

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

DELL TECHNOLOGIES INC. AND DELL INC.,
Petitioners,
v.

CLOUD BYTE LLC
Patent Owner.

Case IPR2025-01285
U.S. Patent No. 9,560,177

**DECLARATION OF DR. PAUL MIN
IN SUPPORT OF PATENT OWNER'S PRELIMINARY RESPONSE**

1. I have been retained on behalf of Cloud Byte LLC (“Patent Owner”) in connection with the above-captioned *inter partes* review (IPR). I have been retained to provide my opinions in support of Patent Owner’s Preliminary Response. I am being compensated for my time at the rate of \$500per hour. I have no interest in the outcome of this proceeding.

2. The statements made herein are based upon my own knowledge and opinion. This Declaration represents only the opinions I have formed to date. I may consider additional documents as they become available or other documents that are necessary to form my opinions. I reserve the right to revise, supplement, or amend my opinions based on new information and on my continuing analysis.

I. QUALIFICATIONS

3. I am an expert in the field of high speed communication and computing, and the development of electronic devices and software systems and for the related applications. I am currently a Senior Professor in the Department of Electrical and Systems Engineering at Washington University in Saint Louis.

4. I received a B.S. degree in Electrical Engineering in 1982, an M.S. degree in Electrical Engineering in 1984, and a Ph.D. degree in Electrical Engineering in 1987 from the University of Michigan in Ann Arbor. I received several academic honors, including my B.S. degree with honors, a best graduate student award and a best teaching assistant award during my M.S. study, and a best

paper award from a major international conference for reporting results from my Ph.D. thesis.

5. After receiving my Ph.D., I worked at Bellcore in New Jersey from August 1987 until August 1990. At Bellcore, I was responsible for evolving the public switched telephone network (PSTN) into a multi-services voice and data network that incorporated packet switches, optical technologies, and wireless technologies. I received an Outstanding Achievement Award for my contributions to Bellcore in 1989.

6. In September 1990, I joined the faculty at Washington University in St. Louis. Upon arriving at Washington University, I developed a communication and computer curricula in the School of Engineering and Applied Science. I regularly teach undergraduate and graduate courses. In July 1996, I was promoted to an Associate Professor of Electrical Engineering with tenure. I am currently a Senior Professor of Electrical and Systems Engineering at Washington University. I have served as the Chair of the Graduate Curriculum (2000–2002) and the Chair of the Undergraduate Curriculum (2011–2014) for the Department of Electrical and Systems Engineering.

7. At Washington University, I have conducted research in communication, computing, and related electronic hardware and software. My research group has pioneered a new paradigm for computing and communication

systems that can alleviate the speed and performance mismatch against optical technology. I have received several grants from U.S. Federal Agencies, including the National Science Foundation (NSF), the Defense Advanced Research Project Agency (DARPA), and the Air Force Office of Scientific Research (AFOSR), and numerous contracts from companies and organizations around the world.

8. In addition, my research group at Washington University has significantly contributed to development of future generations of wireless technology. We developed methods that enable coordinated transmission and reception of wireless signals among multiple base stations. Previously, radio signals from multiple base stations were considered as interference. Leveraging our research, a cluster of base stations can work together as a single resource enhancing the quality of radio signals across extremely noisy wireless channels.

9. I developed and implemented a number of semiconductor integrated circuit chips. These integrated circuit chips include switch fabrics, processors, high speed interfaces, protocol transposers, controllers, content search engines, look up table processors, and memory cells and arrays.

10. I have researched a variety of technologies for the packet switches and routers including packet scheduler, traffic shaper, traffic policing, buffer management, and interposer. In addition, I have researched and implemented various look-up table configurations for fast packet processing, which is

particularly applicable to the Multi Protocol Label Switching or MPLS. Moreover, since mid 1990s, I have been researching and developing various security technologies such as the deep packet inspection, content searching and matching, regular expression processing, etc.

11. As a faculty member at Washington University, I have taught a number of courses in electronics, communication, and computing at both the undergraduate and graduate levels. For example, I have taught Electronics (Washington University ESE 232), Communication Theory (Washington University ESE 471), Transmission and Multiplexing (Washington University ESE 571), and Signaling and Control of Communication Networks (Washington University ESE 572).

12. I have directly supervised numerous graduate students, a number of whom received a doctoral degree under my guidance. A number of doctoral theses that I have supervised relate specifically to the aforementioned-communication and computing technologies related to this litigation. My students and I have published a number of peer-reviewed articles in these topics.

13. In addition to my responsibilities as a university faculty member, I have founded two companies. In May 1997, I founded MinMax Technologies, Inc., a fabless semiconductor company that developed switch fabric integrated circuit chips for the Internet. In March 1999, I founded Erlang Technology, Inc., a

fabless semiconductor company that focused on the design and development of integrated circuit chips and software for the Internet. One of Erlang's products received a best product of the year award in 2004 from a major trade journal for the electronics industry.

14. Outside my own start-up companies, I have also served in various technology and business advisor roles for other companies and organizations around the world. I was the main technical author for one of two winning proposals to the Korean government for CDMA wireless service licenses (1996). I was responsible for designing a commercial scale IS-95 CDMA cellular network, which I understand to be one of the earliest such networks deployed in the world. I worked with numerous engineers and scientists around the world to implement this commercial-scale cellular network before IS-95 CDMA was widely accepted. This provided me with extensive insight into various components of commercial-scale communication technology used today. I have also been involved in a semiconductor company that specializes in semiconductor memories, such as flash EEPROMs, as a board member and as a technical advisor (2007–2011).

15. I am a named inventor on eleven U.S. patents. I have authored and co-authored numerous technical papers and memoranda, many of which have appeared in various peer-reviewed international journals and conferences. I have

given more than 100 seminars and invited talks around the world. I have organized several international conferences and served as an international journal editor.

16. I am a member of, and have been actively involved in, a number of professional organizations. I have served as the Chair of the St. Louis Section of the IEEE, which has more than 3,000 members (2014), and a member of the Eta Kappa Nu Honor Society for electrical engineers. I have also been an Ambassador of the McDonnell International Scholars Academy (2007–2013).

17. I was a member of the Presidential Business Advisors Committee (to President George W. Bush) and was named 2002 Businessman of the Year by the Wall Street Journal for the State of Missouri, for my entrepreneurial efforts.

18. I have received multiple awards for my publications and contributions to technical communication systems. In 1988, I received the Best Paper Award at 18th ISATA Award of Technical Excellence in Florence, Italy. I was also a Rockwell Fellow at the University of Michigan in Ann Arbor in 1988 and 1989. I received a Research Initiation Award in 1993 from the Defense Advance Research Project Agency (DARPA). I received the Best Paper Award at MOBILITY 2011 in Barcelona, Spain. In my nearly 40 years of professional experience, I have acquired significant knowledge about telecommunications, computer, and electronics industry standards and standard setting organizations such as ANSI, IEEE, ITU, IETF, and 3GPP.

19. Additional details of my education and work experience, awards and honors, and publications that may be relevant to the opinions I have formed are set forth in my curriculum vitae. See Appendix __. A list of cases in which I have testified as an expert at trial or by deposition is attached hereto as Appendix __.

II. LEGAL UNDERSTANDING

A. The Person of Ordinary Skill in the Art

20. I understand that a person of ordinary skill in the relevant art at the time of the invention (also referred to herein as “ordinary artisan”) is presumed to be aware of all pertinent art, thinks along conventional wisdom in the art, and is a person of ordinary creativity—not an automaton.

21. I have been asked to consider the level of ordinary skill in the field that someone would have had at the time the claimed invention was made. In deciding the level of ordinary skill, I considered the following:

- the levels of education and experience of persons working in the field;
- the types of problems encountered in the field; and
- the sophistication of the technology.

22. Petitioner proposes that a POSITA is one who “would have had an undergraduate degree (or equivalent) in electrical engineering, computer science, or a comparable subject and approximately two to three years of academic or

professional work experience in a technical field with exposure to computer networking and switching/routing technology. EX1003, ¶71. A higher level of education could substitute for less industry experience and more industry experience could substitute for the specific level of education. *Id.* In any event, a POSITA would have been knowledgeable about then-existing network switching and routing technologies and techniques. *Id.*” Pet. 5-6.

23. For purposes of this declaration, I will use Petitioner’s definition of a POSITA. I am a person of ordinary skill in the art under Petitioner’s definition.

B. Legal Principles

24. I am not a lawyer and will not provide any legal opinions. Though I am not a lawyer, I have been advised that certain legal standards are to be applied by technical experts in forming opinions regarding the meaning and validity of patent claims.

1. Obviousness

25. I understand that to obtain a patent, a claimed invention must have, as of the priority date, been nonobvious in view of prior art in the field. I understand that an invention is obvious when the differences between the subject matter sought to be patented 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 person having ordinary skill in the art.

26. I understand that to prove that prior art, or a combination of prior art, renders a patent obvious, it is necessary to: (1) identify the particular references that singly, or in combination, make the patent obvious; (2) specifically identify which elements of the patent claim appear in each of the asserted references; and (3) explain how the prior art references could have been combined to create the inventions claimed in the asserted claim.

27. I understand that a patent composed of several elements is not proved obvious merely by demonstrating that each of its elements was, independently, known in the prior art, and that obviousness cannot be based on the hindsight combination of components selectively culled from the prior art to fit the parameters of the patented invention.

28. I also understand that a reference may be said to teach away when a person of ordinary skill, 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 applicant. Even if a reference is not found to teach away, I understand its statements regarding preferences are relevant to a finding regarding whether a skilled artisan would be motivated to combine that reference with another reference.

2. *My Understanding of Claim Construction Law*

29. I have been informed that patent claims are construed from the viewpoint of a person of a ordinary artisan and that patent claims generally should be understood consistent with their ordinary and customary meaning at the time of the invention. A review of the patent claim language, the patent specification, and its prosecution history are also necessary to determine the proper meaning and scope of the term at issue.

30. I have further been informed that in the specification and prosecution history the patentee may define a claim term in a way that differs from the ordinary and customary meaning. I understand that during prosecution of the patent before the U.S. Patent and Trademark Office, the Applicant may make representations or provide definitions of terms that may affect the scope of the patent claims. In particular, the Applicant may, during the course of prosecution, limit the scope of the claims to overcome prior art and/or disavow claim coverage by making clear and unambiguous statements to that effect.

31. I have been informed that a ordinary artisan may, among other things, consider dictionaries, publications, other patents, and treatises (*i.e.*, “extrinsic evidence”). I understand that extrinsic evidence may generally not be relied on if it contradicts the meaning of claim language provided by the intrinsic evidence, such as express definitions given for terms in the specification.

3. *Secondary Considerations of Non-Obviousness*

32. I understand that one of the factual inquiries when determining the obviousness of a patent is to consider objective evidence related to the issue of obviousness, sometimes called “secondary considerations of non-obviousness” or “objective indicia of non-obviousness.” I understand that such evidence can often be probative of the issues of obviousness.

33. I understand that examples of objective evidence include (1) commercial success, (2) copying, (3) industry praise, (4) skepticism, (5) long-felt but unsolved need, and (6) failure of others.

34. I understand that there must be a nexus between the patented invention and the evidence of secondary considerations. I further understand that there is a presumption of such a nexus if the claims of the patent are coextensive with a product or products that are the subject of the secondary considerations evidence. I further understand that in order for a claim to be coextensive with a product, one must look at the claims at the whole and not just a new feature. In addition, the claimed invention should not be merely a subcomponent of the products sold but should encompass the entire apparatus.

III. CLAIM CONSTRUCTION

35. In my opinion, all claim terms should be given their ordinary meaning in light of the specification.

IV. GROUND 1: PETITIONER DOES NOT SHOW THAT RIJHSINGHANI ALONE RENDERS OBVIOUS THE CHALLENGED CLAIMS

A. Petitioner Does Not Show that Rijhsinghani Discloses a “Table Including Rules and Actions” (Claims 1 and 7)

36. In my opinion, Petitioner has failed to show that Rijhsinghani discloses the recited “table including rules and actions,” which is found in claims 1 and 7.

37. The Petition relies on certain “instructions” that are sent from an NMS to a switch. Pet. 23-24, 31-34. However, Rijhsinghani teaches that such “instructions” are programming instructions. EX1005, 2:14-19 (“[T]he NMS 290 has configured two VLANs by instructing, *e.g. programming*, and thereby configuring the switches 5’-55’”), 2:53-56 (“[T]he NMS 290 generates and transmits signals to *instruct* the switches 5’-55’ to form the desired VLAN configurations.”), 3:39-45 (“The switch determines, based upon *instructions* previously received from the NMS 290, that the LAN 205 falls within the applicable VLAN”), 10:55-59 (“[T]he control module 288, in accordance with the *programmed instructions* ... determines one or more VLAN matches”).

38. Rijhsinghani does not expressly teach any table that stores such instructions, nor does Petitioner contend that it does. Pet. 23-24. Petitioner instead argues that “a POSITA would have known that the instructions issued to switches ... would be stored in *a table*, as claimed, because a table data structure

was the most common technique for switches to make packet routing decisions.”

Pet. 23 (citing EX1003, ¶142). Petitioner also cites to a number of other references, and claim they show that “[s]witches commonly used information about a received packet to look up routing information in *a table* stored on the switch.” Pet. 23-24. But none of these references teach a table that stores ***programming instructions*** related to routing. For example, Exhibit 1008 displays a “switch table” that does not contain programming instructions. EX1008, 263-264.

Address	Interface	Time
62-FE-F7-11-89-A3	1	9:32
7C-BA-B2-B4-91-10	3	9:36
...	...	...

Figure 5.27 ♦ Portion of a switch table for the uppermost switch in Figure 5.26

39. Exhibit 1009, by way of another example, describes a table storing various fields, none of which constitute programming instructions. EX1009, 5-6.

40. Petitioner also argues that it would have been “obvious ... to try implementing Rijhsinghani’s *rules* and *actions* on each switch in *a table* because it was one of a finite number of identified, predictable data structures for this purpose and could have been implemented by a POSITA with more than a reasonable expectation of success.” Pet. 24. But Petitioner does not provide any evidence

beyond its expert's testimony that a table was a suitable data structure for storing programming instructions.

41. In actuality, at the time of the '177 patent, which has an earliest filing date of February 17, 2011, switches did not store tables containing programming instructions. As shown by Petitioner's own evidence, switches typically stored routing tables with routing *data*, which could be efficiently stored in the small storage space of a switch—such tables could be stored as comma-separated values containing a handful of columns mapping an interface of the switch to an address of a device. Storing programming instructions within a table would have been an inefficient way of implementing a routing table and would therefore not have been something obvious to try.

**B. Petitioner Does Not Show that Rijhsinghani Discloses
“Encapsulat[ing] the Identified Packet by the Additional Header”
(All Claims)**

42. In my opinion, Petitioner does not establish that Rijhsinghani discloses “duplicat[ing] a part of a header of the identified packet as *an additional header*” and then “encapsulat[ing] the identified packet by *the additional header*.”

43. I note that Petitioner has proposed that the term “encapsulate” be construed as “appending an additional header to a data packet.” Pet. 7. I do not necessarily disagree with that construction, but additional discussion is in order.

44. Network communications involve what is known as a network stack, such as the OSI model. For example, the OSI model constitutes various layers such as the physical layer, the data link layer, the network layer, the transport layer, and the application layer. In accordance with the OSI model, and in particular network communications using TCP/IP, a packet may contain multiple layers of headers associated with each of the layers. Thus, a TCP/IP packet will have an **IP header** (associated with the network layer) which includes information the source and destination IP addresses. The TCP/IP packet will also have a **TCP header** (associated with the transport layer) which includes the port number. And the packet may also have, for example, an **application header** such as an HTTP header for communicating with web servers using information pursuant to the HTTP protocol.

45. Each of these headers encapsulate the previous header and the rest of the data as a payload to that header. Thus, a packet containing a payload may be encapsulated by a data link header. Then, the data link header and payload may be encapsulated by the network layer. And so on. Consistent with this understanding, the '177 patent explains that, for example, the "IP header of the packet" can be duplicated by "encapsulating a packet with the **same header as the IP header.**" EX1001, 6:18-24. This is done by appending the same IP header to the packet.

EX1001, 6:51-54 (“[T]he packet ... has the structure of ‘the IP header 1-the IP header 1-the payload’.”).

46. Thus, I do not necessarily disagree that the encapsulation could simply involve appending the header to the packet. However, in my opinion, the claims further require that when a header or a portion of a header is copied, the copied portions must constitute the new, encapsulating header. This is seen from the language of the claims, which recite “duplicat[ing] a part of a header of the identified packet *as an additional header*,” where the additional header is the encapsulating header. In other words, the duplicated portion cannot simply be a *part* of the encapsulating header. This is consistent with the specification, where the IP header is duplicated and appended to the packet. EX1001, 6:18-54.

47. Petitioner argues that “Rijhsinghani discloses ... duplicating part of the header information in the received packet so that it can be used as *part of the VLAN header* added to the packet.” Pet. 44-45. That is true. Rijhsinghani discloses that when it creates a “VLAN header,” it copies the destination and source address from the header of the received packet. But Rijhsinghani never describes that the copied information constitutes a header—instead, Rijhsinghani teaches that the “VLAN header” includes additional, non-duplicated information, such as the “VLAN Protocol” and “VLAN Tag.” Pet. 45; EX1005, Fig. 4

(annotated by Petitioner). This does not meet the recited claims that the duplicated information *is the header*.

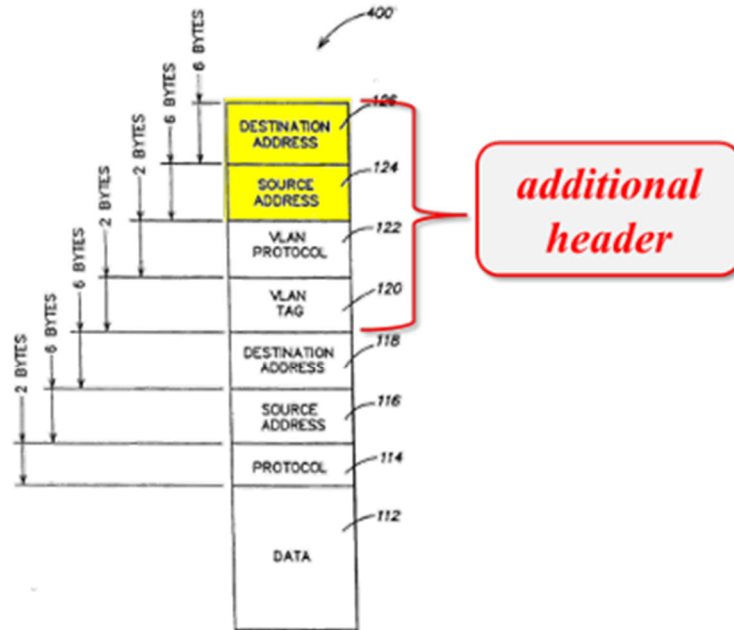


FIG. 4

48. Petitioner alternatively argues that “the source and destination addresses within the VLAN header would constitute such an *additional header*.” Pet. 46 (providing an alternative annotation to Figure 4, reproduced below).

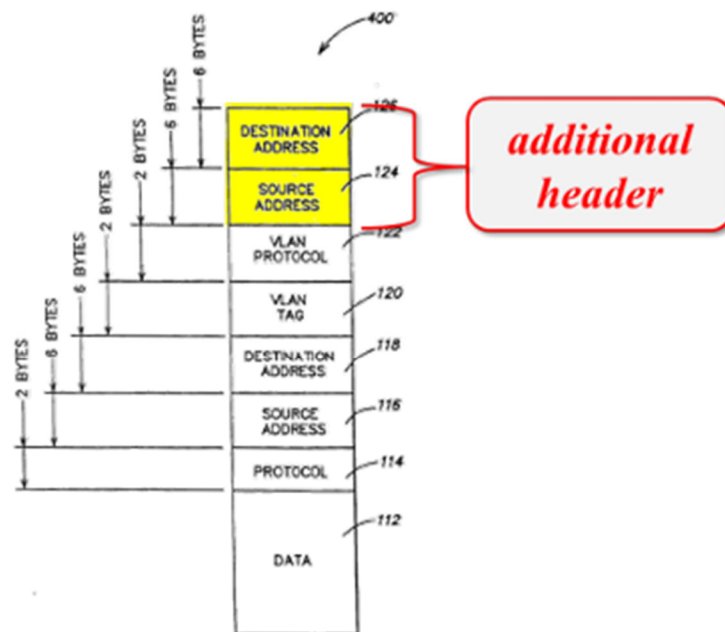


FIG. 4

49. But Petitioner does not explain how the duplicated destination and source addresses alone constitute a header. Rijhsinghani does not ever describe the copied information as alone constituting a header. And Dr. Crovella does not provide any explanation, instead simply saying the same thing as the Petition. EX1003, ¶184. Thus, in my opinion, Petitioner does not sufficiently show that the copied information *is an additional header*.

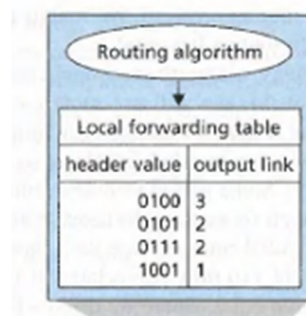
V. GROUND 2 AND 3

50. In my opinion, Grounds 2 and 3 also fail for the same reasons I discussed above for Ground 1. These grounds combine Rijhsinghani with other references to challenge dependent claims. Thus, they do not address the deficiencies I identified above.

VI. GROUND 4 THROUGH 6

51. In my opinion, Grounds 4 through 6 also fail for the same reasons I discussed above for Ground 1. Petitioner adds the Computer Networking prior art to argue that it discloses a “table including rules and actions.” Pet. 82-84. But this ground does not address the deficiencies I identified above.

52. Computer Networking fails for the same reasons as Rijhsinghani, namely, that it does not provide any disclosure for storing computing instructions in a switch’s forwarding table. For example, the Petition relies on the below table. Pet. 82-83 (citing EX1008, 96).



53. But as I discussed above, Rijhsinghani teaches that its alleged rules come in form of *programming instructions* delivered from the NMS for determining which VLAN a packet should be associated with. *See, e.g.*, EX1005, 2:14-19, 10:55-59. Thus, when Petitioner argues that “it would have been obvious to implement Rijhsinghani’s switches with table structures including rules and corresponding actions for processing packets as taught by any number of prior art references including Computer Networking (EX1008)” (Pet. 82), Petitioner does

not explain how it would use the above table to store computing instructions. As Petitioner correctly explains, this table merely includes “a column with header values (*rules*) used to lookup values in a column identifying the output link for forwarding the particular packet.” Pet. 83. But such a table is not suitable for storing programming instructions.

54. If Petitioner is arguing that Rijhsinghani’s programming instructions should be completely replaced with Computer Networking’s forwarding table, in my opinion, Petitioner has not provided any explanation for why a POSITA would be motivated to do that. In my opinion, such a combination would require heavy modifications to the NMS with respect to how the forwarding table is stored in the NMS and delivered to the switches.

VII. CONCLUSION

55. In signing this declaration, I recognize that the declaration will be filed as evidence in a contested case before the Patent Trial and Appeal Board of the United States Patent and Trademark Office. I also recognize that I may be subject to cross-examination in the case and that cross-examination will take place within the United States. If cross-examination is required of me, I will appear for cross-examination within the United States during the time allotted for cross-examination.

56. I hereby declare that all statements made herein of my own knowledge are true and that all statements made on the information and belief are believed to

be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code.

Executed: October 20, 2025

A handwritten signature in black ink, appearing to read "Paul Min". The signature is fluid and cursive, with a horizontal line extending from the end of the name.

Paul Min, Ph.D.