

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

COMCAST CABLE COMMUNICATIONS, LLC,
Petitioner,

v.

ENTROPIC COMMUNICATIONS, LLC,
Patent Owner.

Case IPR2024-00430
Patent 8,284,690 B2

**PETITIONER'S REPLY TO PATENT OWNER'S RESPONSE
UNDER 37 C.F.R. § 42.23**

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EXHIBITS

Previously Filed:

- Ex. 1001: U.S. Patent No. 8,284,690 (“the ’690 patent”)
- Ex. 1002: Expert Declaration of James Bertonis
- Ex. 1003: Certified Prosecution History of the ’690 patent
- Ex. 1004: Excerpts from *Entropic Communications, LLC v. Comcast Corp. et al.*, No. 2:23-cv-01050 (C.D. Cal.) (“CDCA Litigation”)
- Ex. 1005: Excerpts from *Entropic Communications, LLC v. Charter Communications, Inc. et al.*, No. 2:22-cv-00125 (E.D. Tex.)
- Ex. 1006: Excerpts from *Entropic Communications, LLC v. Cox Communications, Inc. et al.*, No. 2:23-cv-01049 (C.D. Cal.)
- Ex. 1007: U.S. Patent Application Publication No. 2007/0223402 to Waxman (“Waxman”)
- Ex. 1008: U.S. Patent Application Publication No. 2008/0198826 to Won (“Won”)
- Ex. 1009: U.S. Patent Application Publication No. 2005/0124340 to Giesberts et al. (“Giesberts”)
- Ex. 1010: Data-Over-Cable Service Interface Specifications, DOCSIS 2.0 – Radio Frequency Interface Specification, CM-SP-RFIV2.0-I11-060602, June 2006 (“DOCSIS-2.0”)
- Ex. 1011: ANSI/IEEE Std 802.2, 1998 Edition, IEEE Standard for Information Technology – Telecommunications and information exchange between systems - local and metropolitan area networks – specific requirements, Part 2: Logical Link Control, redesignated as ISO/IEC 8802-2:1998 (“ISO8802-2”)

- Ex. 1012: IEEE Std 802.11, 2007 revision of 1999 Edition, IEEE Standard for Information Technology – Telecommunications and information exchange between systems - local and metropolitan area networks – specific requirements, Part 11: Wireless LAN Medium Access Control (MAC) and Physical Layer (PHY) Specifications (“IEEE-802.11”)
- Ex. 1013: IEEE Std 802.16-2004, IEEE Standard for local and metropolitan area networks, Part 16: Air Interface for Fixed Broadband Wireless Access Systems, October 1, 2004 (“IEEE-802.16”)
- Ex. 1014: IEEE Std 802.16e-2005, IEEE Standard for local and metropolitan area networks, Part 16: Air Interface for Fixed and Mobile Broadband Wireless Access Systems, Amendment 2: Physical and Medium Access Control Layers for Combined Fixed and Mobile Operation in Licensed Bands, February 28, 2006 (“IEEE-802.16e”)
- Ex. 1015: Veeral S. Shah, *Timing and Frequency Synchronization in OFDM Broadband Wireless Systems* (2001)
- Ex. 1016: U.S. Patent Application Publication No. 2007/0121573 to Zuckerman et al. (“Zuckerman”)
- Ex. 1017: Armin Dammann & Simon Plass, *Cyclic Delay Diversity: Effective Channel Properties and Applications* (2006)
- Ex. 1018: U.S. Patent No. 6,842,487 to Larsson (“Larsson”)
- Ex. 1019: U.S. Patent No. 7,403,578 to Min et al. (“Min”)
- Ex. 1020: U.S. Patent Application Publication No. 2007/0183383 to Bitran et al. (“Bitran”)
- Ex. 1021: Andrew S. Tanenbaum, *Computer Networks* (4th ed. 2003)
- Ex. 1022: Ran Giladi, *Network Processors, Architecture, Programming, and Implementation* (2008)
- Ex. 1023: U.S. Patent No. 7,269,841 to Hendricks et al. (“Hendricks”)

- Ex. 1024: Gerard O’Driscoll, *Next Generation IPTV Services and Technologies* (2008)
- Ex. 1025: ITU-T J.222.1, *Series J: Cable Networks and Transmission of Television, Sound Programme and Other Multimedia Signals* (Jul. 2007)
- Ex. 1026: Data-Over-Cable Service Interface Specifications, DOCSIS 1.0 – Radio Frequency Interface Specification, SP-RFI-C01-011119, March 1997 (“DOCSIS-1.0”)
- Ex. 1027: Data-Over-Cable Service Interface Specifications, DOCSIS 1.1 – Radio Frequency Interface Specification, SP-RFIv1.1-I01-990311, March 1999, (“DOCSIS-1.1”)
- Ex. 1028: Cliff Anderson, *Tuners for DOCSIS 3.0 cable modems*, EE Times, August 22, 2007
- Ex. 1029: Saifur Rahman, *DOCSIS Migration Methodology*, CableFax (November 1, 2007), cablefax.com/archives/docsis-migration-methodology
- Ex. 1030: U.S. Patent Application Publication No. 2007/0171994 to Parker et al. (“Parker”)
- Ex. 1031: U.S. Patent No. 8,503,546 to Ashrafi (“Ashrafi”)
- Ex. 1032: Declaration of Sylvia Hall-Ellis
- Ex. 1033: Declaration of Curtis Knittle

Served (Not Filed):

- Ex. 1034: Second Declaration of Sylvia Hall-Ellis, Ph.D
- Ex. 1035: Supplemental Declaration of James Bertonis

Filed Herewith:

- Ex. 1036: Reply Declaration of James Bertonis in Support of Petitioner’s Reply
- Ex. 1037: Opening brief from *Entropic Communications, LLC. v. Charter Communications, Inc. et al.*, No. 2:22-cv-00125 (E.D. Tex.)

- Ex. 1038: Reply Brief from *Entropic Communications, LLC v. Charter Communications, Inc. et al.*, No. 2:22-cv-00125 (E.D. Tex.)
- Ex. 1039: Entropic’s Disclosure of Proposed Constructions from *Entropic Communications, LLC v. Comcast Corp. et al.*, No. 2:23-cv-01050 (C.D. Cal.) (“CDCA Litigation”)
- Ex. 1040: Newton’s Telecom Dictionary, twenty first edition, CMP Books, 2005, excerpt (definition for “probe”)
- Ex. 1041: Collins English Dictionary, seventh edition, HarperCollins Publishers, 2005, excerpt (definition for “probe”)
- Ex. 1042: U.S. Patent Application Publication No. 2005/0059353 to Smith et al. (“Smith”)
- Ex. 1043: U.S. Patent Application Publication No. 2011/0149842 to Cordeiro (“Cordeiro”)
- Ex. 1044: U.S. Patent Application Publication No. 2007/0189249 to Gurevich et al. (“Gurevich”)
- Ex. 1045: U.S. Patent Application Publication No. 2010/0098110 to Mueller (“Mueller”)
- Ex. 1046: U.S. Patent No. 7,995,459 to Goh et al. (“Goh”)
- Ex. 1047: U.S. Patent No. 8,483,152 to Mueller (“Mueller-2”)
- Ex. 1048: U.S. Patent No. 8,631,450 to Bernath et al. (“Bernath”)
- Ex. 1049: U.S. Patent No. 9,419,858 to Ling et al. (“Ling”)
- Ex. 1050: Document 143-7 (Infringement Chart) from *Entropic Communications, LLC v. Cox Communications, Inc. et al.*, No. 2:23-cv-01049 (C.D. Cal.)
- Ex. 1051: Data-Over-Cable Service Interface Specifications, DOCSIS 3.1 – MAC and Upper Layer Protocols Interface Specification, CM-SP-MULPIv3.1-I15-180509, May 2018 (DOCSIS 3.1 version relied on by Entropic in litigation)

- Ex. 1052: Markman Hearing Transcript from *Entropic Communications, LLC v. Cox Communications, Inc. et al.*, No. 2:23-cv-01049 (C.D. Cal.)
- Ex. 1053: Rebuttal Expert Report of John Holobinko Regarding Validity of U.S. Patent Nos. 8,284,690 and 10,135,682 from *Entropic Communications, LLC. v. Charter Communications, Inc. et al.*, No. 2:22-cv-00125 (E.D. Tex.)
- Ex. 1054: IEEE Std 802.3-2008, IEEE Standard for Information technology, Part 3: Carrier Sense Multiple Access with Collision Detection (CSMA/CD) access method and Physical Layer specifications, 2008 (“IEEE 802.3-2008”)
- Ex. 1055: Deposition Transcript from Deposition of Mr. John Holobinko

I. INTRODUCTION

Multiple grounds based primarily on WiMAX, Waxman, and DOCSIS demonstrate that every claim is unpatentable. Entropic only attempts to save the independent claims and dependent claims 10-11 and 19-20. Those attempts—based on new claim constructions and arguments against inherency that Petitioner never asserted—are futile. Notably, Entropic never argues for the one feature the patent allegedly introduced: a probe request that dictates the form of a probe.

Instead, Entropic systematically changes its constructions for “probe” and argues that the references must show more than its own patent and infringement contentions. Entropic’s inconsistent and contradictory positions underscore its lack of credible arguments. As Entropic would have it, nothing in the prior art is a probe unless it is called a “probe,” and Waxman’s probe does not count either. Plain and ordinary meaning should apply, but the references disclose probes even under Entropic’s narrow definitions.

II. ARGUMENT

A. Entropic’s Inconsistent Positions and the Evidence Demonstrate that Its POR Claim Constructions Are Wrong

In the *Charter* litigation, Entropic argued against the court’s construction of “probe” as having “no intrinsic support” and “in clear violation of the rule against importing the specification into the claims” for referring to the “reference signal.” Ex. 1037, 18-19; Ex. 1038, 6 (“No POSITA would rely upon [Ex. 1001, 1:52-57] to

limit the meaning of ‘probe.’”). In the current litigation against Comcast, Entropic agreed not to adopt that construction and instead apply plain and ordinary meaning. Ex. 1039; Ex. 2001. Pulling a 180°, Entropic’s POPR advocated for the *Charter* court’s construction. POPR 11-13. Entropic shifts gears again in the POR, providing two more constructions for “probe” (POR 11-13); neither of which matches its expert’s construction (Ex. 2007, ¶47). Entropic’s own expert objected to the POR constructions that remove his additional language, leaving Entropic without support for its constructions and positions. Ex. 1055, 88:8-89:8, 95:11-19, 119:18-22, 143:7-144:5. As discussed below, Entropic’s constructions for “probe” and “physical layer probe” are overly narrow.

1. “Probe”

The claimed “probe” is not limited to “a signal or message that is used to characterize (or assess) the communications channel (or path) between the two nodes” or “a signal or message that characterizes the channel,” as Entropic contends (POR 11-13).¹ Nothing in the independent claims limits the use of “probe” in the specification to these constructions, much less impose additional limitations that

¹ Mr. Holobinko’s construction—“a particular kind of signal or message *having a form* used to characterize the communication channel between the two nodes”—is even narrower. Ex. 2007, ¶17 (additional language emphasized).

Entropic attempts to put on this term when arguing against the references. *See, e.g.*, POR 18-20 (arguing probes cannot provide adjustments).

The '690 patent does not define “probe”² and gives only example uses for probes. Ex. 1036, ¶¶6-9. Channel assessment is just one of many examples; others include reaching/discovering hidden nodes, network diagnoses, network maintenance, replicating a problem, assisting with network admissions, and determining modulation schemes. Ex. 1001, 1:13-14, 2:20-27, 4:25-38, 5:23-34, 8:43-47, 9:31-33, 9:44-47; Ex. 1055, 71:25-73:16 (admitting the patent describes potential uses of the probe; “[n]ot a limiting use of the probe”).

Under these circumstances (including no ubiquitous definition in the art), plain and ordinary meaning should apply. Ex. 1036, ¶7; Ex. 1040, 4; Ex. 1041, 6-7; Ex. 1012, 47-48, 84-85. Entropic’s extrinsic evidence is far outweighed by the

² The background statements about probes refer to older probes, not the allegedly new receiver-determined probe. Ex. 1001, 1:41-62; Ex. 1055, 44:5-46:16, 64:6-21. The '690 patent only uses “reference signal” when discussing the older probes. Thus, the *Charter* construction using “reference signal” should not be adopted. Regardless, the *Charter* construction states “*can* compare to a reference signal,” which encompasses the signals/messages mapped to the “probe.” Ex. 1005, 84; Ex. 1036, ¶10.

intrinsic evidence and Petitioner’s evidence against a limited interpretation. Ex. 1036, ¶¶6-12 (citing Exs. 1042-1044 demonstrating various uses for probes). Regardless, even under Entropic’s construction, WiMAX’s Ranging Response, Waxman’s probe response, and DOCSIS-2.0’s Ranging Request and Test Response are probes.

2. “Physical Layer Probe”

Entropic’s physical layer probe construction suffers the same issues, e.g., assumes all probes are channel assessment probes. The “physical layer probe” should not be limited to a channel assessment physical layer probe.

This term is absent from the specification and occurs only in the claims. For this proceeding, plain and ordinary meaning should apply. This would simply involve treating the term as a probe (giving “probe” its plain meaning) relating to the physical layer, as opposed to higher layers (e.g., application layer). Ex. 1055, 90:2-91:3. In view of the ’690 patent, “physical layer probe” includes probes for many uses that relate to the physical layer. Ex. 1036, ¶13; Ex. 1001, 1:13-14, 2:20-27, 4:25-38, 5:23-34, 8:43-47, 9:31-33, 9:44-47. Entropic’s construction cites only to Mr. Holobinko’s declaration, which cites to only one piece of extrinsic evidence—the Grinkemeyer patent. POR 14-15; Ex. 2007, ¶¶56-58. Again, this is dwarfed by Petitioner’s intrinsic and extrinsic evidence. Regardless, even under Entropic’s construction, the references disclose physical layer probes. Ex. 1036, ¶14.

B. Grounds A-B: WiMAX Anticipates or Renders Obvious All Challenged Claims

Regarding WiMAX, Entropic argues only for the independent claims and one dependent claim feature—“simultaneously using OFDMA”—in claims 11 and 19. Entropic’s arguments for the independent claims fail because (1) WiMAX’s ranging is a type of probing and (2) WiMAX’s Range Request has a parameter (e.g., CID) that is put into the *payload* of the Ranging Response. As the Board correctly found in the Institution Decision, WiMAX’s Ranging Request and Ranging Response are within the scope of “probe request” and “physical layer probe”/“probe.” ID 19-21 (claim 9 analysis). The Board found that WiMAX only lacks the “specify content payload” part of limitation 1A. But, that finding was based on Entropic’s arguments designed to misdirect the Board. *See* ID 17-18 (citing POPR 22-25). Entropic’s POPR pointed the Board to the CID in the generic MAC header, but left out that Petitioner relied on that CID being in the TLV information (“payload”) of the Ranging Response. Pet. 13-15 (citing Ex. 1013, 50, 665-666; Ex. 1002, ¶¶148-149). Entropic’s POR repeats its POPR argument and continues to ignore Petitioner’s showing that the CID is in the TLV information; hoping the Board finds “no good reason to depart” from the initial determination. POR 23-26.

On the full record, the Board should find that WiMAX’s ranging teaches all claims, including the “simultaneously using OFDMA” of claims 11 and 19 which merely recites an obvious result when multiple BSs each transmit using OFDMA.

1. WiMAX's Ranging Response is a Physical Layer Probe Even Under Entropic's Construction

WiMAX's ranging is used to acquire correct transmission parameters (e.g., timing and power) and maintain the RF link's quality, and therefore is a type of probing. Ex. 1013, 199, 202, 579; Ex. 1036, ¶¶18-19. Even the probe Entropic alleges for infringement is used for ranging. Ex. 1051, 127 ("0=probe used for ranging purposes"). And, another Entropic patent application describes a similar "ranging" method using "probe packets." Ex. 1045, [0014], [0043], [0048], [0059]-[0060], FIGs. 9-11.

The scope of the '690 patent's claimed "probe request" and "probe" includes WiMAX's Ranging Request and Response. As discussed (§II.A.1), the '690 patent uses "probe" to encompass many (although not all) signals for "various" uses, including (but not limited to) channel assessment, network diagnosis, network maintenance, and assistance with network admission. Ex. 1001, 2:20-27, 4:25-38. WiMAX's ranging fits each of these. It involves acquiring correct transmission parameters (timing and power), which requires assessing the current timing and power of a channel ("channel assessment") and diagnosing a problem with the current timing and/or power ("network diagnosis") to determine adjustments. Ex. 1036, ¶20. WiMAX expressly describes ranging as network maintenance: "[r]anging is a collection of processes by which the SS and BS maintain the quality of the RF communication link between them." Ex. 1013, 199, 202 (periodic ranging

allows the SS to “maintain uplink communications with the BS”). Lastly, WiMAX’s ranging assists with admission of the SS to the network by allowing “an SS joining the network to acquire correct transmission parameters.” Ex. 1013, 202.

Entropic’s attempts to distinguish WiMAX’s Ranging Response, because it includes adjustments, from Entropic’s narrow “probe” construction are unavailing. First, Entropic misleadingly suggests that the Ranging Response requires adjustments (POR 18-19), which ignores that the adjustments are optional. Ex. 1013, 50. Even still, nothing prevents the claimed “probe” from including adjustments or being used for negotiation. Ex. 1036, ¶22. Indeed, Entropic has multiple other patents that use “probes” for making adjustments and negotiating parameters and Entropic’s own evidence states that “probing is used for adjusting transmission parameters.” Ex. 1046, 2:40-44 (probe for timing adjustments); Ex. 1047, 6:47-49 (probing for negotiating bandwidth); Ex. 1048, 8:25-45 (probes for adaptive calibrations); Ex. 2006, 121. On the other hand, Entropic also has a patent stating that “ranging operations [] determine physical layer parameters.” Ex. 1049, 2:47-56. It is disingenuous for Entropic to draw a line between probing and ranging.

Further, Entropic and Mr. Holobinko are incorrect that “there is nothing about the [Ranging Response] that is being used to characterize the channel.” POR 18;

Ex. 2007, ¶64.³ WiMAX's Ranging Response has a Ranging Status "indicat[ing] whether uplink messages are received within acceptable limits by BS." Ex. 1013, 50, 665; *see also* 180-181, 203, 209-211, 620 (ranging until meeting acceptance criteria). By indicating that uplink messages are received within acceptable limits (e.g., Ranging Status=success), the Ranging Response characterizes the uplink channel. Ex. 1036, ¶23. Thus, at least because the Ranging Response includes the Ranging Status, it meets Entropic's narrow "probe" construction.

Also, whether other messages (e.g., UCD message) also characterize channels (POR 20-21) does not take away from the fact that WiMAX's Ranging Response meets the claimed "probe," even under Entropic's construction.

Finally, Entropic's suggestion (POR 22) that claim 9's "physical layer probe" gives it an additional argument against WiMAX's Ranging Response rings hollow. It is undisputed that timing and power are physical parameters. Even Mr. Holobinko lists "signal delay"—a timing related parameter—and "attenuation"—a power related parameter—as physical layer attributes. Ex. 2007, ¶57; Ex. 1036, ¶24. Thus, WiMAX's Ranging Response is the "physical layer probe" because it is used to

³ Mr. Holobinko, however, contradicted this at his deposition: "The [ranging] response can include some other parameters *about the channel* as well." Ex. 1055, 98:19-24.

maintain the RF link (the PHY layer) and to acquire the correct timing and power. Ex. 1013, 199, 202. It is also the “physical layer probe” under Entropic’s narrow construction at least because it includes the Ranging Status for indicating whether the uplink messages are acceptable timing and power limits. Ex. 1036, ¶24.

2. WiMAX’s Ranging Request Specifies Content Payload of the Ranging Response

The Petition explained that WiMAX’s Ranging Request (“probe request”) includes a parameter—the connection identifier (CID)—carrying data that is placed into the payload of the Ranging Response (“probe”), thereby disclosing the “wherein the first plurality of parameters at least specify content payload of the probe” in limitation 1A and “wherein the first plurality of probe parameters comprising at least a payload content for the probe” in limitation 17A. Pet. 13-15.

It is undisputed that the CID is a parameter in the MAC header of the Ranging *Request*. Ex. 1013, 37, 50; Ex. 2007, ¶71. The issue is where the CID appears in the Ranging *Response*. At the pre-institution stage, Entropic misdirected the Board to the CID in the MAC management header of the Ranging Response and Entropic attempts to do the same in the POR. POPR 22-25; POR 23-25. However, Petitioner and Mr. Bertonis have always relied on the CID (from the Ranging *Request*) being in the TLV information of the Ranging *Response*. Pet. 13-15; Ex. 1002, ¶¶148-149.

WiMAX discloses the Ranging *Response* having TLV information, which is the “payload content”⁴:

Table 20—RNG-RSP message format

Syntax	Size	Notes
RNG-RSP_Message_Format() {		
Management Message Type = 5	8 bits	
Uplink Channel ID	8 bits	
TLV Encoded Information	<i>variable</i>	TLV specific
}		

Ex. 1013, 50. Entropic never disputes that the TLV information is the payload of the Ranging Response and Mr. Holobinko even admitted it. Ex. 1055, 113:5-114:13.

⁴ Table 20 shows the MAC PDU payload of the RNG-RSP, so the Management Message Type and Uplink Channel ID are also “payload content.” Ex. 1013, 35-37, 42-43, 49-50; Ex. 1036, ¶31.

WiMAX also discloses that the TLV information includes a Basic CID:

Table 367—RNG-RSP message encodings (continued)

Name	Type (1 byte)	Length	Value (variable-length)	PHY Scope
Downlink Operational Burst Profile	7	2	This parameter is sent in response to the RNG-REQ Requested Downlink Burst Profile parameter. Byte 0: Specifies the least robust DIUC that may be used by the BS for transmissions to the SS. Byte 1: Configuration Change Count value of DCD defining the burst profile associated with DIUC.	All
SS MAC Address	8	6	SS MAC Address in MAC-48 format	All
Basic CID	9	2	Basic CID assigned by BS at initial access.	All
Primary Management CID	10	2	Primary Management CID assigned by BS at initial access.	All
AAS broadcast permission	11	1	0 = SS may issue contention-based Bandwidth Requests permission 1 = SS shall not issue contention-based Bandwidth Request	SCa OFDM OFDMA
Frame number	12	3	Frame number where the associated RNG_REQ message was detected by the BS. Usage is mutually exclusive with SS MAC Address (Type 8). The opportunity within the frame is assumed to be 1 (the first) if the Initial Ranging Opportunity field is not supplied.	SCa OFDM
Initial ranging opportunity number	13	1	Initial Ranging opportunity (1–255) in which the associated RNG_REQ message was detected by the BS. Usage is mutually exclusive with SS MAC Address (Type 8).	SCa OFDM

Ex. 1013, 665-666, 50; Ex. 1036, ¶¶25-31. This Basic CID⁵ in the TLV information of the Ranging *Response* would have had the same value as the CID in the Ranging *Request*. Ex. 1013, 49 (describing scenarios where CID in the MAC header of RNG-REQ is the Basic CID in the RNG-RSP), 33 (“same CID value is assigned to both members (uplink and downlink) of each connection pair”); Ex. 1036, ¶¶32-34.

⁵ The Basic CID is the CID for the basic connection used for ranging—other CIDs (e.g., Primary Management CID) are for other services. Ex. 1013, 7, 33, 43-44, 668, 697.

Although the Basic CID may be assigned in the Ranging Response during initial ranging as Entropic argues (POR 23), nothing requires the Basic CID to be changed and Petitioner does not merely rely on initial ranging.⁶ At least during periodic ranging, a Ranging Request has the CID (equal to a previously assigned Basic CID) and the Ranging Response uses that CID for the Basic CID in its TLV information. Ex. 1013, 49-50, 176 (“SS shall transmit another RNG-REQ message using the Basic CID”), 665, 43 (Table 14 showing RNG-REQ having “Basic” CID); Ex. 1036, ¶¶34-35. To the extent Entropic argues otherwise, this would have at least been one of the finite number of predictable implementations (the Basic CID is included or not) that WiMAX alone identifies and that a POSITA would have had an expectation of success in implementing and would have implemented so that the

⁶ Even in some initial ranging scenarios, the SS sends the Ranging Request with a previously assigned Basic CID. Ex. 1013, 199; Ex. 1036, ¶36. Contrary to Entropic’s argument (POR 23), there are scenarios where the SS has previously received the Basic CID for use as the CID in the initial Ranging Request. Ex. 1013, 49 (“CID is always equal to the Basic CID” when it is previously sent in a data grant interval), 199 (“SS shall send a RNG-REQ message in an Initial Ranging interval...using the Basic CID”), 48 (UL-MAP provides Basic CID before ranging).

Basic CID is available when parsing the payload and generating a subsequent Ranging Request. Ex. 1036, ¶37.

Finally, if limitation 1A is as broad as Entropic reads it for their litigation positions and as Mr. Holobinko reads it, the “content payload of the probe” does not even need to be the same value as a parameter of the probe request. Ex. 1050, 2-7 (P-MAP does not have data that is placed into probe); Ex. 1052, 62:2-71:18 (arguing “content payload” can be just a signal (“like a foghorn”) without any data); Ex. 1055, 69:18-70:3, 78:3-79:13 (“The parameters are specified, and the probe is generated according to the specified parameters. That doesn’t mean that the parameters themselves have to be in the probe.”), 82:2-83:21 (“the content defines what the content payload should be, but not the values”). Under these reads, sending the initial Ranging Request with a CID directing the BS to send the Ranging Request with the Basic CID having any value meets limitation 1A. Moreover, under these reads, limitation 1A is met because all of the information of the Ranging Response payload (e.g., TLV information) is *specified* based on simply receiving the Ranging Request. Ex. 1036, ¶38. For example, the Ranging Request (with management message type=4) tells the BS to send the Ranging Response with the format defined by Table 20, which calls for TLV information having at least the Ranging Status. Ex. 1013, 42-43, 49-50.

3. Entropic's Argument For Claims 11 and 19 are Premised on an Inherency Argument that Petitioner Never Made

The Petition asserts that claims 11 and 19 are obvious in view of WiMAX; anticipation was not asserted. Pet. 4, 35-38, 45-47. Yet, Entropic's entire argument is that WiMAX does not affirmatively teach the claimed "simultaneously using OFDMA" and Petitioner has not shown this element is inherent. POR 28-30. Entropic never disputes that two WiMAX BSs would transmit Ranging Responses using OFDMA to an SS and never disputes that the relied upon scenario—where the two Ranging Responses are transmitted simultaneously—would arise because a POSITA would have been motivated to perform ranging simultaneously, as asserted. Pet. 35-38; Ex. 1036, ¶¶40-43. Entropic and Mr. Holobinko simply complain that it would arise by "chance" or "sometimes." POR 29; Ex. 2007, ¶76.

Obviousness does not require inherency. Here, obviousness does not require a showing that the step of transmitting first and second probes "simultaneously using OFDMA" is always performed. *Unwired Planet, LLC v. Google Inc.*, 841 F.3d 995, 1002 (Fed. Cir. 2016) (affirming obviousness because "[i]t is enough that the combination would sometimes perform all the method steps"); *Hewlett-Packard Co. v. Mustek Sys., Inc.*, 340 F.3d 1314, 1326 (Fed. Cir. 2003). Accordingly, it is sufficient that WiMAX teaches multiple BSs each transmitting a Ranging Response to an SS using OFDMA and that Petitioner has articulated reasons that two Ranging

Responses would have been transmitted simultaneously. Pet. 35-38, 47; Ex. 1013, 50-51, 199-213.

Importantly, the “simultaneously using OFDMA” in claims 11 and 19 merely recites a result that need only occur once. Nothing in these claims requires the first and second probes to be transmitted “simultaneously” on multiple occasions. Moreover, the claims do not recite anything about the first and second probe requests that causes the first and second probes to be transmitted “simultaneously using OFDMA.” That is, the claims do not recite any feature that coordinates the timing at which the two probes are transmitted. As the claims merely cover a scenario in which the first and second probes are simultaneously transmitted by happenstance, it is hypocritical of Entropic and Mr. Holobinko to argue that WiMAX must show more. *See* Ex. 1055, 117:3-118:13 (requiring dictating simultaneous transmissions).

C. Ground C: WiMAX-Won Renders Obvious Claims 8, 16, and 24

Entropic never refutes the obviousness of WiMAX-Won. POR 30. To the extent that WiMAX alone does not teach these claims, WiMAX-Won does.

D. Grounds D-E: Waxman Anticipates or Renders Obvious All Challenged Claims

Waxman discloses a receiver-determined probe just as the '690 patent. Waxman's probe request provides a transmission scheme for its probe response. Entropic tries to distract from this by arguing irrelevancies, by importing

unsupported limitations into the claims, and even by arguing that Waxman’s “probe” is not a “probe.” All these arguments fail.

1. Waxman’s Probe Response is a Probe Even Under Entropic’s Construction

Entropic argues that Waxman’s probe “is unlike the ‘probe’ of the ’690 Patent because Waxman does not disclose that the response characterizes the communication channel between the AP and the station.” POR 32-33. The problem with Entropic’s position is that its construction is supposedly the plain meaning of “probe” *and* Waxman uses *the same term* in the same field. Ex. 1055, 120:25-122:13. This is illogical. Regardless, Waxman’s probe responses have the same uses as probes in the ’690 patent. *Compare* Ex. 1001, 1:12-14, 2:20-27, 2:43-50, 4:25-38, 5:23-34, 6:17-32, 6:51-56, 7:43-48, 8:43-47, 9:4-6, 9:31-33, 9:44-47, 10:10-13, 12:57-13:3 *with* Ex. 1007, [0001]-[0009], [0012], [0024]-[0034], [0036]-[0037], [0040]-[0045]; Ex. 1036, ¶¶44-47. And, at least by approving the probe request, the probe response characterizes the channel as acceptable for the requested transmission scheme. Ex. 1007, [0037]; Ex. 1036, ¶48; Ex. 1055, 126:14-127:7.

2. Waxman’s Probe Request Specifies Content Payload of The Probe Response and The Recipient of The Probe Response

Entropic admits Waxman’s probe request includes multiple parameters, including a parameter for requesting a particular transmission scheme. POR 32. In response to this probe request, Waxman’s probe response provides at least an

acknowledgment or approval, as Entropic also admits. Ex. 1007, [0037]; POR 32. Entropic even admits this acknowledgement would have been in the payload of the probe response. POR 36. This acknowledgement is specified by the probe request because “embedded in the probe request” is a request for the acknowledgment. Ex. 1007, [0037]; Ex. 1036, ¶¶50-51, 53. Thus, Entropic’s argument that the probe request’s parameters do not “relate” to the probe response payload fail to distinguish Waxman from the claims. POR 31, 34.

If Entropic intends that “specify content payload” has a narrow meaning (e.g., requiring the probe request to carry the exact content for the probe’s payload), it should say so. Entropic is likely avoiding that because its litigation contentions more broadly apply this limitation. Ex. 1050, 2-7; Ex. 1052, 62:2-71:18. It is also rich of Entropic to argue that Waxman must disclose more about the contents of its probe than the patent, which merely describes example parameters of its probe *request*. Ex. 1001, 7:29-9:54, FIG. 5.

Still, Waxman does not limit its probe response to only an acknowledgement. Ex. 1007, [0037]; Ex. 1036, ¶¶49-50. Waxman describes generating probe responses having preamble and data portions based on the probe request’s parameters, thereby disclosing multiple parameters in the probe response. Pet. 49; Ex. 1002, ¶¶342-356; Ex. 1007, [0042]-[0043]. Waxman’s probe responses are used to determine reception reliability and provide feedback, meaning the probe

responses would have included parameters for those purposes too. Ex. 1007, [0024], [0028]-[0029], [0036]-[0037], [0044]-[0045]; Ex. 1036, ¶50. Further, where the probe request complies with 802.11 (an example in Waxman), the probe request includes an SSID parameter that is also included in the probe response payload. Ex. 1007, [0009], [0013]-[0020], [0037]; Ex. 1012, 84-85; Ex. 1002, ¶¶343-346. In this example, the probe response's payload includes the identical value (e.g., SSID) provided in the probe request, meeting even the narrowest of interpretations. Ex. 1036, ¶52.

Regarding the recipient of the probe response, Waxman's AP transmits the probe response to the station from which the probe request originated. Ex. 1007, [0037], [0040]-[0041], [0048]-[0049]; Pet. 49. Waxman's stations send probe responses to the AP concurrently, and the AP transmits corresponding probe responses to each respective station. Ex. 1007, [0030]-[0037], [0040]-[0045]. For Waxman's system to operate as described, e.g., for AP 105 to send a probe response to station 102 (and not other stations), the probe request would have included a parameter specifying the recipient station of the probe response. Ex. 1036, ¶54. On this point, Waxman teaches even more than the '690 patent. *See* Ex. 1053, 38-39 (Mr. Holobinko interpreting the '690 patent to find written description support for the same feature); Ex. 1055, 70:5-71:17.

3. Waxman's Probe Response is a Physical Layer Probe Even Under Entropic's Construction

The Board already correctly determined that Waxman discloses physical layer probes. ID 30. Yet, Entropic argues otherwise based on its overly narrow construction.

As explained (§II.A.2), Entropic's "physical layer probe" construction is overly narrow, especially given the absence of the term from the specification. Regardless, even adopting Entropic's construction, Waxman teaches "a probe that characterizes attributes of the physical layer of the communications channel." Ex. 1036, ¶¶55-59.

Waxman's probe response approves use of the requested transmission scheme and at least in this way characterizes attributes (e.g., the transmission scheme) of the physical layer of the communications channel between the AP and station. Transmission schemes control how data is transmitted over the physical layer. Ex. 1036, ¶57. Even if Waxman's probe response has only an acknowledgement, it still acknowledges that a certain transmission scheme works over a communication channel and thus characterizes a physical layer attribute of that channel. Ex. 1036, ¶58.

Additionally, Waxman's probe responses are used for achieving extended range wireless connectivity, which invokes an assessment of the physical layer. Ex. 1007, [0002], [0012], and [0030]. Various additional portions of Waxman describe

use of probes in relation to signal quality, such as providing feedback for subsequent transmissions or selecting a transmission scheme to improve signal to interference-plus-noise ratio. Ex. 1007, [0024], [0028], [0044].

Simply put, Waxman’s probe response pertains to the physical layer, as opposed to upper layers (e.g., application layer). Ex. 1036, ¶59; Ex. 1055, 129:8-19. Ironically, Entropic and Mr. Holobinko argue that Waxman’s probe is not a physical layer probe, even though the ’690 patent only mentions “probes” and never “physical layer probe” except in some claims. Even Grinkemeyer (Entropic’s only evidence) supports that Waxman’s probe responses—for evaluating whether a requested transmission scheme may be used for the physical layer—are physical layer probes. Ex. 2003, 15:49-51.

E. Grounds F-I: Waxman-Zuckerman (Ground G) Renders Obvious Claims 11 and 19

Regarding Grounds F-I, Entropic argues only against Waxman-Zuckerman teaching claims 11 and 19. Its arguments fail for similar reasons its arguments against WiMAX fail. As explained, “simultaneously” transmitted probes need only occur once and the claims lack any feature coordinating the transmissions. §II.B.3. Waxman-Zuckerman results in two APs simultaneously transmitting Waxman’s probe responses. Pet. 65-67. Petitioner demonstrated this result *would* have occurred, not merely that it may have or could have occurred, as Entropic suggests. Pet. 66-67.

Entropic's assertion (POR 42) that Petitioner's Waxman-Zuckerman combination "flies in the face" of Waxman's disclosure of a delay period is severely flawed. First, Entropic omits Waxman's explicit statement that this feature is *optional*. Ex. 1007, [0038]. Second, Entropic impermissibly attacks Waxman alone, and ignores that the combination uses OFDMA for the benefit of simultaneously transmitting the probe responses. *In re Keller*, 642 F.2d 413, 426 (C.C.P.A. 1981) ("one cannot show non-obviousness by attacking references individually"). In the Waxman-Zuckerman combination, the delay period would not have been employed because probe responses would have been transmitted simultaneously on different subchannels so that the APs do not have to contend with each other to transmit to the same station. Ex. 1036, ¶¶60-61. Rather than cut against Waxman-Zuckerman, Waxman's ¶[0038] provides evidence that multiple probe responses would have been transmitted simultaneously. Ex. 1036, ¶61; Ex. 1055, 130:17-133:6 (Mr. Holobinko agreeing that OFDMA solves the problem identified by Waxman).

Tellingly, Entropic never even addresses Zuckerman's teachings or Petitioner's reasons for the Waxman-Zuckerman combination. POR 41-43. The obviousness of Waxman-Zuckerman thus stands unrefuted.

F. Grounds J-K: DOCSIS-2.0's Ranging or DOCSIS-2.0's Testing with ISO8802-2 Anticipate or Render Obvious Numerous Claims

Entropic argues only that DOCSIS-2.0's ranging and testing procedures do not have a "probe request" and "probe." But, those arguments are premised on its

overly narrow construction and cannot be squared with Entropic’s infringement contentions. While Entropic also “agrees [with the Board’s preliminary finding] that Petitioner does not sufficiently explain [how the mode parameter of DOCSIS’s Test Request specifies the content payload of the Test Response],” Entropic tellingly does not otherwise pursue that argument.

1. DOCSIS-2.0’s Ranging Request is a Physical Layer Probe Even Under Entropic’s Construction

Entropic’s infringement contentions rely on a P-MAP message (from DOCSIS-3.1) as the claimed “probe request.” Ex. 1050, 2-7. The P-MAP is similar to DOCSIS-2.0’s UCD message that Petitioner relies on. DOCSIS-3.1 shows that P-MAP messages are MAC Management messages including various parameters for the CM to use for communicating with the CMTS. Ex. 1051, 103-130, 274. If the P-MAP is a “probe request” despite not being called a “request,” DOCSIS-2.0’s UCD message is too.

The UCD message is a “probe request” because it includes a Ranging Required parameter that causes the Ranging Request (claimed “probe”) to be sent:

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.
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Ex. 1010, 135-139. The UCD message is not “decoupled from the Ranging Request,” as Entropic contends. POR 49; Ex. 1036, ¶¶63-64.

Additionally, the fact that the Ranging Request is called a “request” should not disqualify it from being the claimed “probe.” Nothing requires the claimed “probe” to exclude messages that serve as a request. DOCSIS-2.0’s Ranging Request is a “probe” because it is sent for ranging, which is a type of probing as discussed above regarding WiMAX’s ranging. *See* §II.B.1; Ex. 1051, 130, 440 (even the allegedly infringing probes are used for ranging). A POSITA would have understood that the Ranging Request probes the CMTS to diagnose the uplink channel and send timing and power adjustments, and therefore is the “probe” and “physical layer probe.” Ex. 1036, ¶¶65-67.

Moreover, the Ranging Request meets Entropic’s narrow definition of “probe” and “physical layer probe” at least because it characterizes a channel by providing the Downstream Channel ID and/or a zero value in the “Pending Till Complete” parameter indicating that “all previous Ranging Response attributes [e.g., timing, power, and frequency] have been applied prior to transmitting this request.” Ex. 1010, 146-147; Ex. 1036, ¶68.

For these reasons, DOCSIS-2.0’s UCD and Ranging Request messages are the “probe request” and “probe.” Entropic does not argue for any other distinction from DOCSIS-2.0 (e.g., does not contest that the Downstream Channel ID in the

UCD message specifies the Downstream Channel ID in the Ranging Request's payload).

2. DOCSIS-2.0's Test Response is a Physical Layer Probe Even Under Entropic's Construction

DOCSIS-2.0's Test Request and Test Response⁷ are the “probe request” and “probe” at least because the testing procedure is for channel assessment and network diagnosis—two of the “various” uses for probes according to the '690 patent (Ex. 1001, 2:20-27, 4:25-38). The Test Response includes a square wave that the patent expressly describes as an example probe “for channel estimate purposes.” *Compare* Ex. 1010, 185 *with* Ex. 1001, 9:55-58; Ex. 1055, 154:15-156:22 (Mr. Holobinko admitting that the Test Response is a square wave). Moreover, a POSITA would have understood that the Testing procedure is for testing the channel between the CMTS and CM to diagnose potential timing or power problems. Ex. 1010, 96-98, 185-186, 508; Ex. 1002, ¶¶609-610, 629-630; Ex. 2002, 122:19-125:20; Ex. 1036, ¶¶69-74 (explaining that Ex. 1054 shows Mr. Holobinko's arguments are meritless). Entropic attempts to counter this by arguing that a human operator must provide an

⁷ Herein, “Test Response” refers to the response to the Test Request, including the “upstream signal” in DOCSIS-2.0 and “TEST response” in ISO8802-2.

explicit command to send the Test Request. POR 50-51. But, a human operator does not initiate test messages for no reason.

Entropic also notes that ISO8802-2 describes the TEST function for testing the LLC transmission path. POR 51. This effectively admits the Test Response is a “probe” (*albeit* not the “physical layer probe”), and does not undermine the use of the upstream signal from DOCSIS-2.0 being used to diagnose timing and power problems at the physical layer. Ex. 1036, ¶75. Likewise, this use of the upstream signal is not undermined by the UCD message providing channel characteristics, as Entropic urges (POR 51). On this issue, Mr. Holobinko inconsistently testifies that the test procedure is performed “before” the UCD message and that the test procedure does not characterize the channel because the UCD “already” does. Ex. 2007, ¶¶108, 110; Ex. 1055, 163:25-165:18. Also, even if the Test Response is “ancillary” to determining channel characteristics (as Entropic concedes (POR 51)), that is enough for it to be the “probe” under Entropic’s construction, which does not require it to be the *only* message used to characterize a channel.

Entropic’s arguments (POR 51-52) that the test messages are not needed and have “minimal utility” ring hollow, particularly because the probe frames from DOCSIS-3.1 that Entropic asserts for infringement are also sent in addition to UCD messages and have similar utility. Ex. 1051, 103-130. Entropic misses the key

utility of the test procedure—it gives a human operator an ability to force the CMTS to diagnose possible timing and power problems. Ex. 1036, ¶76.

3. The Test Request Specifies Content Payload for the Test Response

Aside from agreeing with the Board’s preliminary decision (citing Pet. 77 and Ex. 1002, ¶¶576-577 instead of Pet. 79 and Ex. 1002, ¶580), Entropic never argues that the Test Request fails to specify the content payload of the Test Response. This is intentional because doing so would doom Entropic’s infringement read and is inconsistent with its litigation position. Ex. 1051, 126-130 (P-MAP does not have data placed into probe); Ex. 1052, 62:2-71:18. To the extent the P-MAP (Entropic’s alleged probe request) specifies payload content for probe frames, at least the Test Request’s Mode parameter specifies payload content for the Test Response. Specifically, when the Mode parameter is ‘1,’ the Test Response includes an upstream signal with 1s and -1s, and when it is ‘2,’ the Test Response includes an upstream signal with 1s. Ex. 1010, 185; Ex. 1036, ¶78.

Moreover, ISO8802-2 (referenced for responding to Test requests (Ex. 1010, 28)) teaches the Test Response having an information field including identical information from the Test Request (i.e., Mode and channel parameters). Ex. 1011, 53; Ex. 1010, 185; Ex. 1036, ¶77. Thus, the Test Request meets limitations [1A] and [17A] for this additional reason.

G. Grounds L-M: Using OFDMA with DOCSIS-2.0 Would Have Been Obvious Particularly In View of Zuckerman

Entropic argues that DOCSIS-2.0 and ISO8802-2 fail to anticipate or render obvious claims 10-11 and 18-19, but ignores that Petitioner additionally relies on Zuckerman for these claims. POR 54-57 (incorrectly stating “Petitioner only uses Zuckerman to assist” for claim 17); Pet. 89-92, 97-99. Zuckerman teaches using OFDMA for cable networks implementing DOCSIS. Ex. 1016, [0005], [0041], [0049]; Ex. 1036, ¶¶79-82.

The incorporation of OFDMA in DOCSIS-3.1 does not undermine the obvious use of OFDMA with DOCSIS-2.0. The number of years between DOCSIS-2.0 and DOCSIS-3.1 does not indicate non-obviousness, much less obviate reliance on Zuckerman. *See Iron Grip Barbell Co. v. USA Sports, Inc.*, 392 F.3d 1317, 1325 (Fed. Cir. 2004) (“Absent a showing of long-felt need or the failure of others, the mere passage of time without the claimed invention is not evidence of nonobviousness.”). A POSITA would have been motivated to adapt DOCSIS-2.0 to use OFDMA because OFDMA’s advantages were well-known (as Zuckerman establishes) and the market was moving toward OFDMA before the ’690 patent. Ex. 1002, ¶¶665-670. If anything, DOCSIS-3.1 shows the compatibility and practicality of using OFDMA in DOCSIS-2.0’s cable network. Ex. 1036, ¶¶81-83.

III. CONCLUSION

For the reasons above and in the Petition, all claims should be canceled.

Respectfully submitted

Dated: February 28, 2025

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CERTIFICATION UNDER 37 C.F.R. § 42.24(d)

Under the provisions of 37 CFR § 42.24(d), the undersigned hereby certifies that the word count for the foregoing Petitioner's Reply totals 5,599, which is less than the 5,600 allowed under 37 CFR § 42.24(c)(1), as counted by the Word Count feature of Microsoft Word.

Pursuant to 37 C.F.R. § 42.24(a)(1), this count does not include the table of contents, the table of authorities, mandatory notices under § 42.8, the certificate of service, this certification of word count, the claims listing appendix, or appendix of exhibits.

Dated: February 28, 2025

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CERTIFICATE OF SERVICE

Pursuant to 37 C.F.R. § 42.105, I hereby certify that I caused a true and correct copy of this **PETITIONER'S REPLY TO PATENT OWNER'S RESPONSE UNDER 37 C.F.R. § 42.23** in connection with IPR2024-00430 to be served via e-mail on February 28, 2025, in its entirety on the following counsel of record for Patent Owner:

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