UNITED STATES DISTRICT COURT
EASTERN DISTRICT OF TEXAS
MARSHALL DIVISION

ENTROPIC COMMUNICATIONS, LLC, *Plaintiff*, v. CHARTER COMMUNICATIONS, INC., *Defendant*.	Case No. 2:22-cv-00125-JRG

REBUTTAL EXPERT REPORT OF JOHN HOLOBINKO REGARDING
VALIDITY OF U.S. PATENT NOS. 8,284,690 AND 10,135,682

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I. INTRODUCTION

1. On behalf of Plaintiff Entropic Communications, LLC ("Entropic" or "Plaintiff"), I have been retained in this patent infringement litigation against Charter Communications, Inc. ("Charter" or "Defendant") to provide a Rebuttal Expert Report ("Report") in response to the Opening Expert Report of Steven H. Goldberg regarding validity (the "Goldberg Report").

2. I understand that Dr. Goldberg has provided opinions for the following claims: claims 1, 7-9, 11, 15, and 16 of U.S. Patent No. 8,284,690 (the "'690 Patent") and claims 1, 2, and 3 of U.S. Patent No. 10,135,682 (the "'682 Patent") (collectively, the "Asserted Claims").

3. As set forth in detail below in this Report, it is my opinion that all of the Asserted Claims are valid.

4. My opinions are based on my years of education, research and experience, as well as my investigation and study of relevant materials, including those identified in this Report.

5. I may rely upon these materials, my knowledge and experience, and/or additional materials in forming any necessary opinions. Further, I may also consider additional documents and information to rebut Dr. Goldberg's opinions. I reserve any right that I may have to supplement this Report if further information becomes available or if I am asked to consider additional information. Furthermore, I reserve any right that I may have to consider and comment on any additional expert opinions or testimony of Charter's expert(s) in this matter.

6. I am being compensated for my services in this matter at my standard consulting rate of $275 per hour. I am also being reimbursed for expenses that I incur during the course of this work. My compensation is not contingent upon the results of my study, the substance of my opinions, or the outcome of any proceeding involving the Asserted Patents/Claims. I have no financial interest in the outcome of this matter.

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II. QUALIFICATIONS

7. A copy of my curriculum vitae ("CV") is submitted with this report as **Exhibit A**.

8. As set forth in my CV, I have over 30 years' experience in the cable television (CATV) industry. During that time, I have held senior roles at some of the largest vendors of DOCSIS equipment and software within the CATV industry, and I have authored multiple patents and academic papers relating to cable TV networks and optical networks.

9. I received a Bachelor of Science in Electrical Engineering from Carnegie Mellon University in 1973.

10. From 1986 through 1998, I was employed by ADC Telecommunications, Inc., a provider of optical video, data, and voice communications equipment and software. I served as director of mergers and acquisitions and as VP of product management and marketing. I also helped conceive the company's flagship digital optics solution, which enabled cable headend network interconnect rings, and some of the cable industry's first HFC optical equipment.

11. From 1998 through 2003, I was president and chief executive of Aplion Networks, Inc., a venture capital backed start up that developed the first patented solution for reliable cloud-based enterprise software as a service with prioritized delivery over service provider and enterprise networks. While there, I helped create the industry's first layer 4-7 programmable router/switch "Network Virtuso" and dynamic provision software.

12. From 2003 through 2005, I was president and chief executive of VPI Systems, Inc., a data analytics software company whose customers were large telecoms and major communications network equipment providers. During my tenure at the company, I increased revenues 80%, won major new customer contracts, and delivered a new analytics software product.

13. From 2006 through 2010, I was employed by BigBand Networks (now Commscope), the only CMTS vendor to support DOCSIS 2.0 TDMA and SCDMA. I worked as

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VP and general manager of the cable edge business, VP of product management, and VP of marketing and member of the executive staff. During my tenure at the company, I led the "edgeQAM" product portfolio within the company's Cable Edge Business. I also led the company's DOCSIS CMTS (cable modem termination system) and software business. As part of my work, I oversaw product engineering and development of CMTS equipment.

14. From 2010 through 2013, I was employed by Motorola Mobility Home (now Commscope). I served as VP of strategy and business development for the company's Network Infrastructure Solutions group. As part of my work with the company, I oversaw the development of CMTS equipment, HFC (hybrid fiber coaxial) equipment, QAM modulation equipment, video processing equipment, and "Fiber to the Home" equipment. I led the development of one of the cable industry's first PNM systems and wrote at least one technical paper that was in the 2013 SCTE Expo Conference Proceedings, Title: "New Analytic Methods For Determining Network Performance Issues And Predicting Service Disruptions in Cable Networks"

15. From 2014 through 2019, I was director of business strategy for Cisco Systems, Inc. There, I headed network business strategy for the company's access networks business. As part of my work, I was involved in product design and specifications for CMTS equipment, HFC equipment and passives, RF (radiofrequency) equipment, OSS systems, and optical networking equipment.

16. I am currently managing director and owner of Business Reimagined, LLC, an independent consulting firm that provides market, technology, competitive analysis, and business strategy assessments across hybrid cloud, routing/switching, micro-services software, optical networks, wireless and wired networks, and other related markets.

III. MATERIALS CONSIDERED

17. The materials I have considered are listed in **Exhibit B**.

IV. LEGAL STANDARDS

18. I am not a legal expert, and I offer no opinions on the law. However, I have been informed by counsel of the applicable legal standards with respect to patent validity, and I have applied them in arriving at my opinions in this case.

A. Presumption of Validity

19. I have been informed by counsel that a patent is presumed valid as it has been granted by the United States Patent and Trademark Office. I have also been informed that the party challenging validity must present clear and convincing evidence in order to overcome this presumption. It is my understanding that the "clear and convincing evidence" standard is an intermediate standard which lies between "beyond a reasonable doubt" (used in criminal cases) and a "preponderance of the evidence" (the standard for infringement). I understand that, although not susceptible to a precise definition, the Federal Circuit has described clear and convincing evidence as that which produces in the mind an abiding conviction that the truth of the factual contentions are highly probable. In reaching my opinions, I have applied this standard. I also understand that the validity of each claim is determined independently of the validity of any other claims, including those upon which it may depend.

20. I understand that a challenger can establish that a patent claim is invalid only by presenting clear and convincing evidence that every limitation in the claim and every limitation in any claims on which it depends, if any, was not novel or was obvious at the time of invention. In other words, an asserted claim cannot be established as invalid if even a single one of the limitations in the claim or the limitations in any claims on which it depends, if any, can be shown not to be obvious, present in, or taught by, any prior art.

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B. Prior Art

21. I understand that a "prior art reference" is a device, method, patent, or publication which predates the claimed invention of a patent and discloses elements of a claim. I understand that the disclosure in the prior art reference does not have to be in the same words as the claim, but the requirements of the claim must be present, either stated or necessarily implied, so that a POSITA would be able to use the prior art reference to make and practice at least one embodiment of the claimed invention.

22. I understand that a patent may be invalid if a claim failed to meet one of several statutory provisions in the patent laws. I understand that these provisions are sometimes referred to as "statutory bars." I further understand that for a patent claim to be invalid because of a statutory bar, the prior art reference must be dated before the date of invention or more than one year before the filing date of the patent application.

23. I understand that a prior art reference may invalidate a patent if the prior art shows that the claimed invention was already patented or described in a printed publication anywhere in the world more than one year before the effective filing date of the patent application. I understand that a prior art reference is a "printed publication" if it is reasonably accessible to those with interest in the field, even if it is difficult to find. I further understand that a "printed publication" includes an electronic publication, such as an on-line or Internet publication.

24. I also understand that a prior art reference may invalidate a patent if the prior art shows that the claimed invention was already being publicly or commercially used in the United States more than one year before the effective filing date of the patent application, and that use was not primarily an experimental use controlled by the inventor to test whether the invention worked for its intended purpose.

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C. Anticipation

25. I understand that a prior art reference anticipates a patent claim if that single reference discloses all limitations of that claim, either expressly or inherently. I understand that, in order for a prior art reference to anticipate a patent claim, the descriptions in that reference and the words in the claim need not be identical so long as all of the limitations of the claim are present in a single reference. Moreover, I understand that a prior art reference need not explicitly describe each limitation of the claimed invention in order to anticipate if the limitations are necessarily implied in the reference such that a POSITA, after looking at the reference, would be able to make and use the claimed invention.

D. Obviousness

26. I understand that an asserted claim that is not anticipated is still invalid if the challenger is able to establish by clear and convincing evidence that, at the time of the alleged invention, the subject matter of the claim would have been obvious to one of ordinary skill in the art in light of the teachings of the prior art. Obviousness often involves combining more than one prior art reference. I understand that the following factors must be evaluated to determine whether an asserted claim is obvious:

- the scope and content of the prior art;
- the difference or differences, if any, between each asserted claim and the prior art;
- the level of ordinary skill in the art at the time the invention was made; and
- additional secondary considerations, if any, that indicate that the invention was obvious or not obvious.

27. I understand that it would be improper to base an obviousness determination on a "hindsight" analysis, *i.e.*, to use the teachings of the patent as a roadmap to combine prior art references or otherwise to find a claim obvious. Instead, a challenger must have placed himself or

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herself back to the time of the purported invention and been guided by the prior art references and the then-existing knowledge, skill, and creativity of a POSITA.

28. I understand that, to support the conclusion that the claimed invention is directed to obvious subject matter, either the references must expressly or impliedly suggest the claimed invention. I understand that rejections on obviousness cannot be sustained with mere conclusory statements; instead, there must be some articulated reasoning with some rational underpinning to support the legal conclusion of obviousness. I understand that if the proposed modification or combination of the prior art would change the principle of operation of the prior art invention being modified, then the teachings of the references are not sufficient to render the claims obvious. I understand that if a proposed modification would render the prior art invention being modified unsatisfactory for its intended purpose, then there is no suggestion or motivation to make the proposed modification.

E. Secondary Considerations

29. I understand that when evaluating the issue of obviousness, it is necessary to consider certain additional factors which, if established, may indicate that the invention would or would not have been obvious. No factor alone is dispositive. These factors, sometimes called "secondary considerations," include the following:

- Were the products covered by the claim successful because of the merits of the claimed invention or because of other reasons, such as advertising or other features of the product other than those found in the claims?
- Was there a long felt need for a solution to the problem facing the inventor that was satisfied by the claimed invention?
- Did others try and fail to solve the same problem as the inventor?
- Did others copy the claimed invention?
- Did the claimed invention achieve unexpectedly superior results over the closest prior art?

- Did others in the field praise the claimed invention or express surprise at the making of the claimed invention?
- Did others accept licenses under the patent because of the merits of the claimed invention?
- Was the claimed invention developed independently by other persons, either before it was invented by the patentee or at about the same time?

F. Motivation to Combine and Hindsight

30. I understand that to prove a claim would have been obvious, the accused infringer must demonstrate that a POSITA would have been motivated to combine or modify the prior art to achieve the claimed invention and would have had a reasonable expectation of successfully combining or modifying the prior art. I understand that the suggestion to modify or combine relevant prior art references may come from either:

- A teaching or suggestion in the prior art references;
- The common sense of a POSITA;
- Any need or problem known to a POSITA and addressed by the claimed invention, including, but not limited to, the problem addressed by the patent; or
- Design incentives and other market forces.

31. I further understand that obviousness should not be evaluated using the benefit of hindsight or what is known today.

G. Written Description

32. I understand that a patent claim is invalid if the patent does not contain an adequate written description of the claimed invention. The test for written description is whether the specification would have objectively demonstrated to a POSITA that the patent applicant actually invented, or "possessed," the claimed subject matter when the patent application was filed. The written description requirement does not require disclosure of examples or an actual reduction to practice of the claimed invention. However, the specification must show possession of the

invention on its face, and evidence of reduction to practice outside of the specification is not sufficient by itself to satisfy the written description requirement.

33. I understand the written description requirement does not require the patent to describe exactly the subject matter claimed. I understand the written description requirement must allow persons of ordinary skill in the art to recognize the claimed invention. I understand that the written description requirement does not require the claims to recite the exact terms used in the specification.

H. Enablement

34. I understand that a patent claim is invalid if the specification does not teach a POSITA how to make and use the full scope of the claimed invention without undue experimentation. Enablement is determined from the point of view of a POSITA at the time when the patent application was filed. I further understand that the following factors may be considered to determine whether any experimentation would have been undue:

- The quantity of experimentation necessary;
- The amount of direction or guidance presented;
- The presence or absence of working examples;
- The nature of the claimed invention;
- The state of the prior art;
- The relative skill of those in the art;
- The predictability or unpredictability of the art; and
- The breadth of the claims.

I. Patentable Subject Matter

35. I understand that the following are patent-eligible subject matter: processes, machines, articles of manufacture, compositions of matter, and improvements to any of the

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preceding. I further understand that subject matter eligibility is determined using a two-step framework. The first step is to determine whether the focus of the claims is directed to one of the patent-ineligible categories excluded from § 101, such an abstract idea. The second step is to determine whether the elements of each claim both individually and 'as an ordered combination' provide an inventive concept.

V. PERSON OF ORDINARY SKILL IN THE ART

36. I understand that claims are viewed from the perspective of a person of ordinary skill in the art (POSITA). I understand that a POSITA is a hypothetical person who is presumed to have known the relevant art at the time of the invention. Factors that may be considered in determining the level of ordinary skill in the art may include: (1) type of problems encountered in the art; (2) prior art solutions to those problems; (3) rapidity with which innovations are made; (4) sophistication of the technology; and (5) educational level of active workers in the field, including the inventors. I have also been informed that in some cases, every factor may not be accounted for, and the factors may have various weights applied to them.

37. Taking these factors into consideration, it is my opinion that a POSITA at the time of the earliest possible priority date of each of the Patents-In-Suit would have been an engineer with at least a bachelor's degree in electrical engineering (or equivalent), with at least two years of experience developing broadband/cable TV/satellite communication systems and solutions. Additionally, I agree with Dr. Goldberg's opinion that "[a]dditional education may substitute for professional experience, and significant work experience may substitute for formal education." Goldberg Report, ¶ 20.

38. I understand Dr. Goldberg took the position that in the context of the Patents-in-Suit, a POSITA would be "a person having at least: a bachelor-level degree in electrical engineering or a related subject and three or more years of experience working in the field of cable

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television signal processing and communication systems; a master's-level degree in electrical engineering or a related subject and one or more years of experience working in the field of cable television signal processing and communication systems; or a Ph.D.-level degree in electrical engineering or a related subject and at least some experience working in the field of cable television signal processing and/or communication systems. Additional education may substitute for professional experience, and significant work experience may substitute for formal education." Goldberg Report, ¶ 20.

39. I consider both of these definitions to be reasonable in the context of the Patents-in-Suit. My opinions are the same regardless under both of these definitions.

VI. CLAIM CONSTRUCTION

40. I have reviewed the Court's Claim Construction Memorandum Opinion and Order (Dkt. No. 123) (June 26, 2023) ("Claim Construction Order"). I understand that the Court has issued the following constructions with respect to the '690 and '682 Patents.

Asserted Claims	Claim Term	Court's Construction
'690 Patent, Claims 1, 7, 8, 9, 11	"probe"	"a signal transmitted to a network node that the network node can compare to a reference signal having a known form in order to determine characteristics of the channel on which the signal was transmitted"
'690 Patent, Claim 9	"physical layer probe"	Plain meaning (apart from the Court's construction of "probe," above)
'690 Patent, Claims 1, 7, 8, 9, 11, 15, 16	"probe request"	"a request, sent by one network node to another network node, that specifies the form of a probe to be generated and transmitted"
'690 Patent, Claims 1	"generating the probe in accordance with the first	Plain meaning

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Asserted Claims	Claim Term	Court's Construction
	plurality of parameters and the second plurality of parameters, wherein the probe has a form dictated by the first plurality of parameters"	
'690 Patent, Claim 9	"wherein the probe is generated in accordance with the first plurality of parameters and in accordance with a second plurality of parameters determined by the second node"	Plain meaning
'690 Patent, Claim 9	"the first plurality of probe parameters comprising a form for the probe, including a modulation profile for the probe"	Plain meaning
'682 Patent, Claim 1	"a composite SNR-related metric based at least in part on a worst-case SNR profile of said SNR-related metrics"	Plain meaning
'682 Patent	"service group[s]"	Plain meaning
'682 Patent, Claim 1	"[communicating with/corresponding to] said one of said plurality of service groups"	Plain meaning

41. In addition, I understand that the parties have agreed to the following constructions, relevant to the '690 and '682 Patents. *See* Joint Claim Construction and Pre-Hearing Statement (Dkt. 84) (April 4, 2023).

Asserted Claims	Claim Term	Court's Construction
'690 Patent, Claims 1, 9	"parameters"	Plain and ordinary meaning
'690 Patent, Claim 1	"associated with [the] generation and transmission of [a/the] probe"	Plain and ordinary meaning

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[redacted]

42. In my analysis of the ’690 and ’682 Patents, I have applied the claim constructions above. With respect to terms construed according to their plain meaning, I have applied the plain meaning as it would be understood by a POSITA as of the priority date for each of the respective patents.

VII. VALIDITY OF THE ASSERTED CLAIMS OF THE ’690 PATENT

A. Background and Summary of the Invention of the ’690 Patent

43. The ’690 Patent was filed December 10, 2009 and is titled “Receiver Determined Probe.” The patent describes how “nodes on a network are programmed to generate a probe transmission in response to a request from the node that will be receiving the probe.” *See* ’690 Patent, Abstract. These nodes, also referred to as network devices (*id.* at 1:67–2:1), can be associated with a variety of devices.

> Nodes described herein can be associated with a variety of devices. For example, in a system deployed in a residence 101, a node may be a network communications module associated with one of the computers 109 or 110. Such nodes allow the computers 109, 110 to communicate on the communications medium 100. Alternatively, a node may be a module associated with a television 111 to allow the television to receive and display media streamed from the internet, or from one or more other network nodes. A node might also be associated with a speaker or other media playing devices 103 that plays music. A node might also be associated with a module configured to interface with an internet or cable service provider 112, for example to provide Internet access, digital video recording capabilities, media streaming functions, or network management services to the residence 101.

’690 Patent, 4:10–24.

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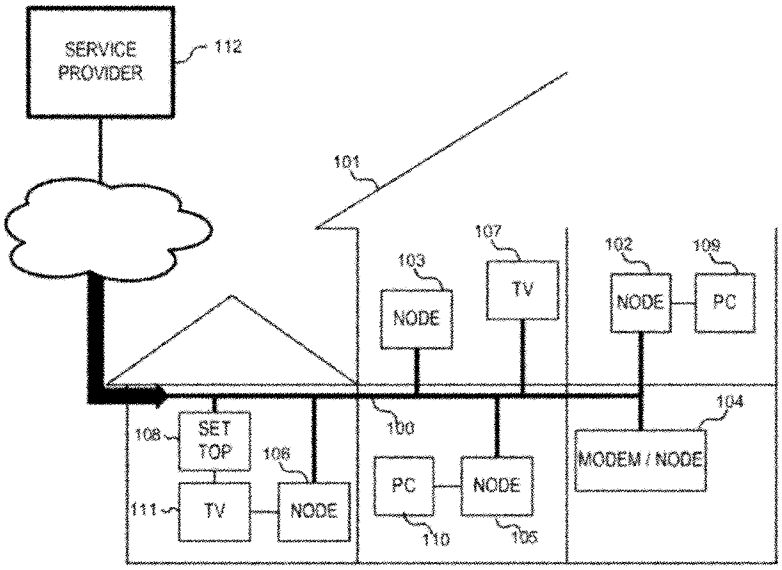

Fig. 1

'690 Patent, FIG. 1.

44. The '690 Patent explains that prior art probes were "typically well defined." *See id.* at 1:52–53. That is, the transmitting node would send a "predetermined probe" to the receiving node. *See id.* at 1:57–59. However, this process suffered from a lack of flexibility in the characterization process. *See id.*

45. To address this problem, the '690 Patent describes how "[t]he receiving node may generate a probe request that specifies a plurality of parameters to be used in such a 'receiver determined' probe to generate a probe having the 'form' specified by these parameters." *Id.* at 2:3–6. After receiving the request, the transmitting node can generate a responsive probe "base[d] upon one of the parameters of the probe request or based upon information that previously existed within the transmitting node." *Id.* at 6:42–45. The probe is transmitted, for example to the node that initiated the probe request, where it "may be used for OFDMA sub-channel assessment" or "for off-site network diagnosis." *See id.* at 2:22–27; *see also id.* at 4:25–27. An example process is depicted in Figure 4 of the patent.

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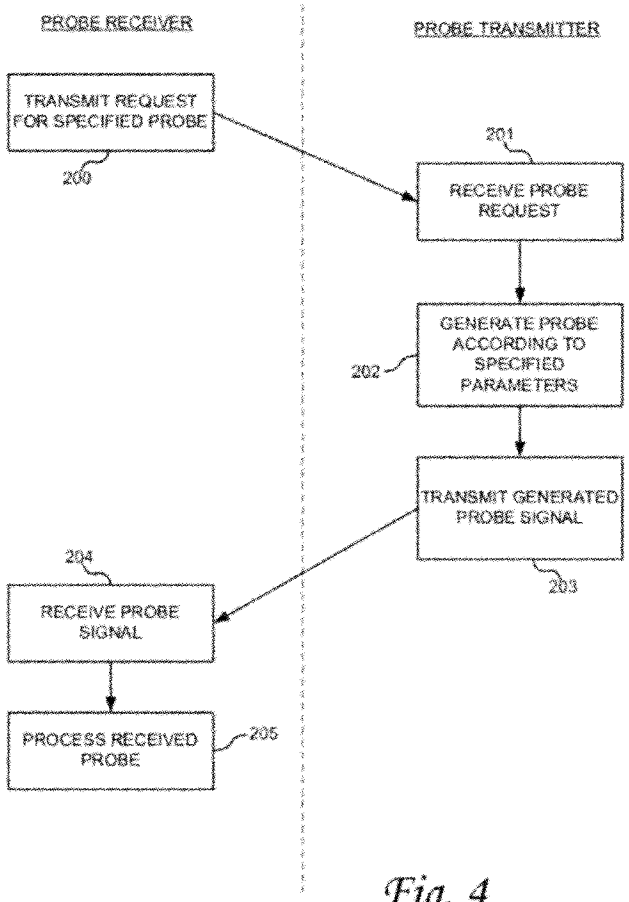

Fig. 4

'690 Patent, FIG. 4.

B. Prosecution History of the '690 Patent

46. I have reviewed the prosecution history leading to the issuance of the '690 Patent. I have also reviewed Dr. Goldberg's summary of the prosecution history. *See* Goldberg Report, ¶¶ 91–98.

C. Priority Date of the '690 Patent

47. The '690 Patent has a filing date of December 10, 2009 but claims priority to provisional application No. 61/122,687 (filed December 15, 2008) and provisional application No. 61/179,454 (filed May 19, 2009). Dr. Goldberg asserts that the '690 Patent is not entitled to claim priority to either of these earlier applications. *See* Goldberg Report, ¶¶ 99–102. However, Dr.

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Goldberg acknowledges that the prior art references asserted against the '690 Patent would still be prior art, regardless of which of the three priority dates is used. *Id.* at ¶ 103.

48. My opinions with respect to the '690 Patent are the same, regardless of whether the patent is entitled to a priority date as late as December 15, 2008 or as early as December 10, 2009. Therefore, I offer no opinion on whether the '690 Patent is entitled to claim an earlier priority date. I will assume for the sake of rebutting Dr. Goldberg's report that the priority date for the '690 Patent is its filing date (December 10, 2009).

D. Asserted Claims of the '690 Patent

49. I understand that claims 7, 8, 11, 15, and 16 of the '690 Patent are asserted against Charter. I understand that claims 1 and 9 are ***not*** asserted. However, claims 7 and 8 are dependent claims that depend from independent claim 1, and claims 11, 15, and 16 are dependent claims that depend from independent claim 9. Dr. Goldberg's report addresses the validity of all of claims 1, 7–9, 11, 15, and 16. Therefore, I will do the same.

50. Independent claim 1 of the '690 Patent recites:

> 1. A method comprising:
>
> a) receiving in a first node, a probe request specifying a first plurality of parameters associated with the generation and transmission of a probe, wherein the first plurality of parameters at least specify content payload of the probe and a second node;
>
> b) determining a second plurality of parameters associated with generation and transmission of the probe;
>
> c) generating the probe in accordance with the first plurality of parameters and the second plurality of parameters, wherein the probe has a form dictated by the first plurality of parameters; and
>
> d) transmitting the probe from the first node to the second node.

51. Dependent claim 7 of the '690 Patent recites:

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7. The method of claim 1, wherein the probe request requests a probe that assists in diagnosing a network problem.

52. Dependent claim 8 of the ’690 Patent recites:

8. The method of claim 7, wherein the probe request is generated by a network operator and uploaded to the second node.

53. Independent claim 9 of the ’690 Patent recites:

9. A method comprising:

a) a first node transmitting a probe request to a second node, the probe request specifying a first plurality of probe parameters for a physical layer probe, the first plurality of probe parameters comprising a form for the probe including a modulation profile for the probe;

b) the first node receiving the probe from the second node, wherein the probe is generated in accordance with the first plurality of parameters and in accordance with a second plurality of parameters determined by the second node.

54. Dependent claim 11 of the ’690 Patent recites:

11. The method of claim 9, further comprising:

a) the first node transmitting a second probe request to a third node;

b) and the first node receiving a second probe from the third node, wherein the second probe is generated according to the second probe request; and

wherein the first probe and second probe are transmitted simultaneously using OFDMA.

55. Dependent claim 15 of the ’690 Patent recites:

15. The method of claim 9, wherein the probe request is configured to diagnose a network problem.

56. Dependent claim 16 of the ’690 Patent recites:

16. The method of claim 15, wherein the probe request is generated by a network operator and uploaded to the first node.

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[redacted]

E. Charter's Asserted Prior Art for the '690 Patent

1. DOCSIS 2.0, Radio Frequency Interface Specification, Document Control No. CM-SP-RFIv2.0-I12-071206 ("DOCSIS 2.0") (CHARTER_ENTROPIC00380721)

57. Data Over Cable Service Interface Specification (DOCSIS) is an international telecommunications standard developed by CableLabs, based on input from various cable industry companies and cable television equipment vendors. DOCSIS is used to provide cable internet access over existing hybrid fiber-coaxial (HFC) infrastructure. DOCSIS version 1.0 released in 1996 and standardized the use of high speed data over HFC. DOCSIS 1.1 released in 1999 and added voice over IP (VoIP). DOCSIS 2.0—the version cited by Dr. Goldberg as prior art—initially released in 2001 and featured higher upstream capacity.

	DOCSIS 1.0	DOCSIS 1.1	DOCSIS 2.0	DOCSIS 3.0	DOCSIS 3.1	4.0
[illegible]	Initial cable broadband technology, high-speed internet access	Added voice over IP service, gaming, streaming	Higher upstream speed, capacity for symmetric services	Greatly enhances capacity, channel bonding, IPv6	Capacity and efficiency progression, OFDM, wideband channel	Symmetrical streaming and increased upload speeds
[illegible]	40 Mbps	40 Mbps	40 Mbps	1 Gbps	10 Gbps	10 Gbps
[illegible]	10 Mbps	10 Mbps	30 Mbps	200 Mbps	1-2 Gbps	6 Gbps
[illegible]	1996	1999	2001	2006	2013	2019

(ENTROPIC_CHARTER_0018554 at ENTROPIC_CHARTER_0018557-558).

58. DOCSIS 3.0 released in 2006 and represented a significant improvement over version 2.0, adding support for channel bonding and Internet Protocol Version 6 (IPv6). Whereas DOCSIS 2.0 could only support up to 40Mbps downstream and 30Mbps upstream, DOCSIS 3.0 could theoretically support up to 1Gbps downstream and 200Mbps upstream (though in practice, these speeds were often not achievable due to limitations in cable modem design). *See* CHARTER_ENTROPIC00097617 at CHARTER_ENTROPIC00097624 ("Currently deployed Cable Modems, eMTA and Combined Gateway devices run on our ***DOCSIS 3.0 plant and enable***

speeds up to 300Mbps. DOCSIS 3.1 will enable us to deliver standard speed tiers (up to 300) as well as new Gigabit speed tiers.”).[1]

59. DOCSIS 3.1, released in 2013, represented yet another significant improvement by adding support for orthogonal frequency-division multiplexing (OFDM) and wideband channels. This allowed for theoretical speeds of up to 10Gbps downstream and 1Gbps upstream. However, this was not true in practice. In a 2017 presentation, Charter indicates that in order to offer higher speeds such as 1 Gbps, Charter must offer a DOCSIS 3.1 compliant modem: “All 1 Gbps customers require a D3.1 modem; to support 1 Gbps Wi-Fi, a Wave 2 router is required.” (CHARTER_ENTROPIC00287892 at CHARTER_ENTROPIC00287893).

2. Ciciora et al., Modern Cable Television Technology, Video, Voice, and Data Communications, 2nd Ed. (Elsevier 2004) (“Ciciora”) (CHARTER_ENTROPIC00044357)

60. Ciciora et al. relates generally to cable television technologies and covers a wide range of topics including digital compression, digital modulation, telephony, headend operation, home networking, etc. I note that Dr. Goldberg relies in particular on chapter 4.3.3 of Ciciora, which is entitled “Orthogonal Frequency Division Multiplexing (OFDM).” *See* Goldberg Report, ¶¶ 202–209. Ciciora notes that OFDM is only one form of “spectrum sharing, in which multiple users share the same spectrum.” CHARTER_ENTROPIC00044357 at CHARTER_ENTROPIC00044567. Other examples include, Time Division Multiple Access (TDMA), Frequency Division Multiplexing (FDM), and Code Division Multiple Access (CDMA). *See id.* at CHARTER_ENTROPIC00044568–44572.

[1] All emphasis herein is added unless otherwise noted.

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[redacted]

F. Dr. Goldberg's Opinion of the '690 Patent's Validity Under 35 U.S.C. §§ 102 and 103 is Not Supported by the Cited Prior Art

1. Claims 1, 7–9, 15, and 16 are valid in view of DOCSIS 2.0

61. Dr. Goldberg opines that claims 1, 7–9, 15, and 16 of the '690 Patent are anticipated and/or obvious in view of the DOCSIS 2.0 standard. *See* Goldberg Report, ¶¶ 107–194. For the reasons below, I disagree.

a) [1a]: "a) receiving in a first node, a probe request specifying a first plurality of parameters associated with the generation and transmission of a probe, wherein the first plurality of parameters at least specify content payload of the probe and a second node"

62. Dr. Goldberg opines that the Universal Channel Descriptor (UCD) feature in DOCSIS 2.0 is a "probe request," which the Court has construed as "a request, sent by one network node to another network node, that specifies the form of a probe to be generated and transmitted." *See* Goldberg Report, ¶ 116. I disagree with Dr. Goldberg's conclusion because the UCD does not specify the form of a probe to be generated and transmitted.

63. The UCD includes a set of "Channel TLV Parameters," which the standard lists and defines at pages 137–139. *See* CHARTER_ENTROPIC00380721 at CHARTER_ENTROPIC00380881–83. One of these is a "Ranging Required" value, which can be set to 0, 1, or 2. *See id.* at CHARTER_ENTROPIC00380883. Dr. Goldberg asserts that, when the Ranging Required value is set to 1 or 2, it requests that the cable modem send an RNG-REQ message to the CMTS. *See* Goldberg Report, ¶ 117. According to Dr. Goldberg, the RNG-REQ message is the "probe," and the UCD specifies the form of the RNG-REQ message. *See id.* at ¶ 118; *see also id.* at ¶ 123 (Dr. Goldberg opining that "the parameters specified by the UCD (e.g., the modulation rate, upstream frequency, preamble pattern, burst descriptor, and Ranging Required parameter) are parameters that specify the 'form' of a RNG-REQ message transmitted by a CM").

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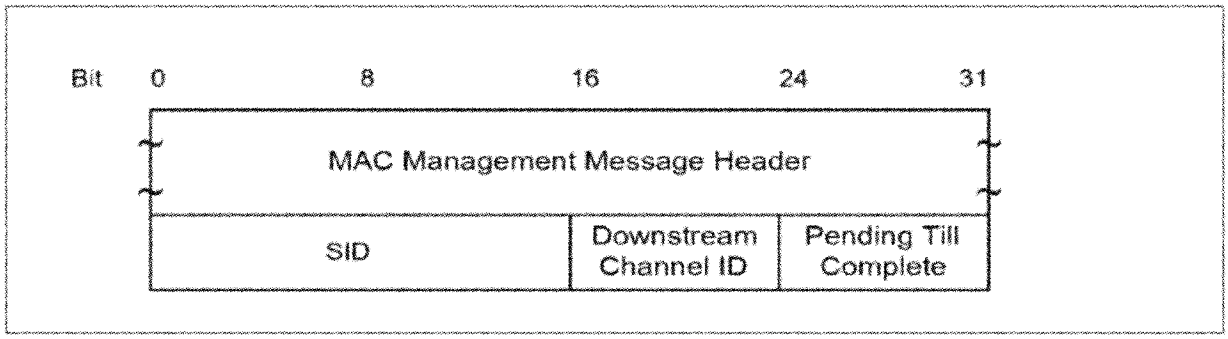
64. I first note that a POSITA would not characterize the UCD as a request for a probe. That is not its purpose. Rather, the purpose of the UCD is to "communicate the characteristics of the upstream physical layer to the cable modems." *See* CHARTER_ENTROPIC00380721 at CHARTER_ENTROPIC00380766. Only in a specific set of circumstances does the UCD cause the cable modem to generate and transmit a ranging request (RNG-REQ), *i.e.*, when the UCD has a Ranging Required value of 1 or 2 "and the UCD change count does not match the UCD currently in effect." *Id.* at CHARTER_ENTROPIC00380883.

Ranging Required	16	1	0= no ranging required 1= unicast initial ranging required 2= broadcast initial ranging required If this value is non-zero and the UCD change count does not match the UCD currently in effect, the CM MUST perform ranging as specified by this TLV before using any other transmit opportunities with the new UCD parameters. If ranging is required, and the CM is already registered, then it MUST maintain its SIDs and not re-register. If this value is 0 or this TLV is omitted, no ranging is required.

CHARTER_ENTROPIC00380721 at CHARTER_ENTROPIC00380883.

65. The second issue with Dr. Goldberg's analysis is that the UCD parameters do not "specify the form" of the RNG-REQ message. The RNG-REQ message has a fixed, predefined form as depicted below.



CHARTER_ENTROPIC00380721 at CHARTER_ENTROPIC00380891.

66. The SID is a "Service Identifier" or "Service Flow Identifier." *See id.* at CHARTER_ENTROPIC00380764. The SID may be an Initialization SID (*e.g.*, when a modem

attempts to join the network for the first time), a Temporary SID (*e.g.*, when a modem has not yet registered), or a Primary SID (previously assigned to the modem). *See id.* at CHARTER_ENTROPIC00380891. The Primary SID is assigned during the registration process and thereafter must always be used during ranging. *See id.* at CHARTER_ENTROPIC00380856 ("The Primary SID MUST always be used for periodic ranging after registration").

67. The downstream channel ID simply identifies the downstream channel on which the CM received the UCD. *See id.* at CHARTER_ENTROPIC00380891.

68. Pending Till Complete is a value that estimates the time needed for the cable modem to complete assimilation of ranging parameters. *See id*. If zero, then the cable modem has applied all previous Ranging Response attributes. *Id*.

69. A POSITA would therefore understand that the "form" of the RNG-REQ is not specified by the contents of the UCD. Reviewing the "Channel TLV Parameters" in the UCD confirms this point. For example, Dr. Goldberg points to the Modulation Rate and Frequency parameters in the UCD. *See* Goldberg Report, ¶ 121; *see also* CHARTER_ENTROPIC00380721 at CHARTER_ENTROPIC00380881. However, these values merely characterize the upstream channel and do not specify the "form" of the RNG-REQ message. *See generally* '690 Patent, FIG. 5 (illustrating examples of parameters that may be modified or determined for generating a probe request). This differs from the probe claimed in the '690 Patent. For example, the probe claimed in the '690 Patent can be used to determine which modulation scheme should be used for a particular communication channel. *See* '690 Patent, 5:21–34. In my opinion, the probes claimed in the '690 Patent utilize a modulation profile that can differ from the modulation rate assigned to a particular channel.

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70. Dr. Goldberg further points to the Preamble Pattern and Burst Descriptor parameters in the UCD. *See* Goldberg Report, ¶ 122. A "burst" is an RF signal that contains a single preamble plus data. *See* CHARTER_ENTROPIC00380721 at CHARTER_ENTROPIC00380755, 380783. A "Burst Descriptor" includes an upstream Interval Usage Code (IUC) followed by an unordered list of physical layer attributes. *See id.* at CHARTER_ENTROPIC00380883–84. The Preamble Pattern is appended to the beginning of the burst and is related to RF modulation and signal correlation. Again, a POSITA would understand that these parameters merely characterize the upstream channel and do not "specify the form" of the RNG-REQ message.

71. Dr. Goldberg also appears to point to the Maintain Power Spectral Density parameter as a so-called "form" parameter for the RNG-REQ. *See* Goldberg Report, ¶ 124. He characterizes this as the CMTS "instruct[ing] the modem to maintain its power level." *Id*. I note that the cable modem will indeed maintain its power level when the Maintain Power Spectral Density value is set to 2 (off) or when the modulation rate is unchanged from the previous UCD. *See* CHARTER_ENTROPIC00380721 at CHARTER_ENTROPIC00380883. Specifically, according to the DOCSIS 2.0 specification at 8.3.3, the Configuration Change Count field in the UCD is incremented by one whenever any of the values of the channel descriptor change. If the value of this count in a subsequent UCD remains the same, the cable modem can quickly decide that the channel operating parameters have not changed, and can disregard the remainder of the message.

72. When Maintain Power Spectral Density is set to 1 (on) and the modulation rate is different, the cable modem will have to change its transmit power. *Id*. However, the Maintain Power Spectral Density parameter does not actually tell the cable modem how much to adjust the

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power level. The cable modem receives the power adjustment in the ranging response (RNG-RSP), which it only receives *after* sending the RNG-REQ message to the CMTS. *See id.* ("In any case the effect of this parameter only lasts until the CM receives a power adjustment in a RNG-RSP"). Therefore, the Maintain Power Spectral Density does not affect the power level of the RNG-REQ.

73. Finally, a POSITA would not characterize the Ranging Required parameter as specifying the form of a probe. The Ranging Required message can only instruct the CM to send a predefined RNG-REQ message. It cannot instruct the CM to send a different kind of message, and it does not specify the form of that RNG-REQ message.

74. For all of these reasons, a POSITA would not characterize the UCD as a "probe request," as that term has been construed by the Court. Therefore, DOCSIS 2.0 does not disclose or suggest "receiving in a first node, a probe request specifying a first plurality of parameters associated with the generation and transmission of a probe, wherein the first plurality of parameters at least specify content payload of the probe and a second node."

b) [1c]: "c) generating the probe in accordance with the first plurality of parameters and the second plurality of parameters, wherein the probe has a form dictated by the first plurality of parameters"

75. Dr. Goldberg asserts that "the parameters that are included in the UCD transmitted by the CMTS specify the form of the RNG-REQ that the CM generates." *See* Goldberg Report, ¶ 156. I disagree.

76. As I explained above with respect to claim element [1a], the RNG-REQ has a fixed, predetermined form. The UCD does not include parameters that "specify the form of the RNG-REQ" as Dr. Goldberg asserts. Therefore, the RNG-REQ does not "[have] a form dictated by the first plurality of parameters." In my opinion, a POSITA would conclude that this element is not disclosed or suggested in DOCSIS 2.0.

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77. Further, I disagree with Dr. Goldberg's assertion that "a RNG-REQ message can be 'compar[ed] to a reference signal having a known form in order to determine characteristics of the channel on which the signal was transmitted.'" *See* Goldberg Report, ¶ 130. Notably, Dr. Goldberg does not identify the supposed "reference signal." Instead, he states only that "the CMTS uses the RNG-REQ as a base for comparison against acceptable signal parameters." *Id*. Further, as I discussed above, the RNG-REQ has a fixed form that includes a MAC management message header, SID, downstream channel ID, and a "Pending Till Complete" value. Dr. Goldberg has not shown that any of these values are compared to a reference signal in order to determine characteristics of the channel on which the signal was transmitted. In my opinion, Dr. Goldberg's analysis does not follow the Court's claim construction for "probe."

c) [8]: "The method of claim 7, wherein the probe request is generated by a network operator and uploaded to the second node"

78. Dr. Goldberg opines that DOCSIS 2.0 teaches or suggests having a network operator, *i.e.* an operations support system in a distribution hub or headend, communicate with the CMTS to configure the UCD parameters. *See* Goldberg Report, ¶¶ 168–174. I disagree with Dr. Goldberg's analysis.

79. In my opinion, a POSITA would not agree that the simple act of changing UCD parameters amounts to the network operator ***generating*** the UCD and uploading it to the CMTS. In fact, DOCSIS 2.0 states that UCDs are transmitted at a regular specified frequency, usually with an interval of no more than 2 seconds between transmissions. *See* CHARTER_ENTROPIC00380721 at 380940 ("It is intended that the nominal interval between SYNC messages be tens of milliseconds and the nominal interval between UCD messages be no more than 2 seconds"). There is no teaching or suggestion to have a network operator generate a UCD on demand or provide a command to a CMTS to cause the CMTS to generate the UCD

[redacted]

message in response to the command. Therefore, Dr. Goldberg has not shown that the prior art teaches or suggests "the probe request is generated by a network operator and uploaded to the second node."

d) [9a]: "a) a first node transmitting a probe request to a second node, the probe request specifying a first plurality of probe parameters for a physical layer probe, the first plurality of probe parameters comprising a form for the probe including a modulation profile for the probe"

80. Dr. Goldberg asserts that the UCD disclosed in DOCSIS 2.0 is a "probe request" and that "the UCD specifies 'a first plurality of probe parameters for a physical layer probe.'" *See* Goldberg Report, ¶¶ 178–179. Dr. Goldberg further asserts that "the plurality of parameters specified in the UCD '[comprise] a form for the probe including a modulation profile for the probe.'" *Id.* at ¶ 180. I disagree.

81. As I explained above with respect to claim element [1a], the RNG-REQ has a fixed, predetermined form. The UCD does not include parameters that "compris[e] a form for the probe" as Dr. Goldberg asserts. In my opinion, a POSITA would conclude that this element is not disclosed or suggested in DOCSIS 2.0.

e) [9b]: "b) the first node receiving the probe from the second node, wherein the probe is generated in accordance with the first plurality of parameters and in accordance with a second plurality of parameters determined by the second node"

82. As I discussed above with respect to claim element [1c], the RNG-REQ is not a "probe" as the Court has construed that term. Dr. Goldberg has not shown that the RNG-REQ is "compar[ed] to a reference signal having a known form in order to determine characteristics of the channel on which the signal was transmitted." In my opinion, a POSITA would conclude that this element is not disclosed or suggested by DOCSIS 2.0.

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f) [16]: "The method of claim 15, wherein the probe request is generated by a network operator and uploaded to the first node"

83. As I discussed above with respect to claim 8, DOCSIS 2.0 does not disclose or suggest the network operator *generating* the UCD and uploading it to the CMTS.

2. Claim 11 is valid in view of DOCSIS 2.0 and Ciciora

a) [11c]: "wherein the first probe and second probe are transmitted simultaneously using OFDMA"

84. Dr. Goldberg opines that claim 11 of the '690 Patent is obvious in view of the combination of DOCSIS 2.0 with Ciciora. *See* Goldberg Report, ¶¶ 195–209. I disagree because a POSITA would not find it obvious to combine DOCSIS 2.0 with Orthogonal Frequency Division Multiple Access (OFDMA) as supposedly taught by Ciciora. I note that Dr. Goldberg is not offering Ciciora to remedy any deficiencies I identified above with respect to claim 9.

85. I first note that Dr. Goldberg does not explicitly state why a POSITA would be motivated to combine DOCSIS 2.0 with Ciciora's teachings about OFDMA. Dr. Goldberg characterizes Ciciora as "describing various techniques for sharing the spectrum of a cable network," one of which is Orthogonal Frequency Division Multiplexing (OFDM). Goldberg Report, ¶ 202. Dr. Goldberg also points out that DOCSIS 2.0 already used Time Division Multiple Access (TDMA) and Synchronized Code Division Multiple Access (S-CDMA) communication techniques. *See* Goldberg Report, ¶ 207. Dr. Goldberg then opines that "it would have been obvious to a POSITA to apply an OFDMA-based network instead of a TDMA or S-CDMA network to DOCSIS 2.0," presumably because OFDMA, TDMA, and S-CDMA are all—in Dr. Goldberg's words—"technique[s] that allow[] for ***simultaneous*** signal transmission and reception." *See id.*

86. I disagree with Dr. Goldberg's assessment. Ciciora discusses OFDM in the context of multiple forms of spectrum sharing, including TDMA, CDMA, and Frequency Division

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Multiplexing (FDM). *See* CHARTER_ENTROPIC00044357 at CHARTER_ENTROPIC00044567–44572. Ciciora identifies advantages and disadvantages for each of these, for example, noting that TDMA "is quite useful for return path transmission, in which a number of return transmitters need to communicate to the headend." *Id.* at CHARTER_ENTROPIC00044569. In my opinion, a POSITA would not see any teaching in Ciciora that motivates combining DOCSIS with OFDM or OFDMA specifically, as opposed to using any other form of spectrum sharing.

87. Moreover, DOCSIS 2.0 initially released in 2001. *Supra* ¶ 57. At that time, OFDM and OFDMA were already well known in the art[2], as were other advanced modulation schemes such as spread spectrum and frequency hopping. If it had been obvious to combine DOCSIS 2.0 with OFDM/OFDMA, it would have occurred by the time DOCSIS version 3.0 released in 2006, especially considering how much DOCSIS 3.0 improved upon version 2.0. Instead, OFDM was not introduced into the DOCSIS standard until version 3.1, released 12 years after DOCSIS 2.0. *Supra* ¶ 59.

88. Furthermore, DOCSIS 2.0 defines the upstream spectrum for cable systems to be from 5MHz to 40 MHz. This portion of the RF spectrum is very noisy. As Ciciora comments regarding TDMA's superior performance at lower RF frequencies, a POSITA would understand that using OFDMA as the means to provide return path communications in the lowest part of the RF spectrum would not be practical due to noise considerations. Not until DOCSIS 3.1 when return path spectrum could be expanded to much higher RF frequencies did OFDMA become viable for a portion of the return path RF spectrum generally in the higher frequency portion of the extended return path spectrum.

[2] OFDM was first invented in the 1960s by Robert Chang of Bell Labs.

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89. Therefore, I disagree that claim 11, and in particular transmitting the first and second probe simultaneously using OFDMA, is obvious in view of DOCSIS 2.0 and Ciciora.

G. The claims of the '690 Patent are directed to patent-eligible subject matter

90. Dr. Goldberg opines that the claims of the '690 Patent are directed to the abstract idea of "a node sending a probe in a form that is dictated by another node, such as the receiver of the probe." *See* Goldberg Report, ¶ 211. I disagree that this describes an unpatentable abstract idea.

91. I understand that typical examples of abstract ideas include mathematical concepts, methods of organizing human activities, and concepts that can be performed in the human mind. The claims of the '690 Patent are not directed to any of these categories, but are instead directed to methods performed by networked devices such as a cable modem and a CMTS.

92. The claims of the '690 Patent are directed to solving a clearly identified problem that existed in prior art networks, namely the fact that "requiring the transmitting node to send a predetermined probe reduces the amount [of] flexibility of the characterization process." *See* '690 Patent, 1:57–59. By allowing for the node receiving the probe to dictate the form of the probe being sent to the receiving node, the receiving node can still compare the received probe to a reference signal as the receiving node knows the precise form of the probe. *See id.* at 1:60–62, 2:17–19. This flexibility in the generation of the probes used to characterize the communication channel provides a variety of improvements to the functioning of computer networks, such as simplifying communications, providing better interoperability between devices and communication standards, and improving functioning of the network itself. *See id.* at 10:3–32.

93. As such, I disagree with Dr. Goldberg's assertion that "Claim 1 recites generic and functional steps that involve nothing more than the well-known process of requesting and transmitting probes." *See* Goldberg Report, ¶ 214. For example, claim 1 of the '690 Patent recites a method comprising steps of "receiving in a first node, a probe request specifying a first plurality

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of parameters," "determining a second plurality of parameters," "generating the probe in accordance with the first plurality of parameters and the second plurality of parameters," and "transmitting the probe from the first node to the second node." Each of these steps is performed within a network node, *i.e.* a networked device. Independent claim 9 similarly recites a method comprising steps of transmitting a probe request from a first node to a second node and "the first node receiving the probe from the second node." The claim also requires the probe to be generated in accordance with a first plurality of probe parameters specified in the request, as well as a second plurality of parameters determined by the second node. I disagree that these are generic and functional steps involving nothing more than the well-known process of requesting and transmitting probes.

94. For example, Dr. Goldberg asserts that "requires receiving a probe request (e.g. from the receiver of the probe) that includes parameters identifying the form of the probe" is one such generic and functional step. *See* Goldberg Report, ¶ 214. As explained in the '690 Patent, this is not true. The '690 Patent acknowledges that sending and receiving probes having a pre-determined form is known. *See* '690 Patent, 1:48–62. Specifically, these probes need to have a pre-determined form so that the receiving node knows, before receiving the probe, the expected form of the probe so that the received probe can be compared to a reference probe in order to determine characteristics of the communication channel. *Id.* This does not include the probe request including "parameters identifying the form of the probe" as asserted by Dr. Goldberg. *See* Goldberg Report, ¶ 214. As described throughout the '690 Patent, a probe transmitted in response to a probe request, having a form dictated by parameters specified in the probe request, is not a probe having a pre-determined form. *See* '690 Patent, 1:66–2:19, 6:17–48, FIG. 4. I note that Dr. Goldberg provides no evidence to dispute the clear description of the different probes provided in

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the ’690 Patent. Accordingly, it is my opinion that generating and/or transmitting a probe having its form dictated by a set of parameters defined in a probe request is not a generic or functional step.

95. I further disagree with Dr. Goldberg’s assertions that “claims 1 and 9 simply recite a ‘first node’ and a ‘second node,’ without providing any details on what features these nodes have” and that “the claimed nodes are nothing more than generic, well-known, computing devices.” *See* Goldberg Report, ¶¶ 216–217. For example, the ’690 Patent describes how nodes may be associated with a variety of devices.

> Nodes described herein can be associated with a variety of devices. For example, in a system deployed in a residence 101, a node may be a network communications module associated with one of the computers 109 or 110. Such nodes allow the computers 109, 110 to communicate on the communications medium 100. Alternatively, a node may be a module associated with a television 111 to allow the television to receive and display media streamed from the internet, or from one or more other network nodes. A node might also be associated with a speaker or other media playing devices 103 that plays music. A node might also be associated with a module configured to interface with an internet or cable service provider 112, for example to provide Internet access, digital video recording capabilities, media streaming functions, or network management services to the residence 101.

’690 Patent, 4:10–24.

96. In particular, Figure 6 of the ’690 Patent “illustrates an example computing module that may be used in implementing various features of embodiments of the disclosed method and apparatus.” *See* ’690 Patent, 3:12–14. Figure 6 depicts a computing module 300 that includes a processor 304, memory 308, storage devices 310, bus 302, and communications interface 324. *See id.* at FIG. 6, 11:1–12:20. Likewise, Figure 3 “illustrates a transmitter module 150 used within a node” to generate PHY packets. *See id.* at 5:57–61. Figure 3 depicts a transmitter module 150 that includes frequency domain payload 160, subcarrier mapper 163, frequency domain preamble generator 162, OFDM modulator 164, time domain payload 161, time domain preamble generator 167, filter 165, and radiofrequency (RF) upconverter 166. *See id.* at FIG. 3, 5:57–6:16. Based on

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these disclosures, I disagree that the claims of the '690 Patent only recite generic, well-known computing devices. *See* Goldberg Report, ¶¶ 216–217.

97. For at least these reasons, it is my opinion that claims 1 and 9 of the '690 Patent are directed toward patentable subject matter.

98. Lastly, I disagree with Dr. Goldberg's assertion that "[t]he dependent claims also fail to recite an inventive concept that would transform the abstract idea into patentable subject matter." *See* Goldberg Report, ¶ 219. For example, dependent claims 7 and 15 depend on claims 1 and 9 respectively and further recite "wherein the probe request requests a probe that assists in diagnosing a network problem" / "wherein the probe request is configured to diagnose a network problem." These claims are directed to using the '690 Patent's "receiver determined probes" to address problems that arise in communication networks. For example, the '690 Patent describes how "a probe can replicate a potential problem, reach or discover a distant or previously undetected node on the network, or assist with network admissions procedures." *See* '690 Patent, 4:35–38; *see also* '690 Patent, 7:7–10.

99. Dependent claims 8 and 16 similarly depend on claims 1 and 9 respectively and further recite "wherein the probe request is generated by a network operator and uploaded to the second/first node." These claims are likewise directed to using the '690 Patent's "receiver determined probes" to address problems that arise in communication networks. For example, the '690 Patent describes how a network coordinator node "can generate a probe request for a probe to be transmitted between two other nodes with an instruction that a probe report be transmitted to the NC. This might be used by an off-site network manager that can communicate with only some of the network nodes, but suspects that communications between other network nodes may be

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causing a network problem." '690 Patent, 7:21–28. In this way, claims 8 and 16 address a problem that arises in the context of multiple networked devices.

100. Dependent claim 11 depends on claim 9 but further involves a third node. In claim 11, two different nodes transmit probes simultaneously using OFDMA. This is consistent with the specification's description of how "OFDMA may be employed to allow multiple nodes to have simultaneous access to the channel." *See* '690 Patent, 4:65–66. In my opinion, claim 11 is directed to an improvement in networked communications and recites an inventive concept.

101. For the above reasons, it is my opinion that the claims of the '690 Patent are directed to patent-eligible subject matter.

H. The claims of the '690 Patent are not invalid for lack of written description / enablement

1. "probe"

102. Dr. Goldberg opines that the term "probe" lacks written description support and enablement. *See* Goldberg Report, ¶¶ 222–225. I disagree. I note that the Court has construed the term "probe" to mean "a signal transmitted to a network node that the network node can compare to a reference signal having a known form in order to determine characteristics of the channel on which the signal was transmitted."

103. A POSITA would have been familiar with the Open Systems Interconnection (OSI) model, which describes seven layers of abstraction used by computers to communicate over a network. *See, e.g.*, CHARTER_ENTROPIC00044357 at CHARTER_ENTROPIC00044582. The "physical layer" is one of these layers.

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7	Application Layer	Human-computer interaction layer, where applications can access the network services
6	Presentation Layer	Ensures that data is in a usable format and is where data encryption occurs
5	Session Layer	Maintains connections and is responsible for controlling ports and sessions
4	Transport Layer	Transmits data using transmission protocols including TCP and UDP
3	Network Layer	Decides which physical path the data will take
2	Data Link Layer	Defines the format of data on the network
1	Physical Layer	Transmits raw bit stream over the physical medium

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104. Dr. Goldberg admits that the '690 Patent describes physical layer probes. *See* Goldberg Report, ¶ 223. My understanding is that the specification need not describe exactly the subject matter claimed. Rather, the specification must allow a POSITA to recognize the claimed invention. In my opinion, a POSITA would have recognized that the claimed probes include physical layer probes, which is supported by the '690 Patent specification as confirmed by Dr. Goldberg. Therefore, a POSITA would recognize that the specification discloses and enables the claimed "probes."

2. "wherein the first plurality of parameters at least specify content payload of the probe and a second node"

105. Dr. Goldberg opines that the term "wherein the first plurality of parameters at least specify content payload of the probe and a second node" lacks written description support and enablement. *See* Goldberg Report, ¶¶ 226–229. Specifically, he opines that there is no disclosure

or enablement for the probe request specifying the "second node" when the second node happens to be the requesting node. *See id.* at ¶ 227. I disagree.

106. I first note, Dr. Goldberg admits that "[t]he '690 Patent discloses embodiments whereby a probe is transmitted back to the probe requester." *See* Goldberg Report, ¶ 228; *see also* '690 Patent, 6:57–58. Dr. Goldberg also admits that the '690 Patent discloses an example whereby "node 2 might generate a probe request for node 3 to generate and transmit a specified probe to node 1." *See* Goldberg Report, ¶ 229 (quoting '690 Patent, 7:13–15).

107. In my opinion, a POSITA would recognize that, in both of these examples, the probe request may include a parameter specifying the node that will receive the probe. I further note the '690 Patent discloses that "one or more nodes [may] transmit a probe request." *See* '690 Patent, 6:18–22. A single node may then generate a responsive probe and transmit it to multiple nodes, which the patent calls "point-to-multipoint." *See id.* at 6:22–25. A POSITA would therefore recognize that the specification discloses and enables "the first plurality of parameters at least specif[ies] content payload of the probe and a second node."

3. "determining a second plurality of parameters associated with generation and transmission of the probe;" "generating the probe in accordance with the first plurality of parameters and the second plurality of parameters, wherein the probe has a form dictated by the first plurality of parameters;" "wherein the probe is generated in accordance with the first plurality of parameters and in accordance with a second plurality of parameters determined by the second node;" "the first plurality of probe parameters comprising a form for the probe including a modulation profile for the probe"

108. Dr. Goldberg opines that each of these terms lacks written description support and enablement. *See* Goldberg Report, ¶¶ 230–231. Specifically, he opines that there is no disclosure of a "second plurality of parameters." *Id.* at ¶ 230. I disagree. I note that three of these terms have been construed by the Court according to their plain meaning.

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109. As an initial matter, I disagree with Dr. Goldberg's implicit understanding that the second plurality of parameters must only include what he calls "non-form" parameters. In my opinion, the plain meaning of "the probe has a form dictated by the first plurality of parameters" (claim 1) and "the first plurality of parameters comprising a form for the probe" (claim 9) does not carry such a requirement. In my opinion, a POSITA would read these terms to mean that the "first plurality of parameters" includes at least one parameter relating to the form of the probe whereas the "second plurality of parameters" can include any parameters ("form" or otherwise) relating to the generation of the probe. This would include, for example, the parameters described in Figure 5 of the '690 Patent.

110. Even assuming that the "second plurality of parameters" is limited to what Dr. Goldberg calls "non-form" parameters, I disagree with Dr. Goldberg's assertion that "the specification provides no explanation regarding how to distinguish form versus non-form parameters – indeed, the specification would teach a POSITA that all disclosed parameters are 'form' parameters." *See* Goldberg Report, ¶ 231. In my opinion, a POSITA would recognize there are many parameters relating to the generation and transmission of the probe, which are not necessarily related to the "form" of the probe.

111. For example, the '690 Patent describes one embodiment wherein "the probe transmitter transmits the generated probe to the probe requester at a specified time." '690 Patent, 6:40–42; *see also* '690 Patent, Claim 14 ("The method of claim 9, wherein the probe request is transmitted at a specific time").

112. In another example, the probe transmitter could transmit the generated probe to the probe requester at a specific power level. I note Figure 5 indicates that the probe request may specify "a transmit power setting" and "a power scaling factor for the payload relative to the

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preamble." *See id.* at 8:59–60, 9:7–8. But both of these parameters are distinct from the power level itself. *See id.* at 8:61–63 ("the network protocol may establish a range of transmit power settings that are available for various transmissions"), 9:28–31 ("The scaling factor can be determined such that the payload is transmitted at the power level of a normal OFDMA sub-channel, even though the preamble does not specify that the communication is an OFDMA sub-channel").

113. These examples are consistent with the '690 Patent's disclosure that "the probe transmitter can transmit the probe to any other probe base [*sic*] upon one of the parameters of the probe request <u>or based upon information that previously existed within the transmitting node</u>." '690 Patent, 6:42–45. Based on that disclosure, and in view of the specific examples described in the specification, a POSITA would understand that the patent discloses and enables determining a second plurality of parameters (at the transmitting node).

4. "wherein the probe request is generated by a network operator and uploaded to the [second/first] node"

114. Dr. Goldberg opines that the term "wherein the probe request is generated by a network operator and uploaded to the [second/first] node" lacks written description support and enablement. *See* Goldberg Report, ¶ 232. I disagree.

115. The '690 Patent describes how "an NC can generate a probe request for a probe to be transmitted between two other nodes with an instruction that a probe report be transmitted to the NC. This might be used by an off-site network manager that can communicate with only some of the network nodes, but suspects that communications between other network nodes may be causing a network problem." '690 Patent, 7:21–28; *see also* '690 Patent, 2:20–27 (describing how probes may be used "in network accessible by content providers . . . for off-site network diagnosis").

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116. Further support appears in the specification at 7:3–11:

> In another example, the probe report could be conveyed to an offsite network administrator for remote management purposes. For example, the parameters of the requested probe can be determined by an off-site network administrator, and conveyed to a probe requestor. The resulting probe, post-processing, and probe report can be used to assist in diagnosing a network problem possibly involving the probe requester or the probe transmitter. In one such case, a probe report is sent to the network administrator.

'690 Patent, 7:3–11.

117. Based on the above, a POSITA would recognize that the specification discloses and enables "wherein the probe request is generated by a network operator and uploaded to the [second/first] node."

I. Dr. Goldberg failed to consider objective indicia of non-obviousness for the '690 Patent

118.

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VIII. VALIDITY OF THE ASSERTED CLAIMS OF THE '682 PATENT

A. Background and Summary of the Invention of the '682 Patent

122. The '682 Patent is titled "Method And System For Service Group Management In a Cable Network." The '682 Patent was filed on January 9, 2018, and issued on November 20, 2018. The '682 Patent claims priority to U.S. Application No. 15/434,673, filed on February 16, 2017 (now U.S. Patent No. 9,866,438), U.S. Application No. 15/228,703, filed on August 4, 2016 (now U.S. Patent No. 9,577,886), U.S. Application No. 13/948,444, filed on July 23, 2013 (now U.S. Patent No. 9,419,858), and U.S. Provisional Application No. 61/674,742, filed on July 23, 2012.

123. The '682 Patent is directed to a method and system for a "cable modem termination system (CMTS) [to] determine, for a plurality of cable modems served by the CMTS, a corresponding plurality of SNR-related metrics." '682 Patent Abstract. The specification describes how the CMTS may assign cable modems to service groups based on each cable modem's performance on their respective SNR-related metrics. *See id.* at 5:37–39; 8:7–9. The '682 Patent further discloses that the CMTS may build a composite profile for the service group (termed "composite SNR-related metric") based in part on the worst-case SNR of the cable modems within the service group. *Id.* at 4:14–24.

124. This composite SNR-related metric allows the CMTS to select physical layer communication parameters that are most appropriate for the cable modems within a given service group, which in turn may lead to optimized performance for the cable modems. *Id.* at 5:7–20. For example, cable modems within the same service group may share similar SNR-related metrics,

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and thus would benefit from similar physical layer parameters, which makes application of the same composite SNR-related metric to the similarly-situated cable modems advantageous. *Id.* at 4:14–17; 5:7–20; 5:40–57.

125. An exemplary system showing a CMTS and CMs is shown below in Figure 4A:

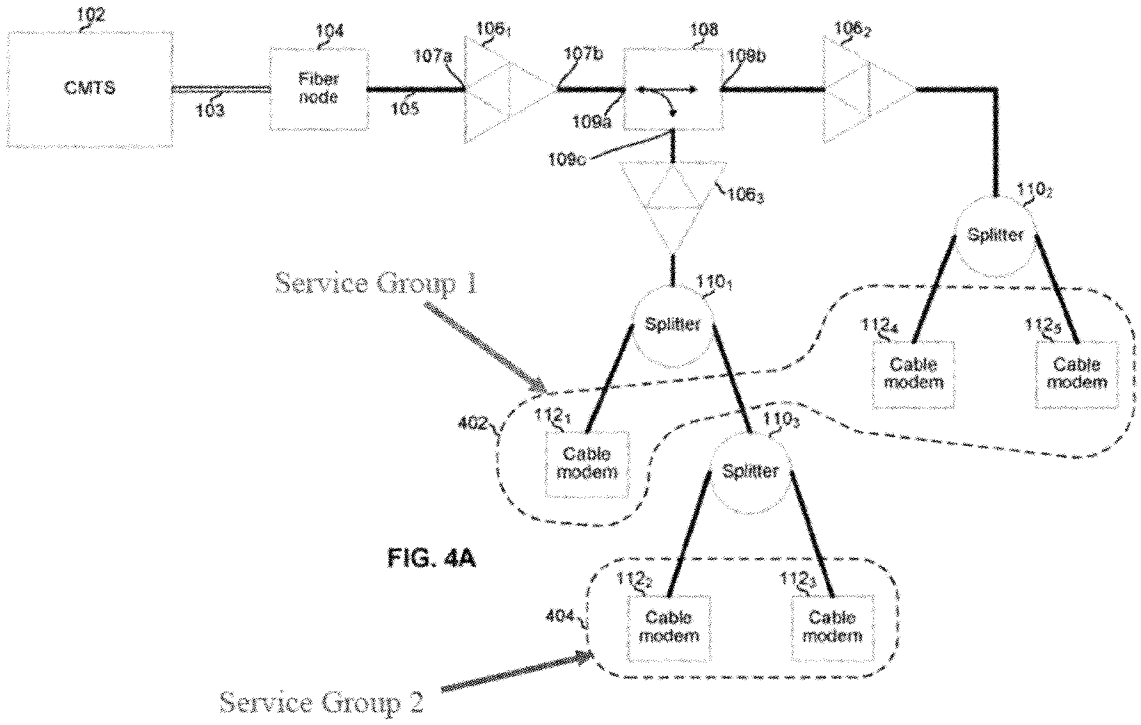

FIG. 4A

'682 Patent, FIG. 4A (annotated); *see also id.* at 6:42–7:22, FIG. 4B.

126. The '682 Patent discloses that the CMTS builds a composite view of the various cable modems' SNR-related levels (*e.g.,* worst case SNR levels), and that "SNR at a particular frequency or SNR over a range of frequencies" is an SNR profile. *Id.* at 3:53–58. The specification further describes that a plurality of CMs that share similar SNR-related metrics within a service group are said to have a composite worst-case SNR profile for a particular service group. *Id.* at 4:14–17, 5:7–12.

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B. Prosecution History of the ’682 Patent

127. I have reviewed the prosecution history leading to the issuance of the ’682 Patent. I have also reviewed Dr. Goldberg’s summary of the prosecution history. *See* Goldberg Report, ¶¶485–486.

128. In the April 3, 2018 Office Action that rejected claims 1-18 on the ground of nonstatutory double patenting, the Examiner specifically stated that “**Claims 1-18** are allowed over the prior arts, since the prior arts taken individually or in combination fail to particular disclose, fairly suggest, or render obvious the following under limitation: In claims 1 and 10, ‘ ... a composite SNR-related metric based at least in part on a worst-case SNR profile of said SNR-related metrics corresponding to said one of said plurality of service groups .... ‘ in combination with other limitations recited in the claims.” ENTROPIC_CHARTER_0005245 at ENTROPIC_CHARTER_0005329 (emphasis in original).

129. The Examiner went on to discuss “the **first closes[t] prior art US Patent 8,743,933 B2** to Prodan et al.” *Id.* (emphasis in original). Specifically, the Examiner found that “Prodan does not teach a composite SNR-related metric based ‘at least in part on a worst-case SNR profile of said SNR-related metrics corresponding to said one of said plurality of service groups’. Therefore, Prodan does not teach the underlined limitation above when such limitation is incorporated with other limitations of the independent claims.” *Id.* at ENTROPIC_CHARTER_0005331. Notably, U.S. Patent No. 8,743,933 is the issued patent of U.S. Patent Application Publication No. 2012/0269242 (“Prodan ’242”) upon with Dr. Goldberg now relies.

130. Moreover, Prodan ’242 and U.S. Patent No. 8,743,933 were cited in an Information Disclosure Statement by Applicant filed June 21, 2018, were considered by the Examiner during the prosecution of the ’682 Patent, and appear in the references cited in the ’682 Patent.

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ENTROPIC_CHARTER_0005245 at ENTROPIC_CHARTER_0005352, -5356. The Examiner specifically found the '682 Patent patentable in view of Prodan '242 and the patent that issued from Prodan '242 (U.S. Patent No. 8,743,933).

131. I also note that the other reference relied on by Dr. Goldberg, U.S. Patent Application Publication No. 2013/0107921 A1 ("Prodan '921"), was also was cited in an Information Disclosure Statement by Applicant filed June 21, 2018, was considered by the Examiner during the prosecution of the '682 Patent, and appears in the references cited in the '682 Patent. ENTROPIC_CHARTER_0005245 at ENTROPIC_CHARTER_0005356. The Examiner specifically found the '682 Patent patentable in view of Prodan '921.

C. Priority Date of the '682 Patent

132. The earliest priority claim by the '682 Patent is to U.S. Provisional Application No.61/674,742 ("'742 Provisional Application"), filed on July 23, 2012. Dr. Goldberg does not dispute that the '682 Patent is entitled to claim priority to the '742 Provisional Application. Therefore, I have applied the July 23, 2012 date in my analysis of the prior art.

D. Asserted Claims of the '682 Patent

133. I understand that claims 1, 2, and 3 of the '682 Patent are asserted against Charter. I have reproduced the claim language below.

134. Independent claim 1 of the '682 Patent recites:

> 1. A method comprising:
>
> determining, by a cable modem termination system (CMTS), for each cable modem served by said CMTS, a corresponding signal-to-noise ratio (SNR) related metric;
>
> assigning, by said CMTS, each cable modem among a plurality of service groups based on a respective corresponding SNR-related metric;

generating, by said CMTS for each one of said plurality of service groups, a composite SNR-related metric based at least in part on a worst-case SNR profile of said SNR-related metrics corresponding to said one of said plurality of service groups;

selecting, by said CMTS, one or more physical layer communication parameter to be used for communicating with said one of said plurality of service groups based on said composite SNR-related metric; and

communicating, by said CMTS, with one or more cable modems corresponding to said one of said plurality of service groups using said selected one or more physical layer communication parameter.

135. Dependent claim 2 of the '682 Patent recites:

2. The method of claim 1, wherein said one or more physical layer communication parameter includes one or more of: transmit power, receive sensitivity, timeslot duration, modulation type, modulation order, forward error correction (FEC) type, and FEC code rate.

136. Dependent claim 3 of the '682 Patent recites:

3. The method of claim 1, wherein said CMTS uses orthogonal frequency division multiplexing (OFDM) over a plurality of subcarriers for said communicating.

E. Charter's Asserted Prior Art for the '682 Patent

1. U.S. Patent Publication No. US 2013/0041990 A1 ("Thibeault") (CHARTER_ENTROPIC00380698)

137. Thibeault, which is entitled, "Method and Apparatus for Improving Throughput of a Modem," discloses an apparatus for configuring logical channels in a network. Thibeault at [0008]. The disclosed apparatus may comprise, among others, a microprocessor configured to determine network parameters associated with a selected network element. *Id.* These network element parameters may include a modulation error ratio (MER) or a signal to noise ratio (SNR). *Id.* at [0009]. Furthermore, the microprocessor may compare the network parameters with threshold values and assign the network elements to a logical channel based on the comparison; provide instructions to the network element to re-assign to a third logical channel different from

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the second logical channel; and/or assign the network element to the second logical channel using an upstream channel override signal. *Id.*

2. U.S. Patent Publication No. US 2012/0269242 A1 ("Prodan '242") (CHARTER_ENTROPIC00036351)

138. Prodan '242, which is entitled, "Frequency Spectrum and Modulation Scheme Allocation for High Speed Data Networks," discloses frequency spectrum and modulation scheme allocation techniques to optimize power utilization. Prodan '242 at Abstract. Prodan '242 seeks to reduce power utilization at individual cable modems and in the overall network, by allocating upstream frequency bands or when such frequency bands are fully allocated by assigning transmission modulation schemes among cable modems while accounting for tap and cable losses experienced by individual upstream cable modem transmissions. *Id.* at [0022]. Finally, this references was considered during the prosecution of the '682 Patent.

3. U.S. Patent Publication No. US 2013/0107921 A1 ("Prodan '921") (CHARTER_ENTROPIC00036397)

139. Prodan '921, which is entitled, "Adaptive Tilt Compensation of Upstream Channel in High Speed Data Networks," discloses embodiments that seek to reduce power utilization at individual cable modems and in the overall network, by pre-compensating upstream transmissions according to feedback channel characteristics received from the headend. Prodan '921 at Abstract. According to embodiments, pre-compensation is performed using power filtering/amplification and/or bit loading. *Id.* An example embodiment includes a transmitter with dynamic bit loading features, where bit loading is a technique that allocates bits to be transmitted according to the quality of sub-channels (e.g., OFDM sub-channels or a single carrier within a channel bonded carrier group). *Id.* at [0040].

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F. Dr. Goldberg's Opinion of the '682 Patent's Validity Under 35 U.S.C. §§ 102 and 103 is Not Supported by the Cited Prior Art

1. Claims 1 and 2 are Valid in view of Thibeault in combination with Prodan '242

140. Dr. Goldberg cites U.S. Patent Application Publication No. 2013/0041990 A1 (CHARTER_ENTROPIC00380698–707) ("Thibeault") in combination with U.S. Patent Application Publication No. 2012/0269242 A1 (CHARTER_ENTROPIC00036351–363) ("Prodan '242") for the proposition that claims 1 and 2 of the '682 Patent are invalid and obvious. I disagree. It is my opinion that claims that 1 and 2 of the '682 Patent are valid in view of Thibeault in view of Prodan '242.

141. As discussed above, I have reviewed the prosecution history for the '682 Patent and note that Prodan '242 was cited. *See* ENTROPIC_CHARTER_0005245 at ENTROPIC_CHARTER_0005356. As discussed above, the Examiner specifically found the '682 Patent patentable in view of Prodan '242 and the patent that issued from Prodan '242.

142. I note that Dr. Goldberg only provides an analysis of the claims of the '682 Patent under 35 U.S.C § 103. *See* Goldberg Report, ¶ 491. I understand that Dr. Goldberg does not provide an opinion regarding anticipation of claims of the '682 Patent under 35 U.S.C. § 102.

a) [1b]: "assigning, by said CMTS, each cable modem among a plurality of service groups based on a respective corresponding SNR-related metric;"

143. In my opinion, Thibeault does not disclose this feature.

144. Dr. Goldberg's analysis of this limitation commits two main errors that lead Dr. Goldberg to the wrong conclusion: first, Dr. Goldberg misinterprets the definition of "service group" as adopted by the Court and used in the '682 Patent; second, Dr. Goldberg makes a false equivalence between the "service group" disclosed in the '682 Patent and the "service group"

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disclosed in Thibeault, including how the service groups in each relate to their respective inventions overall.

145. Dr. Goldberg reduces the "service group" disclosed in the '682 Patent to simply modulation profiles. *See* Goldberg Report, ¶ 507. This is contrary to both the disclosure of the '682 Patent and the Court's construction of "service group." First, Dr. Goldberg asserts that the '682 Patent does not define the term service group. *See* Goldberg Report 507. This is false. The '682 Patent contains many definitions of a "service group" to include groupings of cable modems. *See*, for example, '682 Patent, 6:42-7:22, FIG. 4A, FIG. 4B.

146. Second, Dr. Goldberg asserts "that Entropic apparently interprets the assignment of a cable modem to a 'profile' or a 'modulation profile' as an assignment to a service group. *See* Entropic's Second Suppl. Infringement Contentions, Ex. F, at 6, 13." *See* Goldberg Report, ¶ 507. Dr. Goldberg misrepresents Plaintiff's Infringement Contentions, which clearly illustrate that a "service group" is a group or cluster of cable modems. *See*, for example, Entropic's Second Suppl. Infringement Contentions, Ex. F, at 7, 12. I understand that a group of cable modems and a cluster of cable modems are equivalent concepts with respect to the '682 Patent. My opinion is the plain meaning of a "service group" in the context of the '682 Patent constitutes, consistent with the Court's claim construction and the disclosure of the '682 Patent, a group or cluster of cable modems.

147. Dr. Goldberg's misunderstanding of the Court's claim construction order and the '682 Patent's disclosure then leads to the false equivalence between the "service groups" disclosed in the '682 Patent and the "logical channels" disclosed in Thibeault. As a preliminary matter, the term "service group" does not appear in Thibeault whatsoever; indeed, the word "group" does not appear at all, much less with reference to cable modems. Instead, Thibeault discloses logical

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channels in a network. In its Background of the Invention, Thibeault defines logical channels as follows:

> The CMTS (Cable Modem Termination System) will be configured to be running multiple logical channels per physical upstream channel. Each logical channel will have a different modulation profile configured (but not limited to) such as quadrature phase shift keying (QPSK), 16QAM (quadrature amplitude modulation) and 32QAM. Logical channel operation is a mechanism whereby multiple upstream channels may be configured with different operating parameters, e.g. modulation modes, while all operating on the same physical channel. DOCSIS 2.0 introduced this concept to support simultaneous operation and therefore backwards compatibility of TDMA, ATDMA, and SCDMA cable modems.

Thibeault ¶ [0004].

148. Dr. Goldberg explains how Thibeault discloses that "[e]ach logical channel will have a different modulation profile" and tries to relate this disclosure back to his erroneous understanding of the '682 Patent's "service groups" as support for his false equivalence. *See* Goldberg Report, ¶ 509. In short, Dr. Goldberg equates "service groups" with "logical channels" on the basis that each may relate to modulation profiles. However, Thibeault does not organize cable modems into conceptual service groups based on MER as in the '682 Patent. I understand that a logical channel, as defined in Thibeault and utilized in DOCSIS 2.0, is a mechanism that allows for a single physical channel to utilize multiple modulation modes. Thibeault deals with moving individual cable modems to different preconfigured logical channels (i.e. physical channels) during a registration procedure. *See*, for example, Thibeault ¶ [0029]. Accordingly, a "logical channel" as described in Thibeault does not constitute a "service group" as used in the '682 Patent.

149. Dr. Goldberg does not rely on Prodan '242 to disclose this element of claim 1.

150. It is my opinion that the Goldberg Report fails to describe that Thibeault and Prodan '242, either alone or in combination, teaches, suggests, or discloses this element of claim 1.

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b) [1c]: "generating, by said CMTS for each one of said plurality of service groups, a composite SNR-related metric based at least in part on a worst-case SNR profile of said SNR-related metrics corresponding to said one of said plurality of service groups;"

151. As a preliminary matter, Dr. Goldberg discusses the "disagreement" between the parties as to the term "composite SNR-related metric based at least in part on a worst-case SNR profile of said SNR-related metrics" which was resolved during claim construction, and notes that Charter's position is that the term is indefinite. *See* Goldberg Report, ¶ 516. I do not agree with Dr. Goldberg's assessment, and I adopt the Court's claim construction for the term "a composite SNR-related metric based at least in part on a worst-case SNR profile of said SNR-related metrics" as plain and ordinary meaning in my analysis.

152. Dr. Goldberg argues that composite SNR metrics are made for each channel. Goldberg Report, ¶ 518. I understand that Thibeault discloses "[n]etwork element parameters, e.g. ranging messages, which are indicative of the performance capabilities of the network element are read by the CMTS, as indicated in step S3" and "in step S5, the network element parameters are compared against a parameter table containing a table of one or more parameter thresholds associated with a logical channel available on the network to determine if the CMTS needs to reassign that modem to a different logical channel on the currently used physical upstream port" where "[t]he threshold values may be predetermined values or may be dynamically determined based on mathematical techniques such as a mean value of a measured network parameter, or a range of values set by an operator." *See* Thibeault ¶ [0029].

153. I note that Thibeault discloses the "threshold values" for a logical channel. As I described above with respect to element 1b, a logical channel does not constitute a service group of the '682 Patent. As element 1c recites the "composite SNR-related metric" being generated for

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a service group, not a channel, it is my opinion that Thibeault fails to disclose this element of claim 1.

154. My opinion is further underscored by Dr. Goldberg's analysis. Dr. Goldberg notes that Thibeault discloses certain "parameter thresholds associated with a logical channel" that may be determined by "mathematical techniques such as a mean value of a measured network parameter." Dr. Goldberg then equates Thibeault's "parameter thresholds" and "mean value of a measured network parameter" with the '682 Patent's "composite SNR-related metrics." *See* Goldberg Report, ¶ 518-20. However, Dr. Goldberg's comparison falls apart upon closer review. For example, Dr. Goldberg points to Thibeault ¶ [0033] in support of his argument. Goldberg Report, ¶ 519. However, this paragraph of Thibeault expressly discloses pre-determined parameter thresholds that can be used to assign individual cable modems to a particular logical channel: "As an example ***parameter thresholds could be as follows: QPSK is set to an MER of 16; 16QAM is set to an MER of 22; 32QAM is set to an MER of 25; and 64QAM is set to an MER of 28. When a modem as the network element registers on logical channel 0 and its MER (SNR) value is 27*** *the CMTS card will* ***issue an upstream channel override to that particular modem to re-register on logical channel 2 (32QAM)*** because its MER (SNR) says it can pass data cleanly at that modulation mode." Thibeault ¶ [0033]. A POSITA understands that assigning a cable modem to a particular logical channel during registration based on predetermined thresholds does not teach, suggest, or constitute element 1c of claim 1.

155. Turning to paragraph 520 of Dr. Goldberg's Report, Dr. Goldberg again misrepresents Entropic's Infringement Contentions and Dr. Kramer's Claim Construction Declaration. As described above, I understand that Entropic's Second Suppl. Infringement Contentions state that a K-Means algorithm can be used to generate service groups and determine

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dynamic modulation profiles for each service group. *See*, for example, Entropic's Second Suppl. Infringement Contentions p. 12. Based on my review of Dr. Kramer's Claim Construction Declaration, I understand that in paragraph 169, Dr. Kramer describes how a composite SNR-related metric can be determined for a service group, not a logical channel. Accordingly, my opinion is that neither Entropic's Infringement Contentions nor Dr. Kramer's Claim Construction Declaration support Dr. Goldberg's assertion that a POSITA would understand that Thibeault discloses the "composite SNR-related metric" of claim 1.

156. Therefore, Dr. Goldberg provides no support for the proposition that a "POSITA would also have understood, or at least found it obvious, that Thibeault's mean threshold value would be "based at least in part" on a worst-case value of the measured network parameter, such as an SNR." A fatal error of Dr. Goldberg's characterization of Thibeault is the false equivalence between logical channels and service groups; because the two are fundamentally different, each of Dr. Goldberg's observations about Thibeault are inapplicable to the '682 Patent.

157. Dr. Goldberg's proposed combination with Prodan '242 does not remedy the error of his false equivalence and misapplication of Thibeault. Dr. Goldberg suggests that Prodan '242's disclosure of a "modulation scheme allocation technique" and "frequency profiles" discloses an "SNR profile." However, just as with Thibeault, Dr. Goldberg's analysis of the attempted combination between Thibeault and Prodan '242 fails to disclose all aspects of element 1c, including the "composite SNR-related metric" being generated for a service group, not a channel. *See* Goldberg Report, ¶ 529.

158. Although Prodan '242 deals more directly with cable modems, Prodan '242 (either alone or in combination with Thibeault) does not teach the generation of a composite view of the cable modems and treatment in a group. Instead, Prodan '242's "frequency profiles" only relate to

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individual cable modems and are not based on any composite or worst-case, much less the full limitation of element 1c.

159. As described above, Thibeault and Prodan '242 fails to disclose all aspects of claim 1c. Accordingly, it is my opinion that the Goldberg Report fails to describe that Thibeault and Prodan '242, either alone or in combination, teaches, suggests, or discloses this element of claim 1.

c) [1d]: "selecting, by said CMTS, one or more physical layer communication parameter to be used for communicating with said one of said plurality of service groups based on said composite SNR-related metric"

160. Thibeault does not teach, suggest, or disclose this element of claim 1. As described above, a logical channel as described in Thibeault does not constitute a service group in the context of the '682 Patent and nothing in Prodan '242 cures this deficiency in Thibeault. For this reason alone, Thibeault and Prodan '242, either alone or in combination, fail to disclose this element of claim 1.

161. Dr. Goldberg again fights with the Court's claim construction order by disagreeing that "there is a clear antecedent basis for 'said one of said plurality of service groups.'" *See* Goldberg Report, ¶ 534. I do not agree with Dr. Goldberg's assessment, and I adopt the Court's claim construction for the term "communicating with said one of said plurality of service groups" as plain and ordinary meaning in my analysis.

162. Further, Thibeault's invention assigns an individual cable modems to a particular logical channel during a registration process, where a logical channel has a pre-defined modulation profile. See Thibeault ¶¶ [0032]-[0033], FIG. 4. I note that Dr. Goldberg appears to agree with this conclusion, citing to Thibeault ¶ [0004] describing how modulation profiles are pre-configured for different logical channels. *See* Goldberg Report, ¶ 536.

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163. Dr. Goldberg fails to identify any aspect of Thibeault that discloses changing a modulation profile assigned to a logical channel. Dr. Goldberg states "Thibeault discloses parameter thresholds can be dynamically determined based on mathematical techniques such as a mean value of a measured network parameter" and then takes the logical leap that it would be obvious to configure the modulation parameters themselves. Thibeault Report ¶ 539. In my opinion, this is incorrect. First, I note that Dr. Goldberg cites no evidence to support this conclusion. Dr. Goldberg states "[i]n my opinion, it would have been obvious to a POSITA to configure a CMTS to, itself, configure modulation parameters for each logical channel taking into account SNR thresholds." *Id*. However, his reasoning does not support this assertion. For example, Dr. Goldberg relies on Thibeault ¶ [0007], which is located in the Background and recites:

> **Commonly assigned US Publication 20070223512 attempts to improve throughput by moving modems to the correct upstream logical channel after the modem has registered.** It does this by invoking either the upstream channel change (UCC) or dynamic channel change (DCC) protocol to move the modem. **While the approach may work well under ideal conditions, many modems do not handle those protocols properly.** If the modems fail to move with those protocols then they may possibly deregister causing loss of service for subscribers. Accordingly, what is needed is a reliable and cost effective approach to assigning modems to a preferred logical channel to improve throughput.

Thibeault ¶ [0007]

164. Specifically, Thibeault describes a problem with cable modems - that many modems are unable to properly change to different logical channels after registration - and proposes a solution to this problem - improving the determination of which logical channel the cable modem should be assigned during the registration process. *See* Thibeault ¶ [0032], FIG. 4. This does not teach, suggest, or constitute making any modifications to the modulation profiles of the logical channels themselves. I have reviewed Thibeault and cannot locate any disclosure with respect to changing a modulation profile assigned to a logical channel.

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165. In my opinion, a POSITA understands, as clearly articulated in the Background of Thibeault, that a logical channel has a pre-configured modulation profile that is not modified during the operation of the CMTS. Even if, as asserted by Dr. Goldberg, that a threshold value can be dynamically determined and used to determine when a particular logical channel is preferred for a particular cable modem (and I do not agree with this assertion), a POSITA would not be motivated, based on a dynamic determination of a *threshold* for using a logical channel, to modify a modulation profile for the logical channel. Rather, it is my opinion that a POSITA would understand that, by using the assigned thresholds for each logical channel, Thibeault's goal of improving the assignment of cable modems to logical channels is improved without modifying the configuration of the modulation profile of the logical channels themselves.

166. Further, in my opinion, if one were to dynamically modify the modulation profile assigned to a logical channel on a CMTS, then all of the other modems that use the same logical channel would have to adjust their profiles to this new modulation profile. This could potentially degrade their performance or even cause a loss of service for those cable modems. Depending on the modification to the modulation profile, many of the cable modems would not be able to re-register on the same logical channel as before, creating an entirely new problem.

167. Dr. Goldberg does not rely on Prodan '242 to disclose this element of claim 1.

168. It is my opinion that the Goldberg Report fails to describe that Thibeault and Prodan '242, either alone or in combination, teaches, suggests, or discloses this element of claim 1.

2. Claim 3 is Valid in view of Thibeault in combination with Prodan '242 and Prodan '921.

169. Dr. Goldberg further argues that claim 3 of the '682 Patent is invalid as obvious in view of Thibeault, in combination with Prodan '242 and U.S. Patent Application Publication No.

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2013/0107921 A1 (CHARTER_ENTROPIC00036397 – 00036411) ("Prodan '921"). For the reasons stated below, I disagree.

170. As discussed above, I have reviewed the prosecution history for the '682 Patent and note that Prodan '921 was also cited. *See* ENTROPIC_CHARTER_0005245 at ENTROPIC_CHARTER_0005356. As discussed above, the Examiner specifically found the '682 Patent patentable in view of Prodan '921.

a) [3]: "The method of claim 1, wherein said CMTS uses orthogonal frequency division multiplexing (OFDM) over a plurality of subcarriers for said communicating."

171. Dr. Goldberg states that Thibeault in combination with Prodan '242 renders claim 1 obvious. Goldberg Report, ¶ 552. As described above, it is my opinion that Thibeault, either alone or in combination with Prodan '242, fails to teach, suggest, or disclose several elements of claim 1.

172. Dr. Goldberg states that neither Thibeault or Prodan '242 disclose the additional aspects of claim 3. Goldberg Report, ¶ 553. I agree that Thibeault and Prodan '242, either alone or in combination, fails to disclose all elements of claim 3.

173. Dr. Goldberg states that the usage of OFDM, as disclosed in Prodan '921, would have been obvious to combine with his proposed combined system of Thibeault and Prodan '242. Goldberg Report, ¶ 557. I disagree. As thoroughly described above with respect to claim 1, Thibeault involves the usage of logical channels configured per physical upstream channel. *See*, for example, Thibeault ¶¶ [0004], [0011], [0023], [0024], [0032]-[0034], FIG. 4. It is my opinion that this disclosure of logical channels is directed towards the usage of single carrier QAM channels typically used in cable networks. My opinion is supported by the disclosure of Thibeault: "[l]ogical channel operation is a mechanism whereby multiple upstream channels may be configured with different operating parameters, e.g. modulation modes, while all operating on the

same physical channel. DOCSIS 2.0 introduced this concept to support simultaneous operation and therefore backwards compatibility of TDMA, ATDMA, and SCDMA cable modems." Thibeault ¶ [0004].

174. With this understanding of Thibeault, it is my opinion that the combination of Thibeault, Prodan '242, and Prodan '921 proposed by Dr. Goldberg is improper as it changes the principle of operation of the system disclosed in Thibeault. It is my opinion that the usage of logical channels as described in Thibeault is unnecessary for OFDM channels as described in Prodan '921. For example, a POSITA understands that it is unnecessary to utilize the concept of logical channels as described in Thibeault for an OFDM channel as a bit loading can be allocated on a per-subcarrier basis in an OFDM channel. *See* Goldberg Report, ¶ 556; *see also* Prodan '921 ¶ [0040]. A POSITA understands that the usage of OFDM channels further would make those channels incompatible with at least TDMA, ATDMA, and SCDMA cable modems.

175. Accordingly, it is my opinion that the proposed combination of Thibeault, Prodan '242, and Prodan '921 is improper as it changes the principle of operation of the system discussed in Thibeault from one that relies on physical single carrier QAM channels and logical channels assigned to those physical channels to a system that utilizes OFDM channels.

176. Further, it is my opinion that the proposed combination of Thibeault, Prodan '242, and Prodan '921 renders the system of Thibeault unsatisfactory for its intended purpose of providing backwards compatibility with a variety of cable modems, including TDMA, ATDMA, and SCDMA cable modems.

177. For at least these reasons, it is my opinion that the combination of Thibeault, Prodan '242, and Prodan '921 fails to render claim 3 obvious.

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G. The claims of the '682 Patent are directed to patent-eligible subject matter

178. Dr. Goldberg asserts that claim 1 of the '682 Patent is invalid because it is directed towards an abstract idea and fails to recite an inventive concept. Goldberg Report, ¶ 559. I disagree. It is my opinion that claim 1 of the '682 Patent is directed towards patentable subject matter.

179. Dr. Goldberg states claim 1 "recites generic steps that involve nothing more than the abstract idea of grouping cable modems based on a common characteristic and then communicating with all cable modems in the same group in the same way." I disagree and note that this abstract idea does not consider all aspects of claim 1, either alone or as an ordered combination.

180. It is my opinion that claim 1 is not directed towards an ineligible abstract idea. Claim 1 recites a method that includes (1) determining a SNR-related metric for one or more cable modems, (2) determining service groups of cable modems based on the determined SNR-related metrics, (3) determining a composite SNR-related metric for each of the service groups, (4) selecting physical layer communication parameters to be used for communicating with cable modems in each of the service groups, and (5) communicating data between the CMTS and cable modems using the selected physical layer communication parameters. It is my opinion that at least the selection of physical layer communication parameters and using the selected physical layer communication parameters for communications between a CMTS and cable modem involves modifying the operation of the entire cable network, including the CMTS and cable modems. That is, claim 1 does not merely recite an abstract idea of collecting data and selecting other data based on the collected data at a high level of generality. Rather, the method of claim 1 recites a method having elements that amount to significantly more than this abstract idea. Claim 1 recites a method that modifies the operation of a cable network, including the CMTS and cable modems, based on data related to the operating of the cable network in order to improve communications between a

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CMTS and cable modems. Accordingly, it is my opinion that claim 1 is directed towards patentable subject matter.

181. I have considered Dr. Goldberg's foreign language hypothetical. *See* Goldberg Report, ¶¶ 561-564. It is my opinion that this hypothetical fails to consider all aspects of claim 1, both individually and as an ordered combination. It is my opinion that Dr. Goldberg has failed to articulate a hypothetical that explains how claim 1 is directed towards an ineligible abstract idea.

182. Dr. Goldberg further states that claim 1 does not recite a specific improvement to known cable networking components. Goldberg Report, ¶¶ 566-567. I disagree. As described above, it is my opinion that claim 1 recites a specific improvement to the operation of a cable network that improves communications between a CMTS and cable modems.

183. For at least these reasons, it is my opinion that claim 1, and therefore claims 1 - 3, are directed towards patentable subject matter.

H. The claims of the '682 Patent are not invalid for lack of written description / enablement`

184. Dr. Goldberg states claim 1 is invalid because claim 1 recites "generating, by said CMTS . . .a composite SNR-related metric based at least in part on a worst-case SNR profile" and that the '682 Patent fails to provide written description support for this claim language. Goldberg Report, ¶¶ 570-577. I disagree.

185. As a preliminary matter, Dr. Goldberg once again discusses arguments made during claim construction and disagrees with the claim construction order. *See* Goldberg Report, ¶ 573. I do not agree with Dr. Goldberg's assessment, and I continue to adopt the Court's claim construction for the term "a composite SNR-related metric based at least in part on a worst-case SNR profile of said SNR-related metrics" as plain and ordinary meaning in my analysis.

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186. I have analyzed Entropic's Opening Claim Construction Brief, Entropic's Reply Claim Construction Brief, and Dr. Kramer's Claim Construction Declaration. I agree with Entropic's Briefs and Dr. Kramer that the '682 Patent contains sufficient written description support such that a POSITA understands that the inventors were in possession of the inventions claimed in claim 1. The '682 Patent contains numerous disclosures that provide written description support for the recited elements of claim 1. *See*, for example, '682 Patent Abstract, 2:15-17, 3:53-63, 4:6-20, 4:40-52 5:7-12, 5:42-57, FIG. 2B, FIG. 2C, FIG. 3A; Kramer Decl. ¶¶ 166, 168-169, 172.

187. Specifically, the specification confirms that SNR means "signal-to noise-ratio" and discusses SNR profiles and SNR-related metrics (*i.e.*, metrics related to SNR) and their usage in grouping cable modems together. *See, e.g.*, '682 Patent, 3:53–63, Abstract ("A cable modem termination system (CMTS) may determine, for a plurality of cable modems served by the CMTS, a corresponding plurality of SNR-related metrics. The CMTS may assigning [sic] the cable modems among a plurality of service groups based on the SNR-related metrics."). The specification describes that examples of a "worst-case SNR profile" is the SNR profile related to a cable modem or group of cable modems, indicating their worst-case performance metrics:

> [t]he line 222 in FIG 2B represents a composite worst-case SNR profile for one or more CM(s) in the HFC network to which the message 202 is destined. For example, line 222 may be a SNR profile for a single CM 112x to which the message 202 is to be unicast. As another example, the line 222 may be a composite worst-case SNR profile for a plurality of CMs 112 of a particular service group to which the message 202 is to be multicast. As another example, the line 222 may be a composite worst-case SNR profile for all CMs of an HFC network handled by the CMTS

Id. at 4:9–20; *see also* FIG. 2C and 5:7–12.

188. As such, the '682 Patent clearly describes and enables the claim term.

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189. I have also considered Dr. Goldberg's commentary regarding "best-case SNR" and "average SNR" and find them unpersuasive. *See* Goldberg Report, ¶¶ 573-575. The language of claim 1 recites "generating, by said CMTS . . .a composite SNR-related metric based at least in part on a worst-case SNR profile." *See* '682 Patent at 4:9–20, FIG. 2C, and 5:7–12. I understand the written description requirement does not require the patent to describe exactly the subject matter claimed, just that the written description must allow persons of ordinary skill in the art to recognize the claimed invention. Against these standards, it is my opinion that the full scope of claim 1 is both described and enabled. It is my opinion that the '682 Patent describes generating a composite SNR-related metric based at least in part on a worst-case SNR profile in sufficient detail that a POSITA would be able to make and use the full scope of the claimed invention without undue experimentation. Claim 1 merely requires the "composite SNR-related metric" to be based "at least in part on a worst-case SNR profile," which is described in the '682 Patent as described above. *See* '682 Patent at 4:9–20. Accordingly, it is my opinion that the full scope of the claimed invention is enabled as a POSITA would not need to perform any experimentation to perform the full scope of the claimed invention. To the extent that the POSITA desires to add in any additional metrics in the determination of the "composite SNR-related metric," it is my opinion that a POSITA would be able to do so with an ordinary amount of experimentation given the state of the art and the relative skill of a POSITA in this field.

190. For at least these reasons, it is my opinion that these disclosures in the '682 Patent enable a POSITA to make and use the full scope of the claimed invention without undue experimentation.

191. Accordingly, it is my opinion that the '682 Patent is not invalid for failure to meet the written description requirement or the enablement requirement.

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I. Dr. Goldberg failed to consider objective indicia of non-obviousness for the '682 Patent

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199. For at least these reasons, it is my opinion that claims 1 - 3 of the ’682 Patent are not obvious.

IX. CONCLUSION

200. For the reasons described above, it is my opinion that Dr. Goldberg has not demonstrated that any of the Asserted Claims are invalid on any basis he presents. It is also my opinion that the relevant secondary considerations at issue here demonstrate the non-obviousness of the Asserted Claims.

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[redacted]

X. DECLARATION

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

11 Aug 2023
(Date)

John Holobinko
John Holobinko