

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

CISCO SYSTEMS, INC.,

Petitioner,

v.

OPTIMNET LLC,

Patent Owner

IPR2026-00321
U.S. Patent No. 9,313,101

**DECLARATION OF DR. MAHDI ESLAMIMEHR IN SUPPORT OF
PATENT OWNER'S PRELIMINARY RESPONSE**

I, Dr. Mahdi Eslamimehr, declare as follows:

I. Introduction and Qualifications

1. I have been retained by counsel for OptimNet LLC ("Patent Owner") to provide independent technical opinions in connection with the Patent Owner Preliminary Response concerning U.S. Patent No. 9,313,101 (the "'101 patent"). The bases for my opinions, including my education, training, and professional experience, are summarized below and set forth in greater detail in my curriculum vitae, attached as **Ex. 2003**.

2. I am an expert in computer networking and in the design, development, and operation of large-scale network management, traffic-control, and network charging software. My areas of expertise include policy-based network management; network traffic control, management, and policing; quality of service (QoS); packet classification and traffic-flow identification; network management systems; and the operation support and business support systems (OSS/BSS), including the policy, charging, and accounting/billing subsystems, used to operate carrier-grade fixed and mobile networks. These fields are at the core of the '101 patent, which is directed to controlling network traffic by means of a time-based policy that is set, distributed, and executed across a policy server, a policy management system, and policy execution equipment.

3. I hold a Doctor of Philosophy (Ph.D.) in Computer Science from the University of California, Los Angeles (UCLA), and a Master of Science (M.S.) in Computer Science from Linköping University, Sweden. I also hold a Master of Business Administration (MBA) from the London School of Economics and Political Science, and I completed executive education in Strategy Execution at Harvard Business School. I am currently an Adjunct Professor in the Department of Computer Science at the University of Southern California (USC).

4. I have worked as a software and telecommunications engineer for more than twenty years, with responsibilities spanning the design, development, analysis, testing, and operation of network protocols, network management systems, and carrier-grade traffic-control and charging solutions. As the Chief Technology Officer and Chief Operating Officer of Clarity Global, a network-solutions company specializing in operation and business support systems for mid- to large-scale telecommunications operators, I designed, developed, and oversaw the operation of network management, traffic-management, and charging solutions for fixed (FTTx) and mobile (2G/3G/4G/LTE/5G) operators, data centers, and energy companies. My responsibilities included the design of OSS/BSS platforms encompassing business assurance, billing and charging, customer relationship management, and full-service orchestration, and the roll-out and operation of network solutions serving carriers with more than 500 million subscribers across data, IP, transmission, voice, IMS,

circuit-switched, and broadband domains. This work required me to design and operate the precise class of carrier systems that monitor subscriber traffic and apply provider-defined policies, including usage- and time-based controls and the associated accounting models.

5. Through my engineering and executive roles, I developed deep familiarity with the foundational technologies and prior art underlying the '101 patent. This includes policy-based network management architectures in which a traffic-control policy is defined, decided upon, distributed, and enforced across distinct functional elements, including a policy server, a policy decision endpoint, a policy management system, and a policy execution endpoint, as well as the standardized frameworks and protocols used to represent and provision such policies, including the IETF Common Open Policy Service (COPS) framework. It further includes the classification and control of network traffic based on packet header information, such as 5-tuple (source IP address, destination IP address, source port, destination port, and protocol) and 7-tuple (additionally including input port number and signature) information, as well as traffic flows and traffic patterns; quality of service (QoS) frameworks such as Differentiated Services (DiffServ) and Integrated Services (IntServ), together with the traffic policing, shaping, rate-limiting, admission-control, and preferential-processing techniques used to enforce them; and usage- and time-based accounting, charging, and metering models by

which a network service provider monitors, limits, prioritizes, or intercepts subscriber traffic, for example, enforcing a monthly data-volume cap or restricting particular traffic during specified time periods. I am further familiar with the standardized Policy and Charging Control architecture of 3GPP mobile networks, including the Policy and Charging Rules Function and the Policy and Charging Enforcement Function, which apply operator-defined policy and charging rules to subscriber traffic in 2G/3G/4G/LTE/5G networks, the very networks for which I designed and operated OSS/BSS solutions. I was working with these traffic-control, policy-management, and charging technologies in my professional capacity during and before the relevant time frame of the '101 patent.

6. Earlier in my career, I was responsible for the analysis, design, and implementation of network-protocol software and model-based testing frameworks at Ericsson AB's research and development group in Stockholm, Sweden, work that required extensive study of how network protocols are deployed at large scale. I also developed Network-on-Chip (NoC) supporting software and a scalable topology language for many-core processors at Samsung Electronics' infrastructure research and development group, implemented worst-case-execution-time and scheduling tools for microcontrollers at VERIMAG (CNRS) in France, and migrated legacy databases for the United Nations World Food Program. I subsequently served as a

postdoctoral scholar at UCLA and SAP Labs, where I conducted research into complex, large-scale software analysis, testing, and formal verification.

7. In addition to my engineering and operational experience, I have provided technology and intellectual-property consulting to venture capital firms, private equity firms, and Fortune 100 companies. I have led or supervised more than forty technical due diligence and merger-and-acquisition engagements, a number of which concerned telecommunications network core infrastructure, 5G networks, operation support systems, enterprise connectivity, and SD-WAN and MPLS networks. I have also performed patent valuation and analysis directed to network technologies, including virtual private networks (VPNs), content delivery networks (CDNs), machine-to-machine (M2M) communications, and edge/fog computing.

8. My research has been published and presented at leading peer-reviewed conferences and journals and has been cited more than 219 times. I received the Best Paper award from the IEEE International Symposium on Software Reliability Engineering (ISSRE), a software-engineering conference sponsored and hosted by the National Institute of Standards and Technology (NIST).

9. I have been retained as a testifying expert witness and as a non-testifying expert consultant in more than 120 matters, identified in my curriculum vitae, involving patents, trade secrets, software copyright, breach of contract, and

related technical disputes in state and federal courts and in arbitration proceedings. I have never been disqualified as an expert witness in any legal proceeding.

10. Quandary Peak Research is reimbursed for my work in this matter at the rate of \$650 per hour, plus reimbursement for direct expenses. My compensation is based solely on the time I devote to this matter and is not contingent in any way on the substance of my opinions or the outcome of this proceeding.

II. Materials Considered and Methodology

11. In forming the opinions set forth in this declaration, I have reviewed U.S. Patent No. 9,313,101 (Ex. 1001), including its claims and specification; the Petition for inter partes review in IPR2026-00321; the Declaration of Dr. Mark E. Crovella (Ex. 1003) (“Crovella Decl.”); the exhibits cited in the Petition and in this declaration, including Mo (Ex. 1004), Peng (Ex. 1005), ETSI TS 129.212 (Ex. 1006), and ETSI TS 123.203 (Ex. 1007); and the correct prosecution history of the ’101 patent submitted as Exhibit 2001. I have also reviewed the Patent Owner Preliminary Response.

12. I understand that Petitioner has proposed a level of ordinary skill in the art. For purposes of this declaration, I have applied Petitioner’s proposed level of skill. My opinions do not depend on any difference between Petitioner’s proposed level of ordinary skill and any alternative level that Patent Owner may propose later in this proceeding.

13. I have applied the plain and ordinary meaning of the claim terms as they would have been understood by a person of ordinary skill in the art in light of the '101 patent's specification and prosecution history. I have not been asked to offer a separate claim construction opinion for purposes of this declaration.

14. My opinions are based on my review of the materials identified above, my education and professional experience in network policy management, QoS, packet classification, telecommunications OSS/BSS systems, 3GPP policy and charging architectures, and my understanding of how a person of ordinary skill in the art would have understood the cited materials as of the priority date of the '101 patent.

15. My analysis compared the claim language and the Petition's specific citations to Mo, Peng, and the cited standards, and I did not assume that a limitation is satisfied merely because those references generally relate to policy control, QoS, or charging systems.

III. Technical Background of the '101 Patent

16. The '101 patent describes a time-based policy system in which a time-based policy is set at a policy server, passes through a policy management system, and is executed by policy execution equipment. In my opinion, a person of ordinary skill in the art would understand the '101 patent to describe three functionally distinct roles: the policy server sets and formats the policy, the policy management

system stores, synchronizes, and parses the policy for the policy execution equipment, and the policy execution equipment executes the policy on traffic. Ex. 1001, 3:14–16, 3:28–32, 3:33–35, 3:37–42.

17. I do not understand the '101 patent to require that the policy server, policy management system, and policy execution equipment must always be separate physical boxes. The distinction is functional. The policy management system is described as a software-based stage. A person of ordinary skill would nevertheless understand that the policy management system performs intermediate management functions that are different from simply deciding a policy at one node and enforcing it at another. In particular, the policy management system stores the received time-based policy, synchronizes it in real time, parses it into a structure appropriate for the policy execution equipment, and transmits the parsed policy to each policy execution equipment. Ex. 1001, 3:37–42, 4:36–39.

18. A two-node arrangement in which one node makes a policy or QoS decision and a second node enforces that decision does not, by itself, perform the intermediate store-synchronize-parse mediation function described for the policy management system in the '101 patent. Such a two-node arrangement lacks the distinct policy management system role unless the reference identifies functionality corresponding to that intermediate management role.

19. The '101 patent also describes a policy that is set based on a combination of packet information and a time condition. The patent identifies tuple information, including 5-tuple information, as information included in a packet. Ex. 1001, 1:32–33, 3:19–21. A 5-tuple refers to packet-header information for a packet or flow, including source IP address, destination IP address, source port, destination port, and protocol.

IV. Technical Opinions Regarding Mo, Peng, and the Challenged Claims

A. Technical Opinion Regarding Mo's QoS Authorization and Packet-Tuple Information

20. I have reviewed Mo's description of QoS authorization. In my opinion, Mo does not disclose setting a time-based policy based on packet-tuple information. Mo describes QoS at the IP-CAN bearer level, QCI level, and service-flow level. Ex. 1004 ¶¶ [0004], [0031]. Those levels are not the same as packet-tuple analysis. An IP-CAN bearer is a transport bearer. A QCI is a QoS class identifier. A 5-tuple, by contrast, is packet-header information that identifies a particular packet or flow, including source IP address, destination IP address, source port, destination port, and protocol.

21. In my opinion, bearer-level or QCI-level QoS authorization does not require, and does not by itself indicate, that a policy was set based on a per-flow or per-packet 5-tuple. An authorization at the bearer or QCI level applies to a bearer or QoS class. Mo states that Authorized QoS may apply independently to all IP-CAN

bearers with the same QCI. Ex. 1004 ¶ [0005]. A QoS authorization that applies to all bearers sharing a QCI is not set from the unique 5-tuple of any particular packet or flow.

22. Mo's description of its rule sets is consistent with this understanding. Mo states that its rule sets establish Authorized QoS based on subscriber information, usage, and time-of-day information. Ex. 1004 ¶¶ [0034]–[0035]. Subscriber information identifies a subscriber or subscription. Usage reflects consumption. Time-of-day information reflects a time period. None of those inputs is packet-tuple information, and none corresponds to the source IP address, destination IP address, source port, destination port, and protocol of a packet.

23. I have also reviewed the 3GPP standards cited by Petitioner and Dr. Crovella. In my opinion, those standards do not change the analysis. ETSI TS 123.203 states that a service-data-flow filter may be a pattern for matching the IP 5-tuple. Ex. 1007 § 6.2.2.2, p. 47. The word “may” indicates a possible filter pattern, not a requirement. ETSI TS 129.212 also lists filter fields beyond a 5-tuple, including Type-of-Service/Traffic Class, Security Parameter Index, and Flow Label. Ex. 1006 §§ 5.3.14–5.3.15, 5.3.51–5.3.52. A filter may therefore match other fields or fewer fields. From a technical perspective, these standards show at most that a 5-tuple can be used in some PCC filtering contexts. They do not show that Mo's QoS authorization is set from packet-tuple information.

B. Technical Opinion Regarding Configured Filters

24. A configured service-data-flow filter is different from tuple information included in a packet from the traffic. A service-data-flow filter is a rule or filter pattern that may be configured in advance. It may include wildcarded or unspecified fields. Ex. 1007 § 6.2.2.2, p. 47; Ex. 1006 §§ 5.3.14–5.3.15, 5.3.51–5.3.52. A rule that is capable of matching packet fields during later enforcement is not the same as setting a policy based on tuple information actually included in a packet from the traffic. The former describes a possible downstream enforcement criterion. The latter is the claimed act of setting the policy based on tuple information present in a traffic packet.

C. Technical Opinion Regarding Mo's Authorized QoS

25. I have reviewed Mo's description of rule sets and Authorized QoS. Mo describes rule sets that establish an Authorized QoS, and Mo also describes transmitting an updated QoS result to the gateway. Ex. 1004 ¶¶ [0035], [0037], [0045]. In my opinion, a person of ordinary skill would distinguish a policy or rule set from a per-session Authorized QoS output produced by applying rules. The '101 patent claims recite a time-based policy that is set, transmitted, downloaded, stored, synchronized, parsed, and executed. Ex. 1001, claims 1, 3, 6. To the extent Mo's Authorized QoS or RAR message is treated as the claimed policy, I do not see Mo

disclose that this same object is set based on tuple information and a time condition by a policy server.

D. Technical Opinion Regarding the Cited Standards

26. I reviewed the pages of ETSI TS 123.203 and ETSI TS 129.212 cited in Dr. Crovella's declaration for the 5-tuple point. The express language that a service-data-flow filter "may" be a pattern for matching the IP 5-tuple appears at ETSI TS 123.203 (Ex. 1007) § 6.2.2.2, p. 47. I did not see that language on the pages of ETSI TS 123.203 cited in Crovella paragraph 84 (Ex. 1007 pp. 22, 27). Likewise, the page of ETSI TS 129.212 (Ex. 1006 p. 69) cited for the assertion that the QoS includes a 5-tuple contains AVP definitions, including TFT-Packet-Filter-Information, ToS-Traffic-Class, and QoS-Information, but I do not understand that page to state that Mo's QoS authorization includes or is set from a 5-tuple.

E. Technical Opinion Regarding the "Independently From the Traffic" Limitation

27. Based on my review of Mo, I do not see Mo disclose, for the claimed policy, a time condition provided independently from the traffic. Mo repeatedly combines usage measured from the traffic with time of day. Ex. 1004, Title. Mo's claims authorize QoS based at least on subscriber usage and the current time period, and Mo's processing flows are triggered by usage reports and refer to usage as part of a combined condition with time of day. Ex. 1004, claims 1, 8; ¶¶ [0038]–[0041], [0048]. A usage report conveyed in a Credit Control Request reflects usage

measured from the subscriber's actual traffic. In my opinion, that disclosure does not indicate that the time condition is provided independently from the traffic.

28. I understand that Mo includes a clock-based trigger, including a scheduler that wakes up based on a time-of-day clock. Ex. 1004 ¶ [0045]. That does not change my opinion. Storing a Next Re-Authorization time in a cache and later providing it to a scheduler does not establish the source of that value. Crovella Decl. ¶ 82. To the extent a re-authorization time is computed during session processing and then cached, the fact that it is later read from a cache does not show that it was provided independently from the traffic.

F. Technical Opinion Regarding Peng

29. I have reviewed Peng. Peng's time condition is a cumulative-usage-duration threshold, such as Internet access with 2M bandwidth for 150 hours. Ex. 1005, 5:12–14. Peng's decision is based on the combination of a time condition and cumulative time of usage. Ex. 1005, 7:6–18. I do not see Peng disclose setting a policy based on packet-tuple information. I did not find the word "tuple" in Peng, and I did not find disclosure in Peng of using a 5-tuple or flow-descriptor tuple as a decision input for setting the claimed policy.

G. Technical Opinion Regarding the PS, PMS, and PEE Roles

30. The '101 patent describes three functionally distinct roles. The policy server sets and formats the policy. The policy management system stores,

synchronizes, and parses the policy for the policy execution equipment. The policy execution equipment executes the policy on traffic. In my opinion, a person of ordinary skill would understand these as distinct functional roles, even if the patent does not require that they always be implemented as separate physical devices. Ex. 1001, 3:14–16, 3:28–32, 3:33–35, 3:37–42. The specification also teaches that the determination whether the execution time point has arrived can be performed at different stages — for example, “at a PS stage or a PMS stage.” Ex. 1001, 4:27–32.

31. Mo describes the conventional 3GPP PCC arrangement of a PCRF and PCEF, along with an SPR. In Mo, the PCEF generates a Credit Control Request and forwards it. The PCRF validates the message, retrieves subscriber data from the SPR, and returns an authorization to the PCEF over the Gx interface. The SPR is a subscription profile repository. Ex. 1004 ¶¶ [0029]–[0030]. In my opinion, Mo describes two functional PCC nodes relevant to the mapping: a PCRF for decision and scheduling functions, and a PCEF for enforcement functions.

32. I do not see in Mo functionality corresponding to the ’101 patent’s intermediate policy management system. I do not see Mo disclose a node or functionality that receives a policy from a distinct upstream policy server, stores that policy, synchronizes it in real time, parses it into a structure appropriate for policy execution equipment, and then transmits the parsed policy downstream. I also do not

see Mo describe a policy management system transfer syntax or a transfer-syntax conversion step.

33. Mo's PCRF performs decision and scheduling functions. Mo's PCEF receives information over Gx and enforces rules or QoS treatment. Ex. 1004 ¶¶ [0029]–[0030], [0045]. In my opinion, that arrangement does not identify a separate policy management system role between the policy server and the policy execution equipment. Mo supplies, at most, two of the three functional roles described in the '101 patent.

34. I understand that the Petition identifies Mo's PCRF as a policy server and also identifies PCRF software functionality as a policy management system. Pet. 38, 41–42; Crovella Decl. ¶¶ 81, 83, 88–89. In my opinion, labeling one PCRF as both the policy server and policy management system does not show that Mo discloses the distinct store-synchronize-parse mediation functionality of the policy management system.

35. Mo's only arrival-determination identified by the Petition is the re-authorization scheduler determination in Figure 4, where the scheduler determines whether the Next Re-Authorization time is now or earlier. Ex. 1004 ¶ [0045] (step 409). That determination is performed at the PCRF in Mo. I understand the Petition relies on that same PCRF scheduler step for the arrival-determination in claims 1, and 3, and for claim 6 relies on the same scheduler theory together with a proposed

Peng-based relocation of that scheduler functionality to the PCEF. Crovella Decl. ¶¶ 77–79, 90, 99. I understand that claim 1 locates that determination at the policy server, claim 3 at the policy management system, and claim 6 at the policy execution equipment. Ex. 1001, claims 1, 3, 6. In my opinion, Mo does not disclose a PMS or PEE performing that same arrival-determination. Nor does Peng supply the missing intermediate role. Peng, like Mo, describes the two-functional-node 3GPP arrangement of a PCRF and a PCEF, and proposes flexibility as to whether a policy determination and associated processing are performed at the PCRF or at the PCEF. Ex. 1005, 7:6–18. In my opinion, relocating processing between the same two nodes does not add an intermediate policy management system role, and I do not see Peng disclose the store-synchronize-parse mediation functionality described in the '101 patent.

H. Technical Opinion Regarding Claim 3

36. Claim 3 requires storing the policy at a database included in the PMS. Ex. 1001, claim 3. In my opinion, Mo's SPR is not such a database. Mo describes the SPR as a Subscription Profile Repository from which the PCRF retrieves subscriber data. The subscriber data in Mo includes subscriber profile information, such as aggregate maximum bit rate, per-QCI bandwidth limits, per-application limits, identifiers, charging parameters, priority, and preferences. Ex. 1004 ¶ [0029]. Those are inputs used by the PCRF when formulating an authorization.

37. A repository of subscriber profile inputs is technically different from a database that stores the claimed policy. A policy engine may read subscriber data from a profile repository in order to make a decision, but that does not mean the profile repository stores the policy, or that the profile repository is a database included in a policy management system.

38. Mo states that the PCRF stores the Authorized QoS, but I do not see Mo state that the Authorized QoS is stored in the SPR. Ex. 1004 ¶ [0037] (step 209). Nor do I see Mo state that the SPR stores the claimed time-based policy. Moreover, Peng’s description of the SPR is consistent with this understanding. Peng states that the SPR contains subscriber information “used by the PCRF to formulate” policies. Ex. 1005, 1:22–24. In my opinion, a subscriber-profile repository consulted as an input when the PCRF formulates a policy is an input to policy formulation; that description does not show a database that stores the resulting policy.

I. Technical Opinion Regarding Claim 6

39. Claim 6 requires downloading the policy by the policy execution equipment. Ex. 1001, claim 6. In my opinion, the operations described for this limitation do not show a PEE downloading the policy. Pet. 45–46; Crovella Decl. ¶¶ 97–98.

40. Relocating Mo's re-authorization scheduler from the PCRF to the PCEF is not a downloading step. Crovella Decl. ¶ 98. It concerns where a timing determination is performed, not whether the PEE downloads the policy.

41. Invoking a rule set to produce an authorization is also not downloading a policy by the policy execution equipment. It is a decision or authorization process. In my opinion, neither relocating the scheduler nor invoking a rule set establishes that the PEE downloads the policy as claim 6 requires.

42. Peng discusses moving a determination or associated processing between the PCRF and PCEF in order to reduce Gx signaling. Ex. 1005, 7:6–18. I do not see Peng identify a step in which the PEE downloads the claimed policy.

J. Technical Opinion Regarding the Proposed Scheduler Relocation

43. I have reviewed the proposed modification of Mo in view of Peng for claim 6. The proposed modification is described as implementing Mo's re-authorization scheduler in software at the PCEF. Pet. 45–46; Crovella Decl. ¶ 98. In my opinion, the Petition does not provide technical details showing how that modification would be implemented.

44. In particular, I do not see an analysis of what session state, scheduling state, cache state, or rule-set state would have to be moved to or replicated at the PCEF. I also do not see an analysis of how the relocated scheduler would interoperate with the Gx interface, how the PCRF and PCEF would coordinate after

the scheduler is moved, or why the relocated mechanism would still satisfy claim 6's node-specific requirements. In my opinion, the assertion that allocating tasks among devices was well understood and predictable does not provide a technical explanation for the specific modification proposed. Crovella Decl. ¶¶ 75, 98.

45. My opinions are based on the technical disclosures of the '101 patent, Mo, Peng, the cited standards, the prosecution history, and the Petition's specific mappings. I am not offering legal conclusions regarding institution or obviousness; I understand those determinations are for the Board.

V. Summary of Opinions

46. For the reasons set forth above, it is my opinion that Mo does not disclose setting the claimed time-based policy based on tuple information included in a packet from the traffic and a time condition by a policy server. Mo's bearer-level and QCI-level QoS authorization, as described in Mo, is not the same as setting a policy based on packet-tuple information.

47. It is also my opinion that the 3GPP standards cited by Petitioner and Dr. Crovella show, at most, that a service-data-flow filter may use a 5-tuple as one possible filter pattern in some PCC contexts. They do not show that Mo's QoS authorization is set from packet-tuple information, nor do they show that Mo sets the claimed time-based policy based on tuple information included in a packet from the traffic.

48. It is also my opinion that Mo does not disclose the three functional roles described in the '101 patent. In particular, Mo does not disclose an intermediate policy management system role that receives a policy from an upstream policy server, stores and synchronizes that policy, parses it into a structure appropriate for policy execution equipment, and transmits the parsed policy downstream.

49. It is also my opinion that Mo's SPR is not a database included in a PMS that stores the claimed policy. Mo describes the SPR as a subscription profile repository containing subscriber information used by the PCRF. That is technically different from a PMS database that stores the policy.

50. It is also my opinion that the operations identified for claim 6 do not disclose downloading the policy by the policy execution equipment. Relocating a scheduler or invoking a rule set to produce an authorization is not the same as downloading a policy by the policy execution equipment.

51. It is also my opinion that Peng does not change the opinions above. Peng does not disclose setting a policy based on packet-tuple information, does not disclose the intermediate PMS functionality described in the '101 patent, and does not disclose a PEE downloading the claimed policy.

52. My opinions are based on the materials I have reviewed to date and on my education, training, and professional experience.

53. I reserve the right to supplement or amend my opinions if additional materials, arguments, or evidence become available.

54. I further declare that all statements made herein of my own knowledge are true, that all statements made on information and belief are believed to be true, and that these statements were made with the knowledge that willful false statements and the like are punishable by fine or imprisonment, or both, under 18 U.S.C. § 1001. I declare under penalty of perjury that the foregoing is true and correct.

55. Executed on July 2, 2026, at Los Angeles, California.



Mahdi Eslamimehr, Ph.D.