that I must analyze and apply the prior art cited above from the perspective of a POSITA as of the time of the invention. I understand the applicants filed the application that issued as the '431 Patent on September 3, 2004. As such, I understand that September 3, 2004, is the earliest possible priority date for the '431 Patent. For purposes of this declaration only, I analyzed and applied the prior art from the perspective of a POSITA as of September 3, 2004.

67. I have also been advised that, to determine the appropriate level of a POSITA, the following factors may be considered: (1) the types of problems encountered by those working in the field and prior art solutions thereto; (2) the sophistication of the technology in question, and the rapidity with which innovations occur in the field; (3) the educational level of active workers in the field; and (4) the educational level of the inventor. When forming my opinions herein, I analyzed and applied the prior art from the perspective of a POSITA as of the time of the invention.

68. The '431 Patent relates to a method of communicating that links edges devices to a remote network device.

69. It is my opinion that a POSITA would have possessed at least a bachelor's degree in electrical engineering, computer engineering, computer

Declaration of Tal Lavian, Ph.D.
Inter Partes Review of U.S. 7,330,431

science, or a closely related field with some focus on telecommunications/network communications, and at least three or four years of experience in the design and development of telecommunication networks, systems, equipment, and components. Alternatively, a POSITA would have a Master's degree or similar post-graduate work in electrical engineering, computer engineering, computer science, or a closely related field with some focus on telecommunications/network communications, and fewer years of design and development experience.

70. And a POSITA would have possessed the following areas of knowledge, which were part of the general knowledge in the art of the '431 Patent as of September 3, 2004. network communications, network architectures, mapping physical and logical topologies such as multipoint to multipoint communications and ring topologies, bandwidth allocations, Quality of Service (QoS), Service Level Agreements (SLA), Connection Admin Controller (CAC), Resilient Packet Ring (RPR) protocol defined by IEEE 802.17, communications standards such as IEEE and IETF.

71. I am well aware of the qualifications of such a skilled artisan because I have worked with, supervised, and hired engineers with similar capabilities. By 2004, I had over 16 years of practical experience in the industry. And by 2004, I had received a Master's degree in electrical engineering and had been working toward a Ph.D. in computer science specializing in network communications from the

Declaration of Tal Lavian, Ph.D.
Inter Partes Review of U.S. 7,330,431

University of California at Berkeley. Further, by 2004, I was working with individuals who met the above criteria of persons of ordinary skill in the art. Many of my colleagues possessed at least a B.S. in the relevant fields and had several years of experience designing and developing network communication systems.

72. Thus, I am familiar with the understanding and knowledge of persons of ordinary skill in the art as of 2004. I was at least as qualified as the POSITA that I have identified above. Thus, I understand the perspective of a POSITA, which I have applied in my analysis.

VI. CLAIM CONSTRUCTION

73. For IPR petitions filed after November 13, 2018, I understand the Patent Trial and Appeal Board (“Board”) construes claim terms as having their ordinary and customary meaning to a POSITA at the time of invention (i.e., the same standard used in district court). I have applied this standard in rendering my opinions. In addition, I have been asked to assume that the claims are not indefinite.

74. At this time, I do not propose any terms for construction because the ordinary and customary meaning of the terms is appropriate for my analysis. However, I don’t waive, and expressly reserve, the right to respond to any constructions proposed by the Patent Owner or the Board.

75. Paragraph 28 of Ex.1003, Houh Declaration, is incorporated by reference.

VII. SUMMARY OF THE PRIOR ART

A. Baker Overview

76. U.S. 2004/0095946 (“Baker”) was filed November 18, 2002.

77. Baker describes overlaying a logical topology (e.g., a star topology) “on a non-star network, such as a ring network” using virtual paths, and it discloses automatically assigning network resources (including bandwidth) to the network’s elements. Ex.1005, [0012], [0016], [0031], [0062]. Figure 5 shows an example star topology:

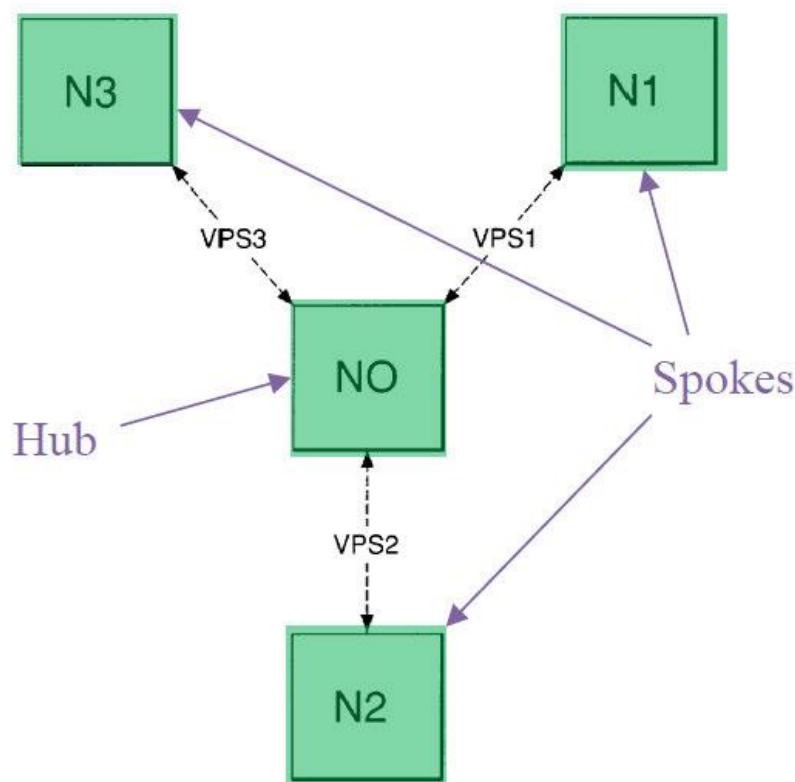


FIG. 5

Declaration of Tal Lavian, Ph.D.
Inter Partes Review of U.S. 7,330,431

Ex.1005, FIG. 5 (annotated); Ex.1003, ¶¶32-33.

78. Automatically assigning network resources includes “detecting the topology of connected elements in the network... allocating the network resources, and assigning the network resources to the network elements.” Ex.1005, [0016]; Ex.1003, ¶34.

79. Paragraphs 32-34 of Ex.1003, Houh Declaration, are incorporated by reference.

B. Wright Overview

80. U.S. 2004/0174884 (“Wright”) was filed March 5, 2003.

81. Wright discloses a logical topology overlaid onto a physical topology, and a procedure for assigning network resources. *See* Ex.1006, [0015]- [0016]. Wright’s system constrains the logical connectivity to a “restricted topology (e.g., a virtual topology)” through the physical network to minimize bandwidth reservations used for providing “a bandwidth QoS.” Ex.1006, [0016]–[0017]. The system receives the logical connectivity as data, provided “in terms of edge nodes and communication requirements between edge nodes” including “queuing and link scheduling mechanisms” for bandwidth guarantees. Ex.1006, [0018], [0015], [0024].

82. The “restricted topology” is created for a VPN service using the “logical connectivity data” and physical connections, and the bandwidth

Declaration of Tal Lavian, Ph.D.
Inter Partes Review of U.S. 7,330,431

requirements calculated for “links within the restricted topology.” Ex.1006, [0007], [0015], [0017], [0024]. Wright teaches reserving bandwidth on each physical link traversed by the restricted topology based on the calculation. Ex.1006, Abstract, [0005]-[0007], [0018], [0024]; Ex.1003, ¶¶35-37.

83. Paragraphs 35-37 of Ex.1003, Houh Declaration, are incorporated by reference.

C. Holender ’699 Overview

84. U.S. 6,104,699 (“Holender ’699”) issued August 15, 2000.

85. Holender ’699, like Baker and Wright, discusses “partitioning of physical network resources” so multiple logical networks overlay the same physical network. Ex.1007, 1:6-8, 3:54-58. The overlaid network topologies “differ from the topology of the underlying physical network.” Ex.1007, 4:22-30; FIG. 1. Separate logical networks are offered for different services to support the often-different demands the different services have on resources including “bandwidth.” Ex.1007, 3:60-67. This separation supports service classes (also called traffic classes), arranged in groups “of similar properties ... handled together in a logical network.” Ex.1007, 3:67-4:15, 4:66-5:5; Ex.1003, ¶¶182-84.

86. Paragraphs 182-184 of Ex.1003, Houh Declaration, are incorporated by reference.

D. Zheng Overview

87. U.S. 6,757,247 (“Zheng”) was filed February 20, 1998 and issued June 29, 2004.

88. Zheng relates to “controlling virtual circuit connections in a ring network.” Ex.1008, 1:8-10. Zheng’s controller determines when to allow a connection in the network so that the bandwidth capacities of the ring segments are not exceeded by the sum of all required bandwidth. Ex.1008, 5:4-25. To further buttress against over-allocation, Zheng discloses using “over-allocated bandwidth,” which is “bandwidth that is allocated to a virtual connection that exceeds the required or subscribed bandwidth for service on the virtual connection.” Ex.1008, 5:29-35; Ex.1003, ¶¶355-57.

89. Paragraphs 355-357 of Ex.1003, Houh Declaration, are incorporated by reference.

E. Holender ’894 Overview

90. U.S. 6,069,894 (Ex.1020, “Holender ’894”) issued May 30, 2000.

91. Holender ’894 shares the same inventors as Holender ’699. The references also share portions of their specification and figures.

92. Holender ’894, like Baker and Wright, discusses “partitioning of physical network resources” so multiple logical networks overlay the same physical network. Ex.1007, 1:6-8, 3:54-58. The overlaid network topologies “differ from the

Declaration of Tal Lavian, Ph.D.
Inter Partes Review of U.S. 7,330,431

topology of the underlying physical network.” Ex.1007, 4:22-30; FIG. 1. Separate logical networks are offered for different services to support the often-different demands the different services have on resources such as “bandwidth.” Ex.1007, 3:60-67. This separation supports service classes, also referred to as traffic classes, arranged in groups “of similar properties ... handled together in a logical network.” Ex.1007, 3:67-4:15, 4:66-5:5; Ex.1003, ¶¶182-84.

VIII. GROUNDS FOR UNPATENTABILITY OF THE CLAIMS OF THE '431 PATENT

93. This declaration provides the analysis of how the asserted prior art references teach each limitation of the challenged claims.

94. As part of my analysis, I considered the declaration of Cisco’s expert, the scope and content of the prior art relied on to show unpatentability and any differences between the alleged invention and the prior art.

IX. GROUND 1: THE COMBINATION OF BAKER, WRIGHT AND HOLENDER '699 RENDERS OBVIOUS CLAIMS 1-5, 7-11, AND 25-26

A. Motivation to Combine Baker with Wright and Holender '699

95. A POSITA considering the teachings of Baker would have also considered the teachings of Wright, as they are analogous prior art pertaining to the same field of endeavor, namely, managing network resources for logical topology connections over an underlying physical topology. *See* Ex.1005, [0016] (disclosed is a method for automatically assigning network resources), [0030] (logical topology

Declaration of Tal Lavian, Ph.D.
Inter Partes Review of U.S. 7,330,431

overlaid onto physical ring network); Ex.1006, [0005] (connectivity data received for logical topology and bandwidth reserved). A POSITA would have been motivated to combine the teachings of Baker and Wright for multiple reasons, as discussed below. Ex.1003, ¶38.

96. Firstly, Baker teaches several concepts, including the overlaying of a logical topology onto a physical topology, assigning and managing network resources, and conveying traffic between nodes, while Wright provides further details about those very same operations. For example, while Baker discloses overlaying a logical topology (such as a star topology) on an underlying physical network (such as a ring network), Baker is not concerned with where the logical topology originated. *See* Ex.1005, [0030]. A POSITA would have been motivated to turn to Wright for logical topology origination details, including a node receiving logical topology information. Ex.1003, ¶39.

97. Wright discloses a node receiving “logical connectivity data,” which is used to define a “restricted topology” (i.e., a logical topology) over a physical topology. Ex.1006, [0005]. It was well-known for one or more network nodes to receive logical topology information of the type disclosed in Baker, as demonstrated by Wright. *See, e.g.*, Ex.1006, [0005] (logical connectivity data received and used for logical topology); *see also* Ex.1010, 3:63-67 (each node “retains ... logical topology information”), 6:26-36 (nodes communicate logical topology updates to each other).

Declaration of Tal Lavian, Ph.D.
Inter Partes Review of U.S. 7,330,431

It would have been obvious for a POSITA to turn to Wright for details regarding the receipt of logical connectivity data. Ex.1003, ¶39.

98. Baker discloses assigning network resources to network elements and managing bandwidth in the network. *See* Ex.1005, [0016] (assign network resources), [0062] (bandwidth management). Wright provides more details about assigning and managing bandwidth for a network such as Baker's (with a logical topology over a physical topology). *See, e.g.*, Ex.1006, [0016]-[0018], [0024]. For example, Wright determines logical connection bandwidth requirements, and aggregates those requirements on underlying physical links. *See id.* It would have been obvious to turn to Wright for details about bandwidth (for links and nodes) and the assignment of bandwidth as a network resource in Baker. Ex.1003, ¶40.

99. Baker also describes that traffic is conveyed between nodes in the physical network according to an overlaid logical topology, but Baker is agnostic to the types of services supported by, or associated with, that traffic. *See* Ex.1005, [0012], [0037]-[0038], [0080]. Wright provides, as examples of services that are traffic, a virtual private network (VPN) service, VoIP, video-on-demand, and video conferencing. *See* Ex.1006, [0003], [0015], [0025]. A POSITA would have been additionally motivated to apply Wright's additional examples of the types of service whose traffic traverses Baker's network. Ex.1003, ¶41.

Declaration of Tal Lavian, Ph.D.
Inter Partes Review of U.S. 7,330,431

100. In addition, , a POSITA would have had a reasonable expectation of success in combining the teachings of Wright with Baker. Ex.1003, ¶42. Wright's teachings are compatible with Baker's teachings. Baker teaches "using Asynchronous Transfer Mode (ATM) over SONET [Synchronous Optical Network]." Ex.1005, [0037]. Wright, similarly, teaches using SONET for the physical links with ATM virtual circuits over those links. Wright, [0015]; Ex.1007, 5:12-35 and FIG. 3 (ATM over SONET). Baker and Wright therefore teach using compatible network technologies, including ATM over SONET. Ex.1003, ¶42.

101. Further, both Baker and Wright disclose the imposition of a logical network onto the physical network. In Baker, this is described as overlaying "a logical star topology ... on an underlying non-star network, such as a ring network" (which can be the physical network). Ex.1005, [0030]. In Wright, this is described as a "restricted topology" over the physical topology, based on "[l]ogical connectivity data" for VPN services. Ex.1006, [0005]-[0007], [0014]. A POSITA would have had a reasonable expectation of success in view of the compatibilities between Baker's and Wright's teachings, including logical networks overlaid onto similar underlying physical networks. Ex.1003, ¶43.

102. Third, Baker's "head node" is capable of implementing Wright's teachings related to receiving connectivity data, determining bandwidth requirements, and supporting VPN services as a type of traffic. Baker's head node

Declaration of Tal Lavian, Ph.D.
Inter Partes Review of U.S. 7,330,431

“executes the Administer Ring routine” as part of the overlay procedures of the logical topology onto the physical topology. Ex.1005, [0051]-[0052]. The head node is designated as a “peer group leader,” or “PGL,” which gives the PGL responsibilities beyond other peer nodes for routing and communication control. Ex.1005, [0046]. Baker teaches configuring the head node with additional computing and hardware resources so the “PGL/head node” can accomplish its tasks. Ex.1005, [0047]. With these additional resources, Baker’s head node would have sufficient resources to perform Wright’s disclosed tasks, such that a POSITA would have had a reasonable expectation of success in combining Wright’s and Baker’s teachings. Ex.1003, ¶¶44-45.

103. Fourth, it would have been predictable and within a POSITA’s skillset to combine Wright’s and Baker’s teachings. Overlaying logical topologies onto physical topologies and managing available bandwidth were known concepts, as demonstrated by Wright and others. *See, e.g.*, Ex.1006, [0016]-[0018]; Ex.1009, [0015]. The combination of Baker’s and Wright’s teachings would predictably result in Baker’s head node receiving logical topology information and assigning network resources (including bandwidth) based on the logical topology information, using techniques adapted from Wright. *See* Ex.1005, [0016]; Ex.1006, [0016]-[0018], [0024]. Applying Wright’s concepts to Baker’s network would advantageously allow Baker’s network to provide “bandwidth QoS guarantees” for traffic such as

Declaration of Tal Lavian, Ph.D.
Inter Partes Review of U.S. 7,330,431

Wright's connectionless VPN services. Ex.1006, [0014]; *see also* [0003]-[0004] (drawbacks of prior bandwidth management), [0015]; Ex.1005, [0013]; Ex.1003, ¶¶46, 48.

104. Finally, in view of the foregoing, the combination of Baker and Wright is nothing more than the combination of known elements (Baker's head node and traffic teachings, and Wright's procedure and VPN service teachings), according to known methods (using Wright's teachings in Baker's network by the head node), to yield predictable results (Baker's head node receiving the logical topology information, determining bandwidth requirements, and allocating bandwidth per Wright, with Baker's network providing service for traffic like Wright's VPN service, VoIP, VOD, etc.). Ex.1003, ¶47.

105. Additionally, a POSITA considering the teachings of Baker would have also considered the teachings of Holender '699, as they are analogous prior art pertaining to the same field of endeavor of partitioning physical resources of an underlying physical topology for overlaying logical topologies. *See* Ex.1005, [0016], [0030] (assigning network resources for a logical topology overlaid onto a physical topology); Ex.1007, 1:6-8, 3:54-58 (partitioning physical resources shared among logical networks); *see also* Ex.1006, [0005] (link bandwidth requirements based on physical and logical connections); Ex.1003, ¶185.

Declaration of Tal Lavian, Ph.D.
Inter Partes Review of U.S. 7,330,431

106. First, a POSITA would have been motivated to turn to Holender '699 for the well-known option of overlaying multiple networks onto the same physical network. Baker discloses multiple logical topologies sequentially overlaid “on top of the ultimate, actual physical network.” Ex.1005, [0030], [0064] (sequential overlay); *see also* [0030] (logical star), [0066] (logical ring). Holender '699 describes how different service demands can be met by employing multiple different logical networks at the same time over single a physical network. Ex.1007, 4:22-30 3:6367; Ex.1003, ¶195.

107. Holender '699 explains that it was already known to establish multiple logical networks on top of a physical network, illustrated as logical networks 1 through *X* in Figure 1, which are all overlaid onto a single physical network. Ex.1007, 1:12-27, 4:22-30, FIG. 1. Holender '699's approach for overlaying different logical networks onto a physical network demonstrates a well-known alternative for overlaying different logical network types, such as Baker's, onto a physical network. Doing so would have been nothing more than applying Baker's multiple overlaying logical networks onto a physical network at the same time and in parallel, per Holender '699. Ex.1003, ¶187.

108. Second, a POSITA would have been motivated to turn to Holender '699 and combine it with Baker to obtain Holender '699's stated benefits. Recognizing the drawbacks of supporting different services with very different demands (e.g.,

Declaration of Tal Lavian, Ph.D.
Inter Partes Review of U.S. 7,330,431

bandwidth, grade of service, etc., and difficulty of network management) on the same logical network, Holender '699 instead offers "separate logical networks" for different services with such differing demands. Ex.1007, 3:60-4:4. Grouping services with similar demands together into a logical network provides the benefit of simplified network management at a higher level. Ex.1007, 4:66-5:1, and 3:67-4:14. A POSITA would have been motivated to obtain these benefits for Baker. Ex.1003, ¶188.

109. Third, a POSITA would have had a reasonable expectation of success in combining Holender '699's teachings with the systems of Baker and the Baker-Wright combination. Like Baker and Wright, Holender '699 teaches using a network with SONET on the bottom of the transmission strata and a cross-connect stratum based on ATM on top of that. Ex.1007, 5:12-37, 6:14-22, FIG. 3; Ex.1005, [0037]; Ex.1003, ¶189.

110. Further like Baker and Wright, Holender '699 overlays a logical network onto a physical network. Holender '699 illustrates this in Figure 1's logical networks LN1-LNX overlaid onto physical network PN. Ex.1007, 4:22-26, FIG. 1; *cf.* Ex.1005, [0030]; Ex.1006, [0005]-[0007]. Thus, Holender '699, Baker, and Wright all apply similar concepts (overlaying logical networks onto physical networks) in compatible manners, giving a POSITA a reasonable expectation of success in combining their collective disclosures. Ex.1003, ¶190.

Declaration of Tal Lavian, Ph.D.
Inter Partes Review of U.S. 7,330,431

111. Fourth, it would have been predictable and within a POSITA's skillset to combine Holender '699's and Baker-Wright's teachings. Baker's traffic traversing the network is an example of Holender '699's more general teachings of "a wide variety of traffic types" that have various service/traffic classes. *See* Ex.1005, [0012], [0038], [0080] (traffic); Ex.1007, 5:7-9, 4:66-5:11 (various traffic types). Further, Baker already contemplated imposing multiple logical networks onto a physical network. While Baker teaches doing so sequentially, Holender '699 demonstrates that it was known and within a POSITA's skillset to do so in parallel to each other. Ex.1007, 4:22-26, FIG. 1; Ex.1003, ¶¶191-92.

112. Combining Holender '699's teachings with Baker's and Wright's teachings is nothing more than the combination of known elements (Baker's and Wright's physical and logical networks, and Holender '699's multiple logical networks per physical network for different traffic classes), according to known methods (Holender '699's teaching to employ multiple parallel logical networks) to yield predictable results (expanding the Baker-Wright combination to allow for multiple logical networks in parallel). Ex.1003, ¶192.

113. Fifth, a POSITA would have also been motivated to turn to Holender '699 and combine it with Baker to achieve advantages associated with employing multiple simultaneous logical network overlays. These include supporting a variety of traffic types and services, of potentially varying bandwidth, grade of service,

Declaration of Tal Lavian, Ph.D.
Inter Partes Review of U.S. 7,330,431

control demands, delay sensitivity, and/or loss sensitivity, etc. *See* Ex.1007, 3:604:8.

For at least the above reasons, a POSITA would have been motivated to combine Baker and Holender '699. Ex.1003, ¶¶193-94.

114. Paragraphs 38-49 of Ex.1003, Houh Declaration, are incorporated by reference.

115. Paragraphs 185-194 of Ex.1003, Houh Declaration, are incorporated by reference.

B. Detailed Analysis of the Claims

i. Claim 1

a. [1.0] A method for assigning bandwidth in a network including nodes coupled by links arranged in a physical topology, the method comprising:

116. Paragraphs 50-54 of Ex.1003, Houh Declaration, are incorporated by reference.

b. [1.1] defining between the nodes logical connections associated with a data transmission service to be provided over the network,

117. Paragraphs 55-68 of Ex.1003, Houh Declaration, incorporated by reference.

c. [1.2] the logical connections having a connection topology different from the physical topology;

118. Paragraphs 69-73 of Ex.1003, Houh Declaration, are incorporated by reference.

d. [1.3] determining respective bandwidth requirements for the logical connections based on parameters of the service;

Declaration of Tal Lavian, Ph.D.
Inter Partes Review of U.S. 7,330,431

119. Paragraphs 74-85 of Ex.1003, Houh Declaration, are incorporated by reference.

120. To the extent Baker and Wright do not disclose this limitation, Baker, Wright, and Holender '699 render obvious determining bandwidth requirements based on service parameters. Holender '699 teaches that “[l]ogical link capacities are determined” where the “logical link capacity” refers to the “individual traffic capacity” that each individual logical link in the logical network has. Ex.1007, 1:53-55, 3:9-15, 6:4-10. Specifically, Holender '699's Figure 4 describes that the logical link capacities are determined “such that the route blocking on each individual route in each one of the logical networks is less than or possibly equal to a maximum allowed blocking probability, given for each individual route, by distributing the route blocking evenly among the logical links used by the respective route.” *Id.*; FIG. 4.

Declaration of Tal Lavian, Ph.D.
Inter Partes Review of U.S. 7,330,431

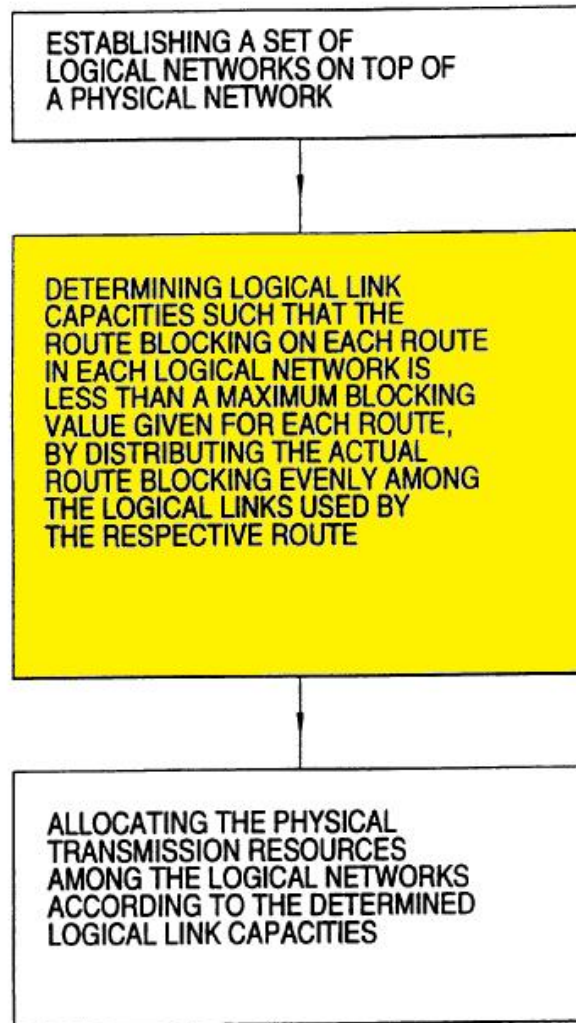


Fig.4

Ex.1007, FIG. 4 (annotated).

121. This teaching therefore discloses “determining respective bandwidth requirements for the logical connections.”

122. Holender '699 further teaches that the bandwidth requirements are “based on parameters of the service” by disclosing that such requirements are determined based on the “maximum allowed blocking value” for each route. *Id.*, 3:9-

Declaration of Tal Lavian, Ph.D.
Inter Partes Review of U.S. 7,330,431

15, 6:4-10. The “maximum allowed blocking value” is similar to Wright’s disclosure of a minimum and maximum bandwidth, which are examples of “parameters of the service.” See Ex.1003, ¶¶80-81. Holender ’699 further teaches how to derive the normalized logical link capacities associated with a physical link based on variables including, among others, the capacity of the physical link (C_k^{phys}):

$$\hat{C}_{ki} = \frac{C_{ki}}{\sum_{l=1}^n C_{kl}} C_k^{phys}, \quad i = 1, \dots, n \quad (8)$$

123. See *id.*, 6:48-8:58 (describing the “mathematical framework and dimensioning model” to determine logical link capacities).

e. [1.4] mapping the connection topology to the physical topology, so that each of the logical connections is associated with one or more links of the physical topology; and

124. Paragraphs 86-89 of Ex.1003, Houh Declaration, are incorporated by reference.

f. [1.5] allocating a bandwidth for the service on each of the links in response to the bandwidth requirements of the logical connections and to the mapping.

125. Paragraphs 90-98 of Ex.1003, Houh Declaration, are incorporated by reference.

126. To the extent Baker-Wright does not disclose this limitation, Baker-Wright-Holender ’699 renders it obvious. Holender ’699 discloses that after the logical link capacities are determined, “the physical transmission resources are

Declaration of Tal Lavian, Ph.D.
Inter Partes Review of U.S. 7,330,431

allocated among the logical links of the logical networks according to the determination.” Ex.1007, 3:15-17, 6:10-13, 9:22-25; FIG. 4.

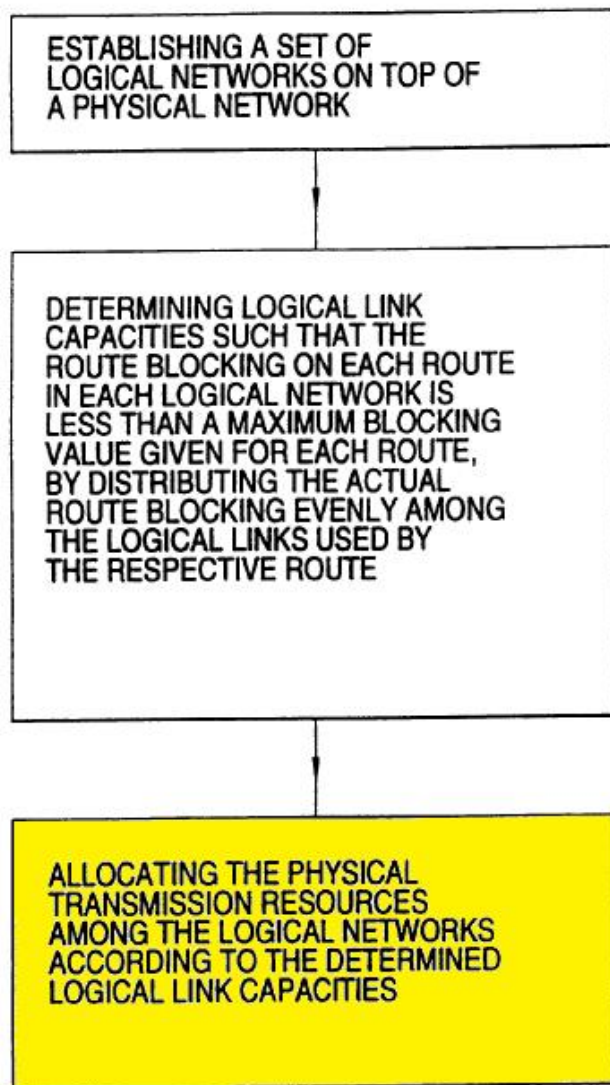


Fig.4

Ex.1007, FIG. 4 (annotated).

127. In other words, Holender '699 discloses “allocating a bandwidth for the service on each of the links.”

Declaration of Tal Lavian, Ph.D.
Inter Partes Review of U.S. 7,330,431

128. Holender '699 further discloses that the allocation is “in response to the bandwidth requirements of the logical connections” because the allocation is “according to the determined logical link capacities” (the “bandwidth requirements of the logical connections”). *Id.*, 3:15-17. Moreover, Holender '699 discloses that the allocation is “in response to the...to the mapping” because the allocation first requires “a set of logical networks [being] established on top of a physical network by associating different parts of the traffic with different parts of the physical transmission and switching resources” (the “mapping”). *Id.*, 9:4-7; 2:26-32, 5:63-6:2.

129. A POSITA would have implemented Holender '699's “allocating” as part of Baker's “special ‘star overlay’ procedures” for the same reasons a POSITA would have implemented Wright's “allocat[ing],” as explained above.

ii. Claim 2

a. [2.0] *The method according to claim 1,*

130. See analysis for Claim 1, limitations 1.0-1.5. *Supra* §§ IX(B)(i)(a-f).

131. Paragraph 99 of Ex.1003, Houh Declaration, is incorporated by reference.

b. [2.1] *wherein the network comprises a ring network, and wherein the physical topology comprises a ring topology.*

132. Paragraphs 100-102 of Ex.1003, Houh Declaration, are incorporated by reference.

iii. Claim 3**a. [3.0] The method according to claim 1,**

133. See analysis for Claim 1, limitations 1.0-1.5. *Supra* §§ IX(B)(i)(a-f).

134. Paragraph 103 of Ex.1003, Houh Declaration, is incorporated by reference.

b. [3.1] wherein the connection topology is chosen from one of a hub-and-spoke topology and a full mesh topology.

135. Paragraphs 104-110 of Ex.1003, Houh Declaration, are incorporated by reference.

iv. Claim 4**a. [4.0] The method according to claim 1,**

136. See analysis for Claim 1, limitations 1.0-1.5. *Supra* §§ IX(B)(i)(a-f).

137. Paragraph 111 of Ex.1003, Houh Declaration, is incorporated by reference.

b. [4.1] wherein the data transmission service comprises a guaranteed bandwidth service.

138. Paragraphs 112-115 of Ex.1003, Houh Declaration, incorporated by reference.

v. Claim 5**a. [5.0] The method according to claim 1,**

139. See analysis for Claim 1, limitations 1.0-1.5. *Supra* §§ IX(B)(i)(a-f).

140. Paragraph 195 of Ex.1003, Houh Declaration, is incorporated by reference.

b. [5.1] wherein the data transmission service comprises a class of service defined by a protocol under which the network operates.

Declaration of Tal Lavian, Ph.D.
Inter Partes Review of U.S. 7,330,431

141. First, as discussed at [1.1], the prior art renders obvious various “*data transmission service[s]*.” Ex.1003, ¶¶196-97.

142. Second, Baker and Wright describe networks operating under the asynchronous transfer mode (ATM) protocol. *See, e.g.*, Ex.1005, [0045]; Ex.1006, [0015]. A POSITA would have known that the ATM protocol defines classes of service for data traffic on a network. Ex.1003, ¶199, *quoting* Ex.1011, [0279] (“ATM can also support multiple quality of service (QoS) classes...”). With this understanding, it would have been obvious for each of the data traffic examples taught by Baker-Wright to comprise one of the QoS classes defined by ATM. Ex.1003, ¶199. Thus, this limitation would have been obvious based on Baker, Wright, and the POSITA’s background knowledge about network protocols including ATM. Ex.1003, ¶¶198-99.

143. Third, Holender ’699 confirms this limitation’s obviousness by describing how logical resource separation offers “different Grade of Service classes.” Ex.1007, 2:54-59; *see also* 4:66-5:9 (grade of service classes also referred to as traffic classes). Handling different traffic groups, each with one or more service classes, in different logical networks is “advantageous for an **ATM network carrying a wide variety of traffic types**.” Ex.1007, 4:66-5:9; *see also* 3:60-4:14; Ex.1003, ¶200. As Baker and Wright use ATM networking, it would have been obvious to achieve this advantage by employing Holender ’699’s traffic grouping

Declaration of Tal Lavian, Ph.D.
Inter Partes Review of U.S. 7,330,431

techniques with the Baker-Wright combination's "*data transmission service*" on Baker's ATM network. Ex.1003, ¶¶200-02.

144. Paragraphs 196-202 of Ex.1003, Houh Declaration, are incorporated by reference.

vi. Claim 7

a. [7.0] The method according to claim 1,
145. See analysis for Claim 1, limitations 1.0-1.5. *Supra* §§ IX(B)(i)(a-f).

146. Paragraph 116 of Ex.1003, Houh Declaration, is incorporated by reference.

b. [7.1] wherein mapping the connection topology to the physical topology comprises generating a bandwidth requirement for each of the links.
147. Paragraphs 117-124 of Ex.1003, Houh Declaration, are incorporated by reference.

vii. Claim 8

a. [8.0] The method according to claim 1,
148. See analysis for Claim 1, limitations 1.0-1.5. *Supra* §§ IX(B)(i)(a-f).

149. Paragraph 125 of Ex.1003, Houh Declaration, is incorporated by reference.

b. [8.1] wherein parameters of the service comprise respective node-bandwidths required by each of the nodes to provide the service.
150. Paragraphs 126-133 of Ex.1003, Houh Declaration, are incorporated by reference.

viii. Claim 9***a. [9.0] The method according to claim 1,***

151. See analysis for Claim 1, limitations 1.0-1.5. *Supra* §§ IX(B)(i)(a-f).

152. Paragraph 134 of Ex.1003, Houh Declaration, is incorporated by reference.

b. [9.1] and comprising monitoring traffic generated in the network by the data transmission service, and adjusting the bandwidth in response to the traffic.

153. Paragraphs 135-141 of Ex.1003, Houh Declaration, are incorporated by reference.

154. Additionally, Holender '699 discloses this limitation. First, Holender '699 discloses “monitoring traffic generated in the network by the data transmission service” when it describes that “the network manager can flexibly and very quickly adapt the overall network system to changing traffic conditions, such as changes in offered traffic, but also to facility failures and new demands on the logical network topology.” Ex.1007, 10:1-6.

155. Second, Holender '699's Figure 6 further discloses “adjusting the bandwidth in response to the traffic.” If the “offered traffic varies,” then the “determining and allocating steps” are “repeated in response to changing traffic conditions so as to change the logical link capacities of the various logical networks.” *Id.*, 10:6-29.

Declaration of Tal Lavian, Ph.D.
Inter Partes Review of U.S. 7,330,431

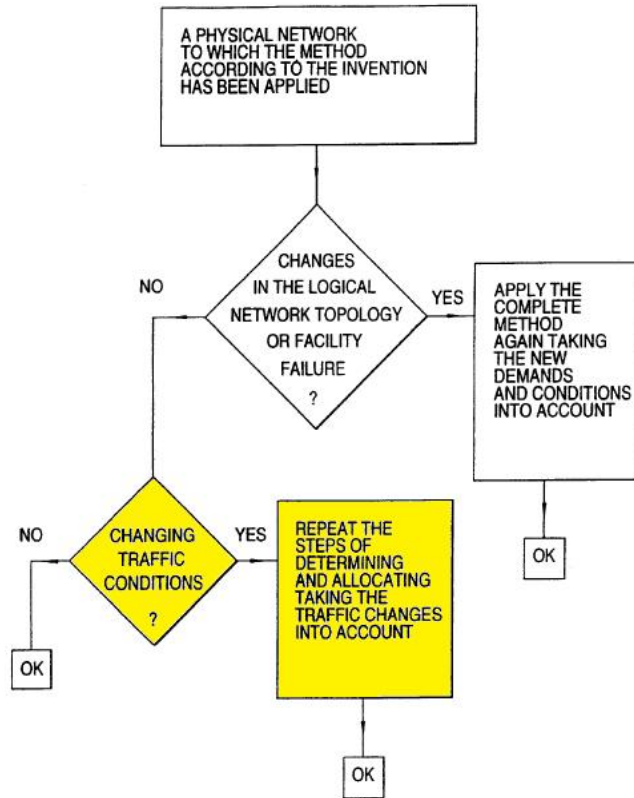


Fig.6

Ex.1007, FIG. 6 (annotated).

ix. Claim 10

a. [10.0] The method according to claim 1,

156. See analysis for Claim 1, limitations 1.0-1.5. *Supra* §§ IX(B)(i)(a-f).

157. Paragraph 203 of Ex.1003, Houh Declaration, is incorporated by reference.

b. [10.1] wherein the data transmission service comprises a plurality of subclasses of traffic, and

158. First, as discussed at [1.1], the prior art renders obvious various “data transmission service[s].” Ex.1003, ¶¶203-05. It would have been obvious that Baker’s and Wright’s different examples of a “data transmission service” would

Declaration of Tal Lavian, Ph.D.
Inter Partes Review of U.S. 7,330,431

have comprised “a plurality of subclasses of traffic” because they include different types of traffic, such as “voice over IP...video-on-demand, [and] video conferencing.” Ex.1006, [0025]; Ex.1003, ¶205.

159. Second, Holender '699 further renders this limitation obvious by extending Baker's and Wright's logical network concepts to multiple logical networks. Holender '699 explains that it is “not at all easy to integrate services with very different demands.” Ex.1007, 3:60-63. Instead, it “turn[s] out to be better to support different services by offering separate logical networks” for them. Ex.1007, 3:54-58, 63-67. Holender '699 teaches arranging traffic of different service classes (also called traffic classes) into different groups, so that “only those of similar properties are handled together in a logical network.” Ex.1007, 3:67-4:4, 4:66-5:5; Ex.1003, ¶¶206-07.

160. Each group has potentially varying bandwidth demands. Ex.1007, 4:66-5:7, 8:59-62. As a result, different “traffic groups are handled separately in different logical subnetworks.” Ex.1007, 5:5-7. This is consistent with the '431 Patent's use of “subclasses,” where a “guaranteed traffic” service includes a specific “subclass of guaranteed traffic.” Ex.1001, 12:39-44. It would have been obvious that Holender '699's different traffic groups are, with their service classes of multiple traffic types with “similar properties” grouped together, a “data transmission service

Declaration of Tal Lavian, Ph.D.
Inter Partes Review of U.S. 7,330,431

compris[ing] a plurality of subclasses of traffic.” Ex.1007, 3:67-4:4; Ex.1003, ¶¶208-11.

161. Paragraphs 204-211 of Ex.1003, Houh Declaration, are incorporated by reference.

c. [10.2] wherein allocating the bandwidth comprises allocating a reserved bandwidth to one of the subclasses.

162. First, as discussed at [1.5], the prior art renders obvious “allocating a bandwidth.” See Ex.1005, [0016]; Ex.1006, [0024], [0005]; Ex.1003, ¶¶212-13.

163. Second, as discussed at [10.1], Holender ’699 teaches arranging traffic classes into groups with one or more traffic types per group, and each group “handled separately in [a] different logical subnetwork[.]” Ex.1007, 5:5-7; Ex.1003, ¶214. Where traffic types are sufficiently different, Holender ’699 teaches each individual traffic type (and, thus, a “subclass”) being handled by its own separate logical network. Ex.1007, 5:1-11. Wright’s and Baker’s disclosures respectively have a per-logical-topology focus, including the allocation of bandwidth per Wright. Ex.1005, [0059]; Ex.1006, [0024]. It would have been obvious to repeat Wright’s bandwidth allocations for each individual traffic type according to Holender ’699’s per-logical-network basis, resulting in “allocating a reserved bandwidth to one of the subclasses.” Ex.1007, 5:1-11; Ex.1003, ¶¶215, 217.

164. Holender ’699 renders this limitation obvious yet another way. Holender ’699’s traffic types are associated with routes over “logical links which

Declaration of Tal Lavian, Ph.D.
Inter Partes Review of U.S. 7,330,431

belong to the same logical network.” Ex.1007, 2:1-14. Each route “carries only a single type of traffic,” with parallel routes for multiple traffic types, and requires an amount of bandwidth per logical link. Ex.1007, 7:8-11, 8:20-25. It would have been obvious for each traffic type (with different route) to have its own bandwidth requirement and allocation. Ex.1003, ¶¶216-18.

165. Paragraphs 212-218 of Ex.1003, Houh Declaration, are incorporated by reference.

x. Claim 11

a. [11.0] The method according to claim 1,

166. See analysis for Claim 1, limitations 1.0-1.5. *Supra* §§ IX(B)(i)(a-f).

167. Paragraph 142 of Ex.1003, Houh Declaration, is incorporated by reference.

b. [11.1] wherein allocating the bandwidth comprises comparing a mapping bandwidth determined in response to the bandwidth requirements of the logical connections and to the mapping with a full bandwidth determined by assuming all possible logical connections in the network are provided for.

168. Paragraphs 143-150 of Ex.1003, Houh Declaration, are incorporated by reference.

xi. Claim 25

a. [25.0] Apparatus for assigning bandwidth in a network including nodes coupled by links arranged in a physical topology, the apparatus comprising:

169. Paragraphs 151-154 of Ex.1003, Houh Declaration, incorporated by reference.

Declaration of Tal Lavian, Ph.D.
Inter Partes Review of U.S. 7,330,431

b. [25.1] a controller which is adapted to:

170. Paragraphs 155-158 of Ex.1003, Houh Declaration, are incorporated by reference.

c. [25.2] [a controller which is adapted to] receive a definition of logical connections between the nodes, the logical connections being associated with a data transmission service to be provided over the network,

171. Paragraphs 159-166 of Ex.1003, Houh Declaration, are incorporated by reference.

d. [25.3] the logical connections having a connection topology different from the physical topology,

172. See analysis for Claim 1, limitation 1.2. *Supra* § IX(B)(i)(c).
173. Paragraph 167 of Ex.1003, Houh Declaration, is incorporated by reference.

e. [25.4] [a controller which is adapted to] determine respective bandwidth requirements for the logical connections based on parameters of the service,

174. Paragraphs 168-171 of Ex.1003, Houh Declaration, are incorporated by reference.

f. [25.5] [a controller which is adapted to] map the connection topology to the physical topology, so that each of the logical connections is associated with one or more links of the physical topology, and

175. See analysis for Claim 1, limitation 1.4. *Supra* § IX(B)(i)(e). Paragraph 172 of Ex.1003, Houh Declaration, is incorporated by reference.

g. [25.6] [a controller which is adapted to] allocate a bandwidth for the service on each of the links in response to the bandwidth requirements of the logical connections and to the mapping.

Declaration of Tal Lavian, Ph.D.
Inter Partes Review of U.S. 7,330,431

176. Paragraphs 173-176 of Ex.1003, Houh Declaration, are incorporated by reference.

xii. Claim 26

a. [26.0] Apparatus according to claim 25,

177. See analysis for Claim 25, limitations 25.0-25.6. *Supra* §§ IX(B)(xi)(a-g).

178. Paragraph 177 of Ex.1003, Houh Declaration, is incorporated by reference.

b. [26.1] wherein the controller is comprised in one of the nodes.

179. Paragraphs 178-181 of Ex.1003, Houh Declaration, are incorporated by reference.

X. GROUND 2: THE COMBINATION OF BAKER, WRIGHT, HOLENDER '699, AND HOLENDER '894 RENDERS OBVIOUS CLAIMS 12-16, 18-24, AND 27-30

A. Motivation to Combine Baker with Wright, Holender '699 and Holender '894

180. A POSITA considering the teachings of Baker would have been motivated to combine Baker with Holender '894 for the same reasons a POSITA would have been motivated to combine the teachings of Holender '699 with Baker. *See supra* § IX(A).

181. Paragraphs 185-194 of Ex.1003, Houh Declaration, are incorporated by reference.

B. Detailed Analysis of the Claims**i. Claim 12**

- a. [12.0] *A method for assigning bandwidth in a network including nodes coupled by links arranged in a physical topology, the method comprising***

182. Paragraph 219 of Ex.1003, Houh declaration, is incorporated by reference.

- b. [12.1] *defining between the nodes a first set of logical connections associated with a first data transmission service to be provided over the network, and a second set of logical connections associated with a second data transmission service to be provided over the network, the first set of logical connections having a first connection topology, the second set of logical connections having a second connection topology***

183. Paragraphs 220-226 of Ex.1003, Houh declaration, are incorporated by reference.

184. First, as discussed at [1.1] and [1.2], the prior art renders obvious “defining... logical connections... having a connection topology.” Ex.1003, ¶¶220-21.

185. Second, it would have been obvious to provide for multiple data transmission services since networks commonly supported numerous services. Ex.1003, ¶222; Ex.1006, [0025] (VPN, VoIP, video-on-demand, video conferencing services). And as discussed at [1.1] and [1.2], the prior art renders obvious multiple different data transmission services, which correspond to the recited “first...” and “second...” “data transmission service[s]” limitations. See Ex.1006, [0014]; [0005], [0006]; Ex.1005, [0038], [0080]; Ex.1003, ¶222.

Declaration of Tal Lavian, Ph.D.
Inter Partes Review of U.S. 7,330,431

186. Third, both Holender references describe how “a number of logical networks are established... shar[ing] the same physical transmission and switching resources.” Ex.1007, 2:50-53; Ex.1020, 4:62-65; see also Ex. 1007, FIG. 1 (below), 4:23-30 (logical network topologies differ from underlying physical network), 4:54-65 (defining multiple logical topologies); Ex.1020, FIG. 1, 6:11-19, 6:43-54.

187. Both Holender references teach different logical networks for different traffic groups, including going so far as to provide a different logical network for each individual traffic type, rendering obvious a different set of “logical connections” for each “data transmission service.” Ex.1007, 5:1-11; Ex.1020, 6:57-67. The different logical networks have different “view[s]” of the physical network, with each logical network different from the other. Ex.1007, 1:16-27; Ex.1020, 1:13-24. Further, Figure 1 (above) shows that different logical networks have different connection topologies from each other. Thus, both Holender references render obvious defining multiple “set[s] of logical connections,” each with its own “connection topology,” and each for a different “data transmission service.” Ex.1003, ¶¶223-24; see also Ex.1007, 5:1-11, 3:60-4:14; Ex.1020, 6:57-67, 5:49-64.

188. In combination with Baker-Wright, both Holender references render obvious applying Baker-Wright’s bandwidth allocating procedures (see claim 1) to each “separate logical network.” Ex.1003, ¶¶225-26.

Declaration of Tal Lavian, Ph.D.
Inter Partes Review of U.S. 7,330,431

c. [12.2] the first and second connection topologies being different from the physical topology

189. Paragraphs 227-231 of Ex.1003, Houh declaration, are incorporated by reference.

190. Baker (see [1.2]) and the Holender references describe how each logical topology (a “connection topolog[y]”) differs from an underlying physical topology. Ex.1005, [0030], [0013], Figs. 1-&2; Ex.1007, 4:28-30, 4:54-65; Ex.1020, 6:17-19, 6:43-54; Ex.1003, ¶¶227-31.

d. [12.3] determining respective first bandwidth requirements for the first set of logical connections based on first parameters of the first data transmission service and respective second bandwidth requirements for the second set of logical connections based on second parameters of the second data transmission service

191. Paragraphs 232-235 of Ex.1003, Houh declaration incorporated by reference.

192. First, as discussed at [1.3], the prior art renders obvious “determining respective bandwidth requirements....” Ex.1003, ¶¶232-33.

193. Second, Wright contemplates bandwidth determination per logical topology. Ex.1006, [0024]. Likewise, Baker’s focus is on a particular logical topology for bandwidth management. Ex.1005, [0059].

194. Third, both Holender references teach the application of multiple logical topologies. See Ex.1007, 4:54-65; Ex.1020, 6:43-54. A POSITA would have therefore been motivated to apply Baker-Wright’s combined teachings and allocate bandwidth on a per-logical network basis. Ex.1003, ¶¶234-35.

Declaration of Tal Lavian, Ph.D.
Inter Partes Review of U.S. 7,330,431

195. Fourth, Holender '894 expressly discloses “determining respective first bandwidth requirements...and respective second bandwidth requirements....” Specifically, Holender '894 discloses optimizing a predefined objective function “associated with resource partitioning” that involves “calculat[ing]...the logical link capacities for the corresponding logical networks.” Ex.1020, 7:37-41, 8:36-44, Fig. 4 (below).

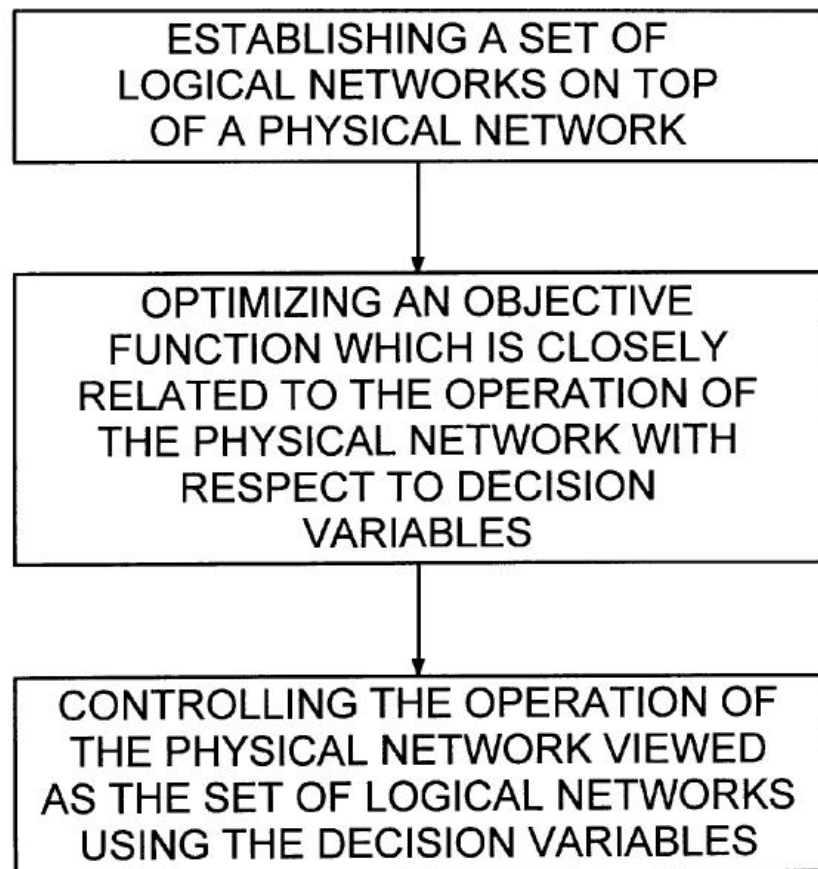


FIG. 4

Declaration of Tal Lavian, Ph.D.
Inter Partes Review of U.S. 7,330,431

- e. [12.4] generating a first mapping of the first connection topology to the physical topology, so that each of the first set of logical connections is associated with one or more links of the physical topology***

196. Paragraphs 236-239 of Ex.1003, Houh declaration incorporated by reference.

197. The prior art renders obvious “mapping....” See [1.4]. It would have been obvious that performing [1.4]’s “mapping...” results in “generating a... mapping.” The prior art’s act of associating physical network resources to logical network resources results in the mapping between those resources. Ex.1003, ¶¶236-37.

198. The Holender references further describe “how to distribute or partition said physical network resources among the logical networks,” which is an act of “generating a... mapping.” See Ex.1007, 2:59-67, 5:38-41; Ex.1020, 2:24-29, 4:4-6; see also Ex.1007, 1:53-57 (physical link is logically subdivided into logical links); Ex.1020, 1:51-53; Ex.1003, ¶¶238-39.

- f. [12.5] allocating a first bandwidth for the first data transmission service on each of the links in response to the first bandwidth requirements of the first set of logical connections and to the first mapping***

199. Paragraph 240 of Ex.1003, Houh declaration, is incorporated by reference.

- g. [12.6] generating a second mapping of the second connection topology to the physical topology, so that each of the second set of logical connections is associated with one or more links of the physical topology***

Declaration of Tal Lavian, Ph.D.
Inter Partes Review of U.S. 7,330,431

200. Paragraphs 241-243 of Ex.1003, Houh declaration, are incorporated by reference.

201. As discussed at [12.4] and [1.4], the prior art renders obvious “generating a...mapping...” Based on the Holender references’ multiple logical topologies and Baker-Wright’s per-logical-network granularity, it would have been obvious to perform “generating...” for each logical topology. See Ex.1007, 4:54-65; Ex.1020, 6:43-54; Ex.1003, ¶¶241-43.

h. [12.7] allocating a second bandwidth for the second data transmission service on each of the links in response to the second bandwidth requirements of the second set of logical connections and to the second mapping;

202. Paragraphs 244-246 of Ex.1003, Houh declaration, are incorporated by reference.

203. As discussed at [12.5] and [1.5], the prior art renders obvious “allocating...” Based on the Holender references’ multiple logical topologies and Baker-Wright’s per-logical-network granularity, it would have been obvious to perform “allocating...” for each logical topology. See Ex.1007, 4:54-65; Ex.1020, 6:43-54; Ex.1003, ¶¶244-46.

i. [12.8] summing the first and the second bandwidths to determine a total allocation for each of the links.

204. Paragraphs 247-252 of Ex.1003, Houh declaration, are incorporated by reference.

Declaration of Tal Lavian, Ph.D.
Inter Partes Review of U.S. 7,330,431

205. The Holender references explain that the “sum of logical link capacities on the same physical link cannot exceed the capacity of the physical link.” Ex.1007, 6:60-65; Ex.1020, 8:57-59. The “logical link capacities” are from the “number of logically separate logical networks” established on top of the physical network. Ex.1007, 6:50-52; Ex.1020, 8:45-47. It would have been obvious to sum allocated bandwidths for the first and second data transmission services to ensure that they do not exceed the available physical link capacity. Ex.1003, ¶¶247-50; see also Ex.1005, [0009] (discussing “available” bandwidth); Ex.1006, [0004], [0016] (same).

206. Wright additionally teaches summing bandwidths by explaining that “[o]ne way to calculate the required reserved bandwidth... is to reserve ‘x+y’ Mb/s.” Ex.1006, [0017]. It would have been obvious to repeat Wright’s summing for each logical topology, as demonstrated by the Holender references. Ex.1003, ¶¶251-52.

ii. Claim 13

a. [13.0] The method according to claim 12,

207. See analysis for Claim 12, limitations 12.0-12.8. *Supra* §§ X(B)(i)(a-i).

Paragraph 253 of Ex.1003, Houh declaration, is incorporated by reference.

b. [13.1] wherein the network comprises a ring network, and wherein the physical topology comprises a ring topology.

208. Paragraph 254 of Ex.1003, Houh declaration, is incorporated by reference.

iii. Claim 14

a. [14.0] The method according to claim 12,

Declaration of Tal Lavian, Ph.D.
Inter Partes Review of U.S. 7,330,431

209. See analysis for Claim 12, limitations 12.0-12.8. *Supra* §§ X(B)(i)(a-i).

Paragraph 255 of Ex.1003, Houh declaration, is incorporated by reference.

b. [14.1] wherein the first connection topology comprises a hub-and-spoke topology and the second connection topology comprises a full mesh topology.

210. Paragraphs 256-259 of Ex.1003, Houh declaration, are incorporated by reference.

211. First, as discussed at [3.1], the prior art renders obvious “hub-and-spoke” and “full mesh” topologies. Ex.1003, ¶¶255-57.

212. Second, the Holender references renders obvious multiple logical topologies, each with a different topology. Ex.1007, 1:21-25, 9:4-7, Fig. 1; Ex.1020, 1:18-22, 13:18-21, Fig. 1; Ex.1003, ¶258. It would have been obvious for two logical topologies to have the well-known and commonly used hub-and-spoke and full mesh topologies. Ex.1003, ¶¶258-59.

iv. Claim 15

a. [15.0] The method according to claim 12,

213. See analysis for Claim 12, limitations 12.0-12.8. *Supra* §§ X(B)(i)(a-i).

Paragraph 260 of Ex.1003, Houh declaration, is incorporated by reference.

b. [15.1] wherein at least one of the first and second data transmission services comprises a guaranteed bandwidth service.

214. Paragraphs 261-263 of Ex.1003, Houh declaration, are incorporated by inference.

v. Claim 16

a. [16.0] The method according to claim 12,

Declaration of Tal Lavian, Ph.D.
Inter Partes Review of U.S. 7,330,431

215. See analysis for Claim 12, limitations 12.0-12.8. *Supra* §§ X(B)(i)(a-i).

Paragraph 264 of Ex.1003, Houh declaration, is incorporated by reference.

b. [16.1] wherein at least one of the first and second data transmission services comprises a class of service defined by a protocol under which the network operates.

216. Paragraphs 265-267 of Ex.1003, Houh declaration, incorporated by reference.

vi. Claim 18

a. [18.0] The method according to claim 12,

217. See analysis for Claim 12, limitations 12.0-12.8. *Supra* § X(B)(i)(a-i).

Paragraph 268 of Ex.1003, Houh declaration, is incorporated by reference.

b. [18.1] wherein generating the first mapping comprises generating a first bandwidth requirement for each of the links, and wherein generating the second mapping comprises generating a second bandwidth requirement for each of the links.

218. Paragraphs 269-270 of Ex.1003, Houh declaration, incorporated by reference.

219. See [7.1]. Based on the Holender references' multiple logical topologies, it would have been obvious to perform "generating a... bandwidth requirement" for physical links used by each logical topology. See Ex.1007, 4:54-65; Ex.1020, 6:43-54; Ex.1003, ¶¶268-70.

vii. Claim 19

a. [19.0] The method according to claim 12,

220. See analysis for Claim 12, limitations 12.0-12.8. *Supra* §§ X(B)(i)(a-i).

Paragraph 271 of Ex.1003, Houh declaration, is incorporated by reference.

Declaration of Tal Lavian, Ph.D.
Inter Partes Review of U.S. 7,330,431

- b. [19.1] wherein the first parameters of the first service comprise respective first node-bandwidths required by each of the nodes to provide the first service, and wherein the second parameters of the second service comprise respective second node-bandwidths required by each of the nodes to provide the second service.*

221. Paragraphs 272-273 of Ex.1003, Houh declaration incorporated by reference.

222. See [8.1]. Based on the Holender references' multiple logical topologies providing multiple services, it would have been obvious for "parameters" of each service to include "node-bandwidths." See Ex.1007, 4:54-65; Ex.1020, 6:43-54; Ex.1003, ¶¶271-73.

viii. Claim 20

- a. [20.0] The method according to claim 12,*

223. See analysis for Claim 12, limitations 12.0-12.8. *Supra* §§ X(B)(i)(a-i). Paragraph 274 of Ex.1003, Houh declaration, is incorporated by reference.

- b. [20.1] and comprising monitoring traffic generated in the network by the first and second data transmission services, and adjusting the total allocation in response to the traffic.*

224. Paragraphs 275-276 of Ex.1003, Houh declaration, are incorporated by reference.

225. See [9.1]. Based on the Holender references' multiple logical topologies providing multiple services, it would have been obvious to "monitor[] traffic generated" by each service and "adjust[]" accordingly. See Ex.1007, 4:54-65; Ex.1020, 6:43-54; Ex.1003, ¶¶274-76.

Declaration of Tal Lavian, Ph.D.
Inter Partes Review of U.S. 7,330,431

ix. Claim 21

a. [21.0] *The method according to claim 12,*

226. See analysis for Claim 12, limitations 12.0-12.8. *Supra* §§ X(B)(i)(a-i).

227. Paragraph 277 of Ex.1003, Houh declaration, is incorporated by reference.

b. [21.1] *wherein the first data transmission service comprises a plurality of subclasses of traffic*

228. Paragraph 278 of Ex.1003, Houh declaration, is incorporated by reference.

c. [21.2] *wherein allocating the first bandwidth comprises allocating a reserved bandwidth to one of the subclasses.*

229. Paragraph 279 of Ex.1003, Houh declaration, is incorporated by reference.

x. Claim 22

a. [22.0] *The method according to claim 12,*

230. See analysis for Claim 12, limitations 12.0-12.8. *Supra* §§ X(B)(i)(a-i).

231. Paragraph 280 of Ex.1003, Houh declaration, is incorporated by reference.

b. [22.1] *wherein the first connection topology is different from the second connection topology.*

232. Paragraphs 281-283 of Ex.1003, Houh declaration, are incorporated by reference.

xi. Claim 23

a. [23.0] *The method according to claim 12, wherein summing the first and the second bandwidths to determine a total allocation for each of the links comprises:*

Declaration of Tal Lavian, Ph.D.
Inter Partes Review of U.S. 7,330,431

233. See analysis for Claim 12, limitations 12.0-12.8. *Supra* §§ X(B)(i)(a-i).

Paragraph 284 of Ex.1003, Houh declaration, is incorporated by reference.

b. [23.1] determining a first mapping bandwidth in response to the first bandwidth requirements of the first set of logical connections and to the first mapping;

234. Paragraphs 285-289 of Ex.1003, Houh declaration, are incorporated by reference.

c. [23.2] determining a second mapping bandwidth in response to the second bandwidth requirements of the second set of logical connections and to the second mapping

235. Paragraphs 290-294 of Ex.1003, Houh declaration, are incorporated by reference.

236. See [23.1] and [11.1]. Based on the Holender references' multiple logical topologies providing multiple services, it would have been obvious to "determin[e] a second mapping bandwidth" for a "second set of logical connections." See Ex.1007, 4:54-65; Ex.1020, 6:43-54; Ex.1003, ¶¶290-94.

d. [23.3] comparing the first mapping bandwidth and the second mapping bandwidth with a full bandwidth determined by assuming all possible logical connections in the network are provided for.

237. Paragraphs 295-299 of Ex.1003, Houh declaration, incorporated by reference.

238. See [11.1]. Based on the Holender references' multiple logical topologies providing multiple services, it would have been obvious to "compar[e]" each "mapping bandwidth" with a "full bandwidth." See Ex.1007, 4:54-65; Ex.1020, 6:43-54; Ex.1003, ¶¶295-97.

Declaration of Tal Lavian, Ph.D.
Inter Partes Review of U.S. 7,330,431

239. Alternatively, it would have been obvious to “compar[e]” the combination of the “first mapping bandwidth” and the “second mapping bandwidth” with a “full bandwidth.” Wright and the Holender references each teach summing bandwidth requirements of all logical connections over the same physical link, to avoid using more bandwidth than is available for that link. See Ex.1006, [0016], [0017]; Ex.1007, 6:63-65 (sum of logical link capacities cannot exceed physical link capacity); Ex.1020, 8:57-59; Ex.1008, 5:16-25 (same). In combination, it would have been obvious to consider all logical network’s logical link capacities on a given physical link when comparing with the “full bandwidth.” Ex.1003, ¶¶297-99.

xii. Claim 24

a. [24.0] *A method for assigning bandwidth in a ring network including nodes coupled by links, the method comprising:*

240. Paragraph 300 of Ex.1003, Houh declaration, is incorporated by reference.

b. [24.1] *defining between the nodes a first set of logical connections associated with a first data transmission service to be provided over the network, and a second set of logical connections associated with a second data transmission service to be provided over the network*

241. Paragraph 301 of Ex.1003, Houh declaration, is incorporated by reference.

c. [24.2] *the first set of logical connections having a hub-and-spokes connection topology, the second set of logical connections having a full mesh connection topology;*

242. Paragraphs 302-304 of Ex.1003, Houh declaration, are incorporated by reference.

Declaration of Tal Lavian, Ph.D.
Inter Partes Review of U.S. 7,330,431

d. [24.3] determining respective first bandwidth requirements for the first set of logical connections based on first parameters of the first data transmission service and respective second bandwidth requirements for the second set of logical connections based on second parameters of the second data transmission service;

243. Paragraph 305 of Ex.1003, Houh declaration, is incorporated by reference.

e. [24.4] generating a first mapping of the first connection topology to the ring network, so that each of the first set of logical connections is associated with one or more links of the ring network;

244. Paragraph 306 of Ex.1003, Houh declaration, is incorporated by reference.

f. [24.5] determining a first bandwidth for the first data transmission service on each of the links in response to the first bandwidth requirements of the first set of logical connections and to the first mapping;

245. Paragraph 307 of Ex.1003, Houh declaration, is incorporated by reference.

g. [24.6] generating a second mapping of the second connection topology to the ring topology, so that each of the second set of logical connections is associated with one or more links of the ring network;

246. Paragraph 308 of Ex.1003, Houh declaration, is incorporated by reference.

h. [24.7] determining a second bandwidth for the second data transmission service on each of the links in response to the second bandwidth requirements of the second set of logical connections and to the second mapping;

247. Paragraph 309 of Ex.1003, Houh declaration, is incorporated by reference.

Declaration of Tal Lavian, Ph.D.
Inter Partes Review of U.S. 7,330,431

i. [24.8] summing the first and the second bandwidths to determine a total bandwidth for each of the links;

248. Paragraph 310 of Ex.1003, Houh declaration, is incorporated by reference.

j. [24.9] allocating one of the first bandwidth, the second bandwidth, and the total bandwidth to each of the links in response to respectively providing the first service, the second service, and both services, over the network.

249. Paragraphs 311-315 of Ex.1003, Houh declaration, are incorporated by reference.

250. As discussed at [12.5] and [1.5], the prior art renders obvious “allocating a first bandwidth.” As discussed at [12.7], the prior art renders obvious “allocating a second bandwidth.” And as discussed at [12.8], the prior art renders obvious “summing... bandwidths to determine a total allocation.” Since [24.9] recites a Markush group, any of those alone is sufficient to render this limitation obvious. Ex.1003, ¶311.

251. Additionally, as discussed at [12.8], it was known that the allocated bandwidth should not exceed the available link capacity. See, e.g., Ex.1006, [0025] (admission on a session-by-session basis, such that bandwidth is not allocated when sufficient capacity not available); Ex.1007, 6:60-65; Ex.1020, 8:57-59. Thus, it would have been obvious to provide less than all services (the first service or second service) when the link capacity would not be sufficient to provide both services. Ex.1003, ¶¶311-15.

xiii. Claim 27**a. [27.0] Apparatus according to claim 25,**

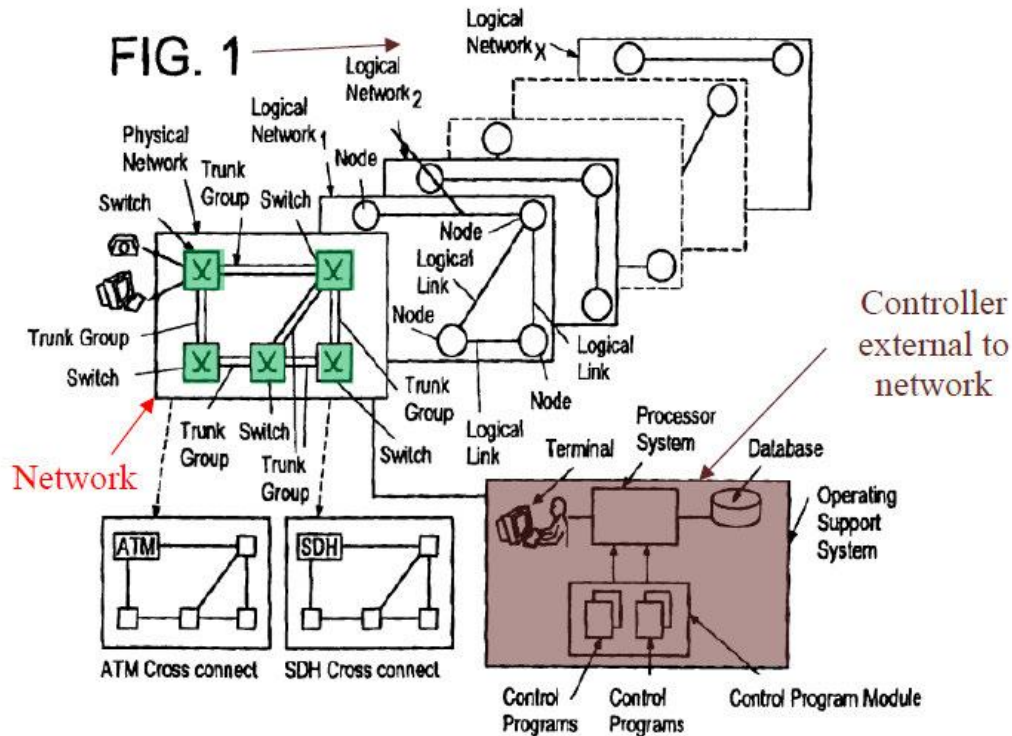
252. See analysis for Claim 25, limitations 25.0-25.6. *Supra* §§ IX(B)(xi)(a-g). Paragraph 316 of Ex.1003, Houh declaration, is incorporated by reference.

253. Paragraph 316 of Ex.1003, Houh declaration, is incorporated by reference.

b. [27.1] wherein the controller is external to the network.

254. Paragraphs 317-322 of Ex.1003, Houh declaration, incorporated by reference.

255. The Holender references describe an “operation and support system OSS” responsible for mapping logical networks to the physical network, including determining and allocating bandwidth. Ex.1007, 4:31-32, 4:54-65; Ex.1020, 6:20-25, 6:43-54. The OSS is external to the physical network and communicates via “[s]pecial data links.” Ex.1007, 4:48-53, FIG. 1; Ex.1020, 6:37-42.



Ex.1007, FIG. 1 (annotated); Ex.1003, ¶319.

256. The Holender references explain that the location of various processors and functions is largely a design choice. Ex.1007, 4:32-53 (discussing “usual[]” arrangements and options such as “regional processors” for a “not completely distributed system”); Ex.1020, 6:20-42 (same). Thus, it would have been obvious as a simple design choice to partly or completely centralize the PGL functionality of the Baker-Wright combination in an external controller as suggested by the Holender references. Ex.1003, ¶320. Alternatively, it would have been obvious to try locating PGL functionality external to the network, because there were a limited number of predictable solutions as demonstrated by both Baker (internal to the network) and the Holender references (partially or completely external to the network),

Declaration of Tal Lavian, Ph.D.
Inter Partes Review of U.S. 7,330,431

demonstrating a reasonable expectation of success in locating the controller externally. Ex.1003, ¶¶321-22.

xiv. Claim 28

a. [28.0] Apparatus for assigning bandwidth in a network including nodes coupled by links arranged in a physical topology, the apparatus comprising:

257. Paragraph 323 of Ex.1003, Houh declaration, is incorporated by reference.

b. [28.1] a controller which is adapted to:

258. Paragraph 324 of Ex.1003, Houh declaration, is incorporated by reference.

c. [28.2] [a controller which is adapted to:] receive a definition of a first set of logical connections, between the nodes, associated with a first data transmission service to be provided over the network, and a second set of logical connections, between the nodes, associated with a second data transmission service to be provided over the network, the first set of logical connections having a first connection topology, the second set of logical connections having a second connection topology,

259. Paragraphs 325-328 of Ex.1003, Houh declaration, are incorporated by reference.

260. Based on the Holender references' multiple logical topologies providing multiple services, it would have been obvious to "receive" multiple "set[s] of logical connections," each associated with a "data transmission service" and having a "connection topology." See Ex.1007, 4:54-65; Ex.1020, 6:43-54; Ex.1003, ¶¶327-28; see also *supra* [12.1].

Declaration of Tal Lavian, Ph.D.
Inter Partes Review of U.S. 7,330,431

d. [28.3] the first and second connection topologies being different from the physical topology,

261. Paragraph 329 of Ex.1003, Houh declaration, are incorporated by reference.

e. [28.4] [a controller which is adapted to:] determine respective first bandwidth requirements for the first set of logical connections based on first parameters of the first data transmission service and respective second bandwidth requirements for the second set of logical connections based on second parameters of the second data transmission service,

262. Paragraphs 330-333 of Ex.1003, Houh declaration, are incorporated by reference.

263. Based on the Holender references' multiple logical topologies providing multiple services, it would have been obvious to "determine" multiple "bandwidth requirements." See Ex.1007, 4:54-65; Ex.1020, 6:43-54; Ex.1003, ¶¶332-33; see also *supra* [12.1], [12.3].

f. [28.5] [a controller which is adapted to:] generate a first mapping of the first connection topology to the physical topology, so that each of the first set of logical connections is associated with one or more links of the physical topology,

264. Paragraphs 334-336 of Ex.1003, Houh declaration, are incorporated by reference.

g. [28.6] [a controller which is adapted to:] allocate a first bandwidth for the first data transmission service on each of the links in response to the first bandwidth requirements of the first set of logical connections and to the first mapping,

265. Paragraph 337 of Ex.1003, Houh declaration, are incorporated by reference.

Declaration of Tal Lavian, Ph.D.
Inter Partes Review of U.S. 7,330,431

h. [28.7] [a controller which is adapted to:] generate a second mapping of the second connection topology to the physical topology, so that each of the second set of logical connections is associated with one or more links of the physical topology,

266. Paragraphs 338-341 of Ex.1003, Houh declaration, are incorporated by reference.

267. See [28.5]. Based on the Holender references' multiple logical topologies providing multiple services, it would have been obvious to "generate a mapping" for each of multiple "connection topolog[ies]" to the "physical topology." See Ex.1007, 4:54-65; Ex.1020, 6:43-54; Ex.1003, ¶¶338-41; see also [12.1], [12.4], [12.6].

i. [28.8] [a controller which is adapted to:] allocate a second bandwidth for the second data transmission service on each of the links in response to the second bandwidth requirements of the second set of logical connections and to the second mapping, and

268. Paragraphs 342-345 of Ex.1003, Houh declaration, are incorporated by reference.

269. See [28.6]. Based on the Holender references' multiple logical topologies providing multiple services, it would have been obvious to "allocate a bandwidth" for each of multiple "data transmission service[s]." See Ex.1007, 4:54-65; Ex.1020, 6:43-54; Ex.1003, ¶¶342-45; see also [12.1], [12.7].

j. [28.9] [a controller which is adapted to:] sum the first and the second bandwidths to determine a total allocation for each of the links.

270. Paragraphs 346-350 of Ex.1003, Houh declaration, are incorporated by reference.

Declaration of Tal Lavian, Ph.D.
Inter Partes Review of U.S. 7,330,431

xv. Claim 29

a. [29.0] Apparatus according to claim 28,

271. See analysis at Claim 28, limitations 28.0-28.9. *Supra* §§ X(B)(xiv)(a-j).

272. Paragraph 351 of Ex.1003, Houh declaration, is incorporated by reference.

b. [29.1] wherein the controller is comprised in one of the nodes.

273. Paragraph 352 of Ex.1003, Houh declaration, is incorporated by reference.

xvi. Claim 30

a. [30.0] Apparatus according to claim 28,

274. See analysis at Claim 28, limitations 28.0-28.9. *Supra* §§ X(B)(xiv)(a-j).

275. Paragraph 353 of Ex.1003, Houh declaration, is incorporated by reference.

b. [30.1] wherein the controller is external to the network.

276. Paragraph 354 of Ex.1003, Houh declaration, is incorporated by reference.

XI. GROUND 3: THE COMBINATION OF BAKER, WRIGHT, HOLENDER '699 AND ZHENG RENDERS OBVIOUS CLAIM 6

A. Motivation to Combine Baker with Wright, Holender '699 and Zheng

277. A POSITA considering the teachings of Baker would have also considered the teachings of Zheng. Baker and Zheng both describe how to manage

Declaration of Tal Lavian, Ph.D.
Inter Partes Review of U.S. 7,330,431

physical resources (like bandwidth) in a network. *See* Ex.1005, [0016], [0030] (assigning network resources, which includes bandwidth); Ex.1007, 1:8-10, 4:56-5:14 (assessing whether enough bandwidth on each link of connection); *see also* Ex.1006, [0005] (bandwidth requirements for each link); Ex.1003, ¶358.

278. First, while Baker contemplates how to manage network resources, Baker provides limited details about how to best manage highly variable traffic flows, including traffic from sources that may briefly exceed their peak rate. A POSITA would have been motivated to refer to other sources, such as Zheng, to take advantage of Zheng's over-allocated bandwidth teachings. *See* Ex.1008, 6:21-23, 5:31-35 (over-allocated bandwidth referring to deliverable bandwidth that exceeds the required bandwidth).

279. Zheng teaches using an over-allocation approach for bandwidth management because it "assures quality of performance in the network." Ex.1008, 5:29-35. The over-allocated bandwidth is not wasted, but rather "may be used at different times by different traffic sources ... when a traffic source meets or exceeds its peak rate." Ex.1008, 6:30-34; Ex.1003, ¶359.

280. Second, a POSITA would have had a reasonable expectation of success in combining Zheng's over-allocated bandwidth teachings with Baker's and Baker-Wright-Holender '699's teachings. Zheng's network teachings are compatible with Baker's network teachings, just like Wright and Holender '699. *See supra* § IX(A).

Declaration of Tal Lavian, Ph.D.
Inter Partes Review of U.S. 7,330,431

Zheng uses ATM over a SONET ring network, just like Baker. Ex.1008, 1:36-40, 1:52-54; Ex.1005, [0037]; *see also* Ex.1006, [0015].

281. Further, Zheng's determination of over-allocated bandwidth, and whether to allow a connection, is performed by a "connection controller 102" that controls a network feeder. *See* Ex.1008, 5:16-46. This is compatible with Baker's PGL (a "*controller*") that is used to manage "network feeder utilization" for better management of bandwidth. *See* Ex.1005, [0062]; Ex.1003, ¶360.

282. Baker's PGL, configured with sufficient resources to accomplish its additional tasks, would in combination with Zheng have sufficient resources to apply Zheng's over-allocation determination teachings. *See* Ex.1005, [0047]. Accordingly, since Baker and Zheng are applicable to ATM over SONET, and contemplated implementing their respective functions at a controller, Zheng was compatible with Baker such that a POSITA would have had a reasonable expectation of success in the Baker-Zheng combination. Ex.1003, ¶361.

283. Third, the Baker-Zheng combination would have been predictable and within a POSITA's skill set. As already noted, Baker and Zheng are both applicable to ATM over SONET. Accordingly, combining Zheng with Baker would have been nothing more than the combination of known elements (Baker's PGL managing bandwidth, and Zheng's over-allocated bandwidth), according to known methods (applying Zheng's teachings in Baker's PGL), to yield predictable results (Baker's

Declaration of Tal Lavian, Ph.D.
Inter Partes Review of U.S. 7,330,431

PGL determining an over-allocated bandwidth, per Zheng, for a link's deliverable bandwidth). For at least the above reasons, a POSITA would have been motivated to combine Baker and Zheng. Ex.1003, ¶¶362-63.

284. Paragraphs 358-363 of Ex.1003, Houh declaration, are incorporated by reference.

B. Detailed Analysis of Claim 6

a. [6.0] The method according to claim 1,

285. See analysis at Claim 1, limitations 1.0-1.5. *Supra* §§ IX(B)(i)(a-f).

286. Paragraph 364 of Ex.1003, Houh declaration, is incorporated by reference.

b. [6.1] and comprising multiplying the bandwidth by a correction factor to determine an actual bandwidth.

287. Paragraphs 365-372 of Ex.1003, Houh declaration, are incorporated by reference.

288. First, as discussed at [1.3], Baker and Wright render obvious “*determining...bandwidth requirements.*” Ex.1003, ¶¶364-68.

289. Second, Zheng further teaches an approach for determining a bandwidth requirement that over-allocates bandwidth to virtual connections, while remaining within the underlying physical links' limits. Like Wright, Zheng ensures that “the sum of all the bandwidth required for each connection...is less than or equal to the total bandwidth available” on each physical link. Ex.1008, 5:4-25. To achieve this result, Zheng teaches dividing a sum of bandwidth B_j requirements by a

Declaration of Tal Lavian, Ph.D.
Inter Partes Review of U.S. 7,330,431

granularity value G , applying a “ceiling function,” and then multiplying the ceiling value by the granularity value G :

$$DB = \left\lceil \frac{\sum_j B_j}{G} \right\rceil \times G$$

Ex.1008, 6:1-18; 6:47-7:7, 5:36-37.

290. A POSITA would have known that dividing by G is mathematically equivalent to multiplying by $\frac{1}{G}$, so Zheng teaches multiplying a sum of bandwidths by both G and $\frac{1}{G}$, either of which is a “*correction factor*.” Ex.1003, ¶¶369-70.

291. It would have been obvious for Baker’s PGL to multiply Baker-Wright-Holender ’699’s bandwidth requirements by a granularity value to determine an “over-allocated” bandwidth for the actual bandwidth, used for the same purpose in Baker-Wright as in Zheng, to provide extra bandwidth should a traffic source exceed an allowed peak rate. Ex.1003, ¶¶371-72.

XII. GROUND 4: THE COMBINATION OF BAKER, WRIGHT, HOLENDER ’699, HOLENDER ’894 AND ZHENG RENDERS OBVIOUS CLAIM 17

A. Motivation to Combine Baker with Wright, Holender ’699, Holender ’894 and Zheng

292. A POSITA would have been motivated to combine Zheng with Baker-Wright-Holender ’699-Holender ’894 for substantially the same reasons given for

Declaration of Tal Lavian, Ph.D.
Inter Partes Review of U.S. 7,330,431

each reference. Holender '894 shares the same inventors as Holender '699. The references also share portions of their specification and figures. A POSITA considering the teachings of Baker would have been motivated to combine Baker with Holender '894 for the same reasons a POSITA would have been motivated to combine the teachings of Holender '699 with Baker.

293. A POSITA considering the teachings of Baker would have also considered the teachings of Zheng. Baker and Zheng both describe how to manage physical resources (like bandwidth) in a network. *See* Ex.1005, [0016], [0030] (assigning network resources, which includes bandwidth); Ex.1007, 1:8-10, 4:56-5:14 (assessing whether enough bandwidth on each link of connection); *see also* Ex.1006, [0005] (bandwidth requirements for each link); Ex.1003, ¶358.

294. First, while Baker contemplates how to manage network resources, Baker provides limited details about how to best manage highly variable traffic flows, including traffic from sources that may briefly exceed their peak rate. A POSITA would have been motivated to refer to other sources, such as Zheng, to take advantage of Zheng's over-allocated bandwidth teachings. *See* Ex.1008, 6:21-23, 5:31-35 (bandwidth management with over-allocated bandwidth, referring to deliverable bandwidth that exceeds the required bandwidth). Zheng teaches using an over-allocation approach for bandwidth management because it "assures quality of performance in the network." Ex.1008, 5:29-35. The over-allocated bandwidth is not

Declaration of Tal Lavian, Ph.D.
Inter Partes Review of U.S. 7,330,431

wasted, but rather “may be used at different times by different traffic sources ... when a traffic source meets or exceeds its peak rate.” Ex.1008, 6:30-34; Ex.1003, ¶359.

295. Second, a POSITA would have had a reasonable expectation of success in combining Zheng’s over-allocated bandwidth teachings with Baker’s and Baker-Wright-Holender ’699’s teachings. Zheng’s network teachings are compatible with Baker’s network teachings, just like Wright and Holender ’699. *See supra*, § X(A). Zheng uses ATM over a SONET ring network, just like Baker. Ex.1008, 1:36-40, 1:52-54; Ex.1005, [0037]; *see also* Ex.1006, [0015]. Further, Zheng’s determination of over-allocated bandwidth, and whether to allow a connection, is performed by a “connection controller 102” that controls a network feeder. *See* Ex.1008, 5:16-46. This is compatible with Baker’s PGL (a “controller”) that is used to manage “network feeder utilization” for better management of bandwidth. *See* Ex.1005, [0062]; Ex.1003, ¶360.

296. Baker’s PGL, configured with sufficient resources to accomplish its additional tasks, would in combination with Zheng have sufficient resources to apply Zheng’s over-allocation determination teachings. *See* Ex.1005, [0047]. Accordingly, since Baker and Zheng are applicable to ATM over SONET, and contemplated implementing their respective functions at a controller, Zheng was compatible with Baker such that a POSITA would have had a reasonable expectation of success in the Baker-Zheng combination. Ex.1003, ¶361.

Declaration of Tal Lavian, Ph.D.
Inter Partes Review of U.S. 7,330,431

297. Third, the Baker-Zheng combination would have been predictable and within a POSITA's skill set. As already noted, Baker and Zheng are both applicable to ATM over SONET. Accordingly, combining Zheng with Baker would have been nothing more than the combination of known elements (Baker's PGL managing bandwidth, and Zheng's over-allocated bandwidth), according to known methods (applying Zheng's teachings in Baker's PGL), to yield predictable results (Baker's PGL determining an over-allocated bandwidth, per Zheng, for a link's deliverable bandwidth). For at least the above reasons, a POSITA would have been motivated to combine Baker and Zheng. Ex.1003, ¶¶362-63.

298. Paragraph 373 of Ex.1003, Houh declaration, is incorporated by reference.

299. Claim 17 recites similar limitations to claim 6 demonstrated as obvious over Baker-Wright-Holender '699-Zheng in Ground 3 above. Further, claim 17 depends from claim 12, analyzed in Ground 2 with the addition of Holender '894. Therefore, claim 17 is obvious over Baker-Wright-Holender '699-Holender '894-Zheng.

B. Detailed Analysis of Claim 17

a. [17.0] The method according to claim 12,
300. See analysis for Claim 12, limitations 12.0-12.8. *Supra* §§ X(B)(i)(a-i).

301. Paragraph 374 of Ex.1003, Houh declaration, is incorporated by reference.

Declaration of Tal Lavian, Ph.D.
Inter Partes Review of U.S. 7,330,431

b. [17.1] and comprising multiplying at least one of the first and second bandwidths by a correction factor to determine a corrected bandwidth.

302. First, as discussed at [6.1], the prior art renders obvious “multiplying... by a correction factor....” Since claim 17 recites a Markush group, this teaching alone renders the claim obvious. Ex.1003, ¶¶374-76.

303. Second, based on Holender ’699 and Holender ’894’s multiple logical topologies providing multiple services with corresponding bandwidths, it would have been obvious to “multiply[]” multiple “bandwidths” by a correction factor. *See* Ex.1007, 4:54-65; Ex.1020, 6:43-54; Ex.1003, ¶¶377-78. See analysis for Claim 12, limitations 12.1 and 12.3. *Supra* §§ X(B)(i)(b, d).

304. Paragraphs 375-378 of Ex.1003, Houh declaration, are incorporated by reference.

Declaration of Tal Lavian, Ph.D.
Inter Partes Review of U.S. 7,330,431

XIII. CONCLUSION

305. I declare that all statements made in this declaration are my opinion and knowledge, and that all statements made on information and belief are believed to be true, and that these statements were made with knowledge that making intentionally false statements are punishable by fine or imprisonment, or both, under section 1001 of Title 18 of the United States Code.

Dated 1/24/2023
1/24/2023 | 6:53:32 PM PST

Signed 
Tal Lavian, Ph.D.