

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

**REPLY DECLARATION OF JAMES BERTONIS
IN SUPPORT OF PETITIONER'S REPLY**

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I, Mr. James G. Bertonis, declare that I have personal knowledge of the facts set forth in this declaration and, if called to testify as a witness, could and would do so competently.

I. INTRODUCTION

1. I have been retained as an expert witness on behalf of the Petitioner, Comcast Cable Communications, LLC, for the above-referenced *inter partes* review proceeding.

2. I have been asked to provide a reply declaration for responding to the arguments raised by Patent Owner and its expert, Mr. John Holobinko.

3. I am being compensated at my usual consulting rate for my work on this matter. My compensation is in no way dependent upon my opinions or testimony or the outcome of this proceeding. I have no financial interest in the parties or in the outcome of this proceeding.

II. MATERIALS REVIEWED

4. In connection with my study of this matter and reaching the opinions stated herein, I have reviewed a number of documents. In addition to those mentioned in my previous declaration, I have reviewed the following documents:

- Patent Owner's Preliminary Response and its accompanying exhibit (Ex. 2001);

- The Board’s Institution Decision;
- Patent Owner’s Response and its accompanying exhibits (Exs. 2002-2007), including Mr. Holobinko’s Declaration (Ex. 2007);
- The transcript of the deposition of Mr. Holobinko (Ex. 1055);
- All other documents referenced herein.

III. CLAIM CONSTRUCTION

5. As previously stated, for my first Declaration, I gave all claim terms their plain and ordinary meaning as would have been understood by a POSITA reading the patent specification at the time of the claimed invention (*i.e.*, December 15, 2008). In view of Patent Owner’s and Mr. Holobinko’s claim constructions and arguments, I have provided opinions about some claim terms below.

A. “probe”

6. I gave this term plain and ordinary meaning and disagree with Patent Owner’s and Mr. Holobinko’s efforts to limit its meaning. They misuse my deposition testimony by pulling statements out of context to suggest that I agree to limit this term to require channel assessment (see POR, 11; Ex. 2007, ¶ 48), but I explained that this was just an example. Ex. 2002, 11:9-22, 13:2-22. As I clearly stated at the outset of my deposition, giving examples is the “best way I can define [probe]” in the context of the ’690 patent. Ex. 2002, 8:6-9. This is because the ’690 patent does not provide a definition for “probe” and gives only examples of

uses for the probe (which I discuss below). The '690 patent certainly does not limit the meaning of “probe” to the definitions provided by Patent Owner and Mr. Holobinko at least because the '690 patent does not even disclose what data is in the probe that allegedly characterizes the channel in their view—it gives only examples of what data could be in the probe *request* (see Ex. 1001, Fig. 5 and its corresponding description at 7:29-9:54).

7. I am not aware of any concrete, ubiquitous technical definition in the relevant art of communication networks for the term “probe.” Most definitions for “probe” refer to test devices used to explore or investigate something, which supports my positions that ranging signals for exploring the timing of a channel (in WiMAX and DOCSIS 2.0) and test signals (in DOCSIS 2.0) are probes. See, e.g., Ex. 1040, 4; Ex. 1041, 6-7. I note that the Newton’s Dictionary includes a second definition for probe as “An empty message that is sent to reach a particular address to determine if an address can be reached,” which undermines Patent Owner’s and Mr. Holobinko’s definitions as requiring characteristics to be in the message. Ex. 1040, 4. Their limited definition also does not fit with the use of “probe” in the well-known IEEE 802.11 standard, which describes a probe request and probe response for handshake and authentication processes. Ex. 1012, 47-48, 84-85. A POSITA would not have interpreted the “probe” of the '690 patent to exclude the

probe response in the well-known IEEE 802.11 standard, which is an example of Waxman's probe response too.

8. Also, to the extent that the statement in the background section of the '690 patent that "probes are typically well defined" (Ex. 1001, 1:52-53) intends to suggest that there is some widely-accepted definition, I disagree. I note that neither Patent Owner nor Mr. Holobinko cite to any well-known definition and the '690 patent does not explicitly define the term. A POSITA would have understood that the statement in the background section that "probes are typically well defined" (Ex. 1001, 1:52-53) is referring to older probes and not the "receiver determined probe" that is supposed to be the focus of the '690 patent. As such, a POSITA would have understood that the term "probe" as used in the claims and specification of the '690 patent is not limited to what's described in the background section about previous probes. Ex. 1001, 1:41-62.

9. Instead, a POSITA would see that the '690 patent simply describes the term "probe" by way of example uses of probes, only some of which refer to channel characterization. Ex. 1001, 1:12-14 ("***some embodiments*** relate to channel assessment probes"), 2:20-27 ("these receiver determined probes may be ***used in a variety of applications***. For example, the probes may be ***used to reach or discover hidden nodes***; in networks employing orthogonal frequency division multiple access (OFDMA), the probes may be ***used for OFDMA sub-channel assessment***;

or in networks accessible by content providers, the probes may be *used for off-site network diagnosis*”), 2:43-50 (“by way of example”), 4:25-38 (“In many embodiments, *network probes are used to perform various channel assessment or network maintenance procedures*. ... For example, 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.”), 5:23-34 (“In one embodiment, *probes are used* during a network profiling period *to determine the modulation schemes* to be used for the different links.”), 6:17-32 (probes for point-to-point, point-to-multipoint, multipoint-to-multipoint), 6:51-56 (“time domain probes”), 7:43-48 (“MoCA’s Type II Frequency Domain Tone Probes”), 8:43-47 (“For example, *diagnostic probe requests* could be unrestricted in terms of the available preambles while *network maintenance or assessment or channel assessment probe requests* could be restricted in terms of their available preambles.”), 9:4-6 (“amplified non-OFDMA probe”), 9:31-33 (“In one embodiment, such probes *might* be used to assess a channel”), 9:44-47 (“For example, a probe request may specify that the generated probe be repeated to allow improved channel assessment or to diagnosis a particular network issue.”), 9:55-58 (“time-domain probes” which could be just a square wave), 10:10-13 (“error vector measurement (EVM) probe or echo profile probe (EPP)”), 12:57-13:3 (explaining that the wide scope of the claimed invention). Even Mr. Holobinko acknowledged

that the '690 patent provides different example uses of a probe. Ex. 1055, 71:25-72:16, 73:3-16 (“It’s describing additional potential application -- uses of the probe. Not a limiting use of the probe.”). In view of all of these examples, it is my opinion that a POSITA would not have limited the meaning of “probe” to the definitions provided by Patent Owner and Mr. Holobinko. I also note that the independent claims (claims 1, 9 and 17) do very little to limit the scope of the described “probes” – they just require the probe to be formed, generated, and transmitted based on the probe request. Only some dependent claims touch on a particular use of the probe. See, e.g., claim 7 (“probe that assists in diagnosing a network problem.”).

10. In addition, I note that the probes described throughout the '690 patent and in the claims do not require a comparison with a “reference signal.” The '690 patent only refers to a “reference signal” when discussing previous probes in the background section (Ex. 1001, 1:48-62), and not when discussing the receiver determined probe that is the focus of the '690 patent. For example, the '690 patent does not disclose the receiver in Figure 4 comparing the receiver determined probe with any reference signal at block 205. Ex. 1001, 6:57-7:11. For these reasons, I disagree that the plain and ordinary meaning of the claimed “probe” requires comparing the probe to a reference signal. I note that even Mr. Holobinko appears to agree that the plain and ordinary meaning of the claimed “probe” does not

require comparison with a reference signal. Ex. 2007, ¶ 55; Ex. 1055, 44:5-46:16 (“you don’t need the reference as before”), 64:6-21, 173:12-24. All that said, I note the court’s construction in the Charter case just says that the probe is a signal that “the network node *can* compare to a reference signal,” which can be said about many signals including those that I rely on for the claimed “probe.”

11. As mentioned above, I also disagree with Patent Owner’s and Mr. Holobinko’s attempt to limit the definition of probe, even though their definitions do not mention the reference signal. I note that Patent Owner defines probe as “a signal or message that is used to characterize (or assess) the communications channel (or path) between the two nodes.” POR, 11. Similarly, Patent Owner says the plain meaning of a “probe” is “a signal or message that characterizes the channel.” POR, 13. Mr. Holobinko provides a different (although similar) definition that defines probe as “a particular kind of signal or message *having a form* used to characterize the communication channel between the two nodes.” Ex. 2007, ¶ 47 (emphasis added to show additional words in Holobinko’s construction). I note that Mr. Holobinko believes these additional words to be important and he would object to removing them as Patent Owner’s construction does. Ex. 1055, 88:8-89:8. Accordingly, Mr. Holobinko’s definition possibly adds even another narrower limitation that the “form” of the signal has to be used to characterize the channel. In the context of the ’690 patent, the term “form” is used

to capture features of how the signal or message is generated/transmitted, like how it is modulated. See Ex. 1001, 2:3-19. If this additional requirement is intentionally being added, then I especially disagree with his definition because there is no support for it in the '690 patent. Regardless, even Patent Owner's definition is too narrow in the context of the '690 patent because it is seemingly limiting the term "probe" to a signal or message used for channel assessment and excluding other uses for the probe (like network diagnosis). As I explained above, a POSITA would have understood that the term probe includes signals or messages for various uses and would not have limited the term to only channel assessment probes (although that would be one type of probe).

12. Finally, even if Patent Owner's definition for probe is adopted to effectively limit a probe to a channel assessment probe, I note that a POSITA would not have interpreted a channel assessment probe as excluding a signal or message that provides adjustments or is also used for negotiating communication parameters. I disagree with Mr. Holobinko's interpretation that the claimed "probe" excludes signals or messages that use parameters to make adjustments. Ex. 1055, 96:9-97:23. I have not seen any evidence for making this exclusion. Indeed, the '690 patent suggests probes could be used to make adjustments. Ex. 1001, 6:63-7:5 (explaining that the probe may lead to generating a probe report having communication parameters to be used for subsequent transmissions). There

are also additional references that further support that probes were used in negotiating parameters for a communication channel. See Ex. 1042 (US20050059353), ¶ [0021]-[0023] (using probe responses for synchronization); Ex. 1043 (US20110149842), ¶¶ [0052]-[0053] (using a sector ID field of a probe to set a transmit sector for a node); Ex. 1044 (US20070189249), ¶¶ [0074]-[0077] (an AP responds to a probe request with standard 802.11 probe response frame that provides parameters for transmissions). Therefore, I disagree with Patent Owner's and Mr. Holobinko's application of their definitions to exclude the signals/messages that I pointed to as probes (i.e., WiMAX's Ranging Response, Waxman's probe response, and DOCSIS 2.0's Ranging Request and Test Response). A POSITA would have understood that each of the signals/messages that I rely on are probes and even particularly channel assessment probes, as I explain below.

B. “physical layer probe”

13. Similarly, I gave this term plain and ordinary meaning and disagree with Patent Owner's and Mr. Holobinko's efforts to limit its meaning for the reasons provided above with respect to the term “probe.” First, I note that the term “physical layer probe” is not used in the '690 patent except for in the claims. The patent also does not expressly describe the physical layer attributes that the probe supposedly must characterize according to Mr. Holobinko's construction and he

even acknowledged the physical layer attributes were not described in the discussion of the patent where it addresses possible processing of the probe (Ex. 1001, 6:57-7:11). Ex. 1055, 65:6-67:14. Further, in view of the many example uses of “probe” in the ’690 patent as I discussed above, a POSITA would not limit the plain and ordinary meaning of “physical layer probe” to “a probe that characterizes attributes of the physical layer of the communications channel” as Patent Owner argues (POR, 15) or to “a signal or message having a form used to characterize the communication channel’s physical communication layer attributes” as Mr. Holobinko states (Ex. 2007, ¶ 58). As with the term “probe,” it is difficult to state a concise definition of this term given all the example uses in the ’690 patent. As Patent Owner’s and Mr. Holobinko’s probe constructions improperly limit the term to a channel assessment probe, their physical layer probe constructions also improperly limit the term to channel assessment physical layer probes. In addition to covering what Patent Owner and Mr. Holobinko cover with their definitions, a POSITA would have understood the plain and ordinary meaning of “physical layer probe” includes at least the following given the uses disclosed in the ’690 patent that I identified above: a signal or message that diagnoses problems with the physical layer or with the ability of nodes to communicate on the physical layer, a signal or message that tests the physical layer or the ability of nodes to communicate on the physical layer, a signal or message that adjusts

communications over the physical layer, a signal or message that replicates a problem with the physical layer, a signal or message for reaching or discovering a distant or previously undetected node using the physical layer, and/or a signal or message that assists with network admissions to the physical layer. Basically, the “physical layer probe” is a probe (for any of the example uses given in the ’690 patent) that relates to the physical layer, as opposed to upper layers.

14. I understand that Patent Owner argues that the “physical layer probe” must mean something more than “probe.” Even if that is true, all of the signals/messages that I relied on as being probes (i.e., WiMAX’s Ranging Response, Waxman’s probe response, and DOCSIS 2.0’s Ranging Request and Test Response) are also physical layer probes, so any distinction does not change my opinions. At most, adding “physical layer” before “probe” just excludes upper layer probes, which Mr. Holobinko acknowledged could exist but are not dealt with in the ’690 patent. Ex. 1055, 90:2-91:3. Likewise, I did not rely on probes for upper layers of the OSI model (see ¶49 of my first declaration), like the application layer. All of the signals/messages I rely on are probes that relate to the physical layer. In addition, even if Patent Owner’s definition for “physical layer probe” is adopted, all of the signals/messages that I relied on do characterize or assess attributes of the physical layer, as I explain below.

C. “at least specify content payload of the probe”

15. I understand that this limitation has become a point of dispute. My understanding, based on Patent Owner’s infringement contentions (which rely on a P-MAP from DOCSIS 3.1 which does not have information that is placed into the relied upon probes) and arguments in the litigation (“that a content payload for a probe can just be a signal doesn’t necessarily have to have any data or symbols” and the probe can just be a signal like a foghorn that “doesn’t necessarily carry information”)), is that Patent Owner interprets this limitation such that a parameter in the probe request only has to cause something (e.g., data or just a signal) to be sent in the payload of the probe. Ex. 1050, 2-7; Ex. 1052 (transcript from claim construction in litigation), 62:2-71:18. In other words, my understanding is that Patent Owner’s litigation position does not interpret this limitation as requiring the probe request to include content (e.g., a value) that is carried over into the probe. To put it simply, it appears Patent Owner’s litigation interpretation does not require the probe request and payload of the probe to have the same/identical value. Based on Mr. Holobinko’s deposition testimony, it appears he also does not interpret this limitation as requiring the probe request to have a parameter with the exact same value as a parameter in the probe. 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. But the probe is generated according to the specified parameters.”), 82:2-83:21 (“It says the content defines what the content payload should be, but not the values, so to speak.”). However, in this proceeding, Patent Owner appears to take the position that the probe request and payload of the probe *must* have the same/identical value. See, e.g., POR, 23 (“the CID sent in the initial ranging procedure cannot be specified by the SS because the SS does not yet have a CID to specify”). In any event, I have shown how the prior art meets both interpretations.

IV. ANALYSIS

16. Below I address the arguments the Patent Owner and/or Mr. Holobinko made. I note that they do not contest most of my opinions, so I have not repeated all of my opinions from my first declaration. It should be understood that my opinions herein are based on the same POSITA definition that I provided in my first declaration. Ex. 1002, ¶118. That said, my opinions would be the same even using Mr. Holobinko’s definition of the POSITA (Ex. 2007, ¶ 43).

A. WiMAX Anticipates Independent Claims 1 and 9 and Renders Obvious Independent Claim 17

17. In this section, I address Patent Owner’s and Mr. Holobinko’s arguments that WiMAX (more specifically, IEEE Std 802.16-2004 which is Ex. 1013) does not anticipate or render obvious the independent claims. In particular, I address their arguments that WiMAX’s Ranging Request and Ranging Response are not a probe request and probe, respectively. I also address their arguments that

WiMAX does not anticipate or render obvious “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.

1. WiMAX’s Ranging is a Type of Probing

18. As I previously explained, “Ranging is a collection of processes by which the SS and BS maintain the quality of the RF communication link between them.” Ex. 1013, 199. The ranging procedure includes two uplink procedures called “initial ranging” and “periodic ranging” as well as downlink burst profile management in which an “SS applies an algorithm to determine its optimal burst profile.” Ex. 1013, 174-182, 199-213. WiMAX explains that “Initial ranging (see 6.3.9.5) allows an SS joining the network to acquire correct transmission parameters, such as time offset and Tx power level, so that the SS can communicate with the BS. Following initial ranging, periodic ranging allows the SS to adjust transmission parameters so that the SS can maintain uplink communications with the BS.” Ex. 1013, 202. WiMAX also explains that “The time (ranging) and power measurements allow the system to compensate for the near/far user problems and the propagation delay caused by large cells,” which shows that ranging is for testing and diagnosing the network. Ex. 1013, 579.

Based on these descriptions of ranging, a POSITA would have understood that ranging is a type of probing.

19. WiMAX also explains that “[a]n RNG-REQ shall be transmitted by the SS at initialization and periodically to determine network delay and to request power and/or downlink burst profile change.” Ex. 1013, 49. Based on all of this, a POSITA would have understood that WiMAX’s Ranging Request (RNG-REQ) is a request to assess and/or diagnose the channel between the SS and BS. As such, I relied on the Ranging Request and Ranging Response of WiMAX for the “probe request” and “probe” of the claims. My opinions are further supported by DOCSIS 3.1 (which Patent Owner relies on for asserting infringement), which describes one of its probes (the ECT Probe) and states that “this probe is used for ranging purposes.” Ex. 1051, 130.

20. I did not treat the term “probe” as “nothing more than ‘message’” as the Patent Owner and Mr. Holobinko accuse me of doing. POR, 21; Ex. 2007, ¶ 48. To be clear, my opinion is not that all signals are probes. However, as I discussed above with respect to the construction of “probe,” the ’690 patent uses “probe” to encompass many 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. In my opinion, a POSITA would have considered WiMAX’s ranging to fall within each of these uses.

WiMAX's ranging involves acquiring correct transmission parameters (specifically, timing and power), which requires assessing the current timing and power of a channel (this is "channel assessment") and diagnosing a problem with the current timing and/or power (this is "network diagnosis") to determine adjustments. Ex. 1013, 49-51, 199. WiMAX also describes ranging as network maintenance when it states that "Ranging is a collection of processes by which the SS and BS *maintain* the quality of the RF communication link between them." Ex. 1013, 199 (emphasis added), 202 (periodic ranging allows the SS to "*maintain* uplink communications with the BS" (emphasis added)). Moreover, WiMAX's ranging (and in particular its initial 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.

21. Further, another patent application by the same Patent Owner (Entropic) describes a "ranging" method (similar to WiMAX's ranging) using "probe packets." Ex. 1045, ¶¶ [0014], [0043], [0048], [0059]-[0060], Figs. 9-11. Similarly, DOCSIS 3.1 describes using "upstream probes for ranging-related functions." Ex. 1051, 440 (see Section 10.5.1.2). These descriptions further support my opinion that ranging is a type of probing.

22. I also disagree with the Patent Owner's suggestion that the Ranging Response requires adjustments. POR, 18-19. The Patent Owner is overlooking

that the adjustments (timing and power adjustments) are optional. Ex. 1013, 50 (“If this field is not included, no adjustment shall be made”). At any rate, I disagree with the Patent Owner and Mr. Holobinko’s attempt to drive a wedge between characterizing a channel and making adjustments or negotiating parameters. See POR, 2; Ex. 2007, ¶ 64. By providing adjustments, the Ranging Response is characterizing the channel as having one or more unacceptable attributes (e.g., poor timing or power). And given all the example uses in the ’690 patent (that I discussed above), there is nothing in the patent that would tell a POSITA that the claimed “probe” cannot have adjustments or cannot be used for negotiation. Rather, a POSITA would have understood that a probe can be used for making adjustments, even if it is also used for assessing the channel. This is supported by multiple other patents that the Patent Owner (Entropic) has that use “probes” for making adjustments and negotiating 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). Even the DOCSIS 3.1 standard that the Patent Owner submitted as Ex. 2006 states that “probing is used for adjusting transmission parameters.” Ex. 2006, 121. On the other hand, the Patent Owner also has a patent that supports my position that ranging is used for assessing physical parameters of the channel, even if it is also used for making adjustments. Specifically, the Patent Owner’s U.S. Patent

9,419,858 states that “ranging operations [] determine physical layer parameters” while discussing a DOCSIS network, which is similar to WiMAX because WiMAX was actually developed based on DOCSIS. Ex. 1049, 2:47-56.

23. The Patent Owner and Mr. Holobinko are also incorrect that “there is nothing about the [Ranging Response] that is being used to characterize the channel.” POR, 18; Ex. 2007, ¶ 64. Mr. Holobinko even contradicted this at his deposition when he stated that “The [ranging] response can include some other parameters *about the channel* as well.” Ex. 1055, 98:19-24 (emphasis added). In any event, WiMAX states that its Ranging Response “shall” include the Ranging Status parameter, and that this parameter “indicate[s] whether uplink messages are received within acceptable limits by BS.” Ex. 1013, 50, 665. By indicating that uplink messages are received within acceptable limits (e.g., when the Ranging Status is equal to “success”), the Ranging Response characterizes the uplink channel. As such, a POSITA would have understood that because the Ranging Response includes the Ranging Status, it meets the Patent Owner’s and Mr. Holobinko’s definition for “probe.” I note that WiMAX also explains that ranging includes monitoring and measuring parameters until they “meet acceptance criteria for the new subscriber.” Ex. 1013, 620. And, WiMAX includes a number of figures (one of which from Ex. 1013, 181 is below) showing that the ranging procedure includes determining, based on the Ranging Request, whether the

channel is good enough, which means it determines whether the channel is within “tolerable limits.” Ex. 1013, 180-181, 203, 209-211. Although Mr. Holobinko acknowledges that WiMAX’s ranging response does not only include adjustment parameters, he is incorrect that the other parameters are not determined by the ranging process (Ex. 1055, 98:19-24 (“The response can include some other parameters about the channel as well. But those parameters are not determined by the ranging process.”)) since the drawing below shows that Ranging Required parameter would have been determined from analyzing the Ranging Request.

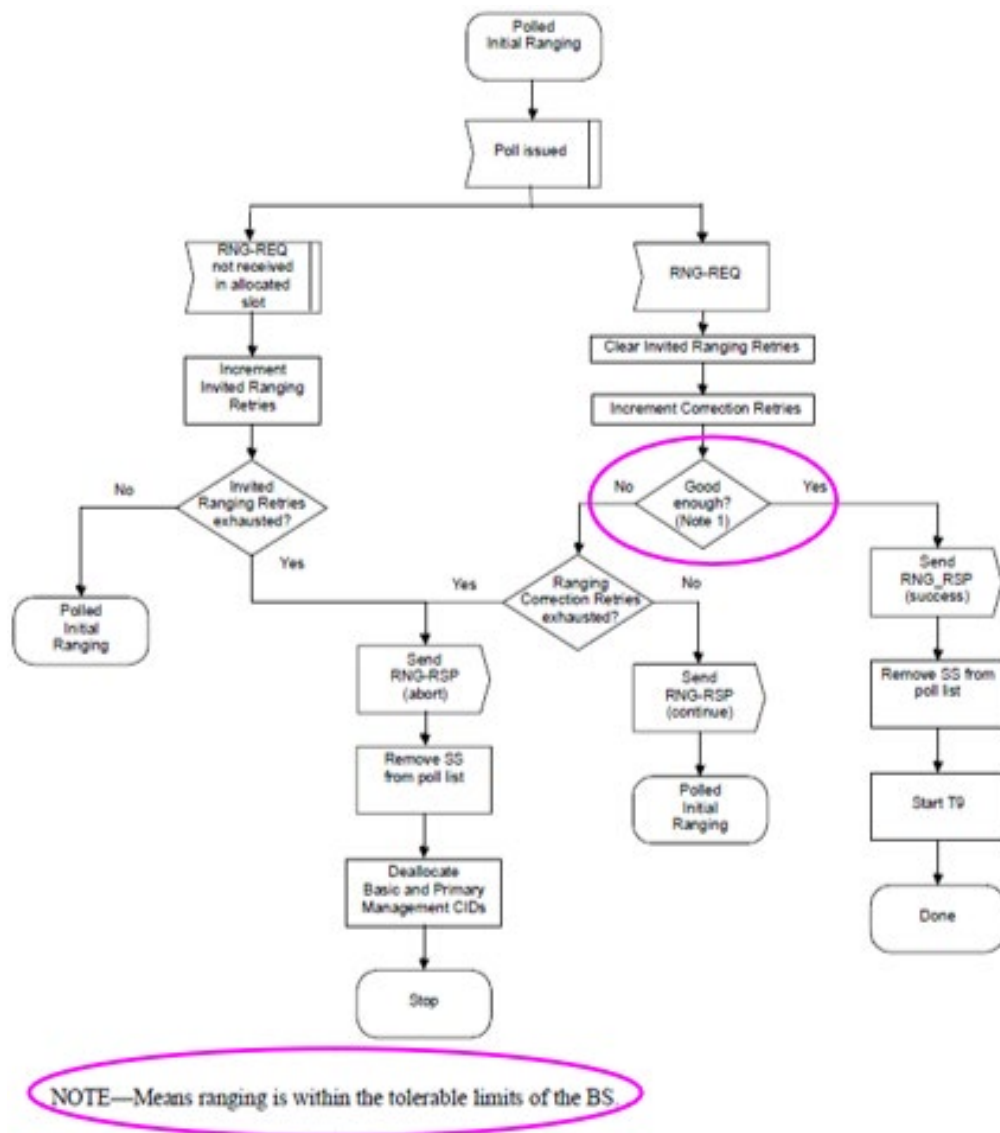


Figure 63—Initial Ranging, Polled Phase-BS

24. Finally, claim 9’s use of the term “physical layer probe” does not change my opinions above because timing and power are physical parameters. I agree with Mr. Holobinko that “signal delay” and “attenuation” are physical layer attributes. Ex. 2007, ¶ 57. A POSITA would have understood that “signal delay” is a timing related parameter, and that “attenuation” is a power related parameter.

Thus, the Ranging Response in WiMAX is the “physical layer probe” because it is used to maintain the RF link—the PHY layer—and to acquire the correct timing and power. Ex. 1013, 199, 202. The Ranging Response is also the “physical layer probe” under Patent Owner’s and Mr. Holobinko’s construction because it includes the Ranging Status for indicating whether the uplink messages are within acceptable/tolerable timing and power limits, as I explained above. To put it simply, the Ranging Response in WiMAX is a probe related to the physical layer and not some upper layer like the application layer.

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

25. This section is in response to Patent Owner and Mr. Holobinko arguments that WiMAX does not disclose or render obvious “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. In particular, they argue that the CID parameter from the Ranging Request (which I rely on for the probe request in the WiMAX grounds) is not part of the payload of the Ranging Response (which I rely on for the probe in the WiMAX grounds). However, their arguments mistake what I relied on in my first declaration, which was WiMAX’s use of the CID in the TLV information (which a POSITA would have understood to be a payload) of the

Ranging Response—not in the MAC management header of the Ranging Response. See Ex. 1002, ¶¶ 148-149. I explain this position below.

26. First, the format for the Ranging Request (RNG-REQ), which is the claimed “probe request,” is given in Table 19 (reproduced below). Ex. 1013, 49.

Table 19—RNG-REQ message format

Syntax	Size	Notes
RNG-REQ_Message_Format() {		
Management Message Type = 4	8 bits	
Downlink Channel ID	8 bits	
TLV Encoded Information	<i>variable</i>	TLV specific
}		

27. The Ranging Request is one of the MAC Management messages. Ex. 1013, 35-43 (Table 14 shows that the Ranging Request message is the MAC Management Message when Type = 4). The Ranging Request has a generic MAC header as shown in Figures 18 and 19 (reproduced below). Ex. 1013, 35-36.

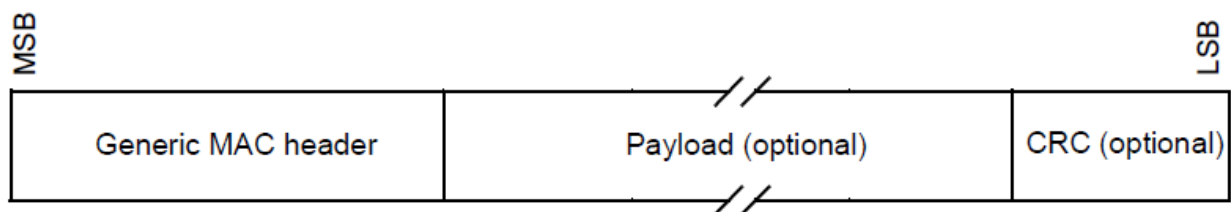


Figure 18—MAC PDU formats

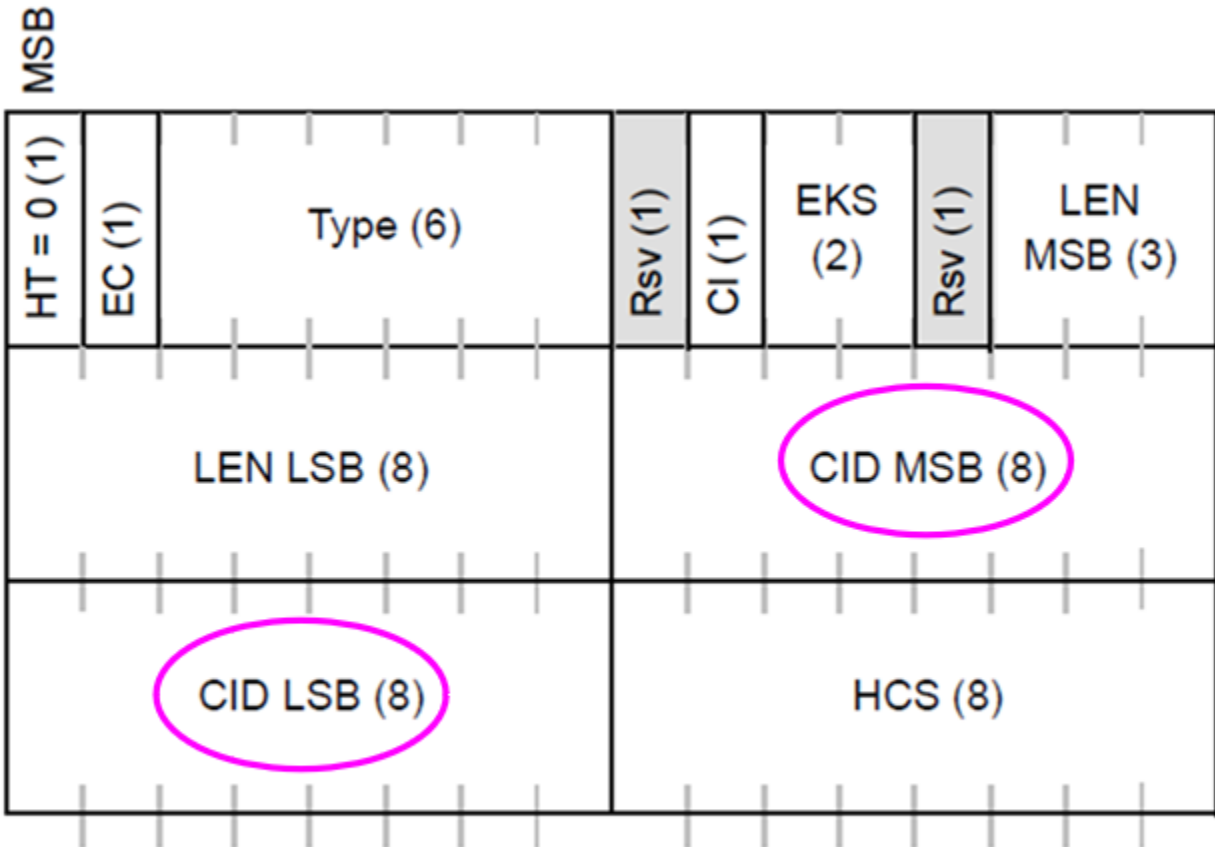


Figure 19—Generic MAC header format

28. As shown in Figure 19 above, the MAC header includes numerous parameters (referred to as “fields”) and one of the parameters is the connection identifier (CID), which is a 16 bit value and thus shown as two bytes (8 bits each) above. Ex. 1013, 37. The parameters (or fields) of the MAC header are defined in Table 5 (reproduced below). Ex. 1013, 37.

Table 5—Generic MAC header fields

Name	Length (bits)	Description
CI	1	CRC Indicator 1 = CRC is included in the PDU by appending it to the PDU Payload after encryption, if any 0 = No CRC is included
CID	16	Connection identifier
EC	1	Encryption Control 0 = Payload is not encrypted 1 = Payload is encrypted
EKS	2	Encryption Key Sequence The index of the Traffic Encryption Key (TEK) and Initialization Vector used to encrypt the payload. This field is only meaningful if the EC field is set to 1.
HCS	8	Header Check Sequence An 8-bit field used to detect errors in the header. The transmitter shall calculate the HCS value for the first five bytes of the cell header, and insert the result into the HCS field (the last byte of the MAC header). It shall be the remainder of the division (Modulo 2) by the generator polynomial $g(D = D^8 + D^2 + D + 1)$ of the polynomial D^8 multiplied by the content of the header excluding the HCS field. (Example: [HT EC Type]=0x80, BR=0xAAAA, CID=0x0F0F; HCS should then be set to 0xD5).
HT	1	Header Type. Shall be set to zero.
LEN	11	Length. The length in bytes of the MAC PDU including the MAC header and the CRC if present.
Type	6	This field indicates the subheaders and special payload types present in the message payload.

29. As shown from the table above, one of the parameters is a connection identifier (CID), which is a 16 bit identifier of the connection between the SS and BS. Ex. 1013, 37, 7. Thus, the Ranging Request (RNG-REQ) message, specifically its header, includes the CID parameter.

30. Now, I will explain how this CID parameter is carried over into the *payload* of the Ranging Response (RNG-RSP), which I rely on for the claimed “probe.” The format for the RNG-RSP message is given in Table 20 (reproduced below). Ex. 1013, 50.

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
}		

31. As shown in the table above, the Ranging Response (RNG-RSP) message includes TLV Encoded Information. Ex. 1013, 50. A POSITA would have clearly understood that the TLV Encoded Information is part of the payload of the Ranging Response message, and even Mr. Holobinko admitted this. Ex. 1013, 50, 35 (showing payload part of MAC PDU that the TLV Encoded Information of the Ranging Response would be put into); Ex. 1055, 113:5-114:13.¹ WiMAX also discloses that the TLV Encoded Information includes numerous

¹ In fact, all three parts of the RNG-RSP message format (i.e., management message type, uplink channel ID, and TLV information) are part of the MAC PDU payload. Ex. 1013, 35-36 (showing MAC PDU including Generic MAC header and Payload), 42-43 (showing MAC Management message format that is in the MAC PDU payload). I note that the Management Message type (8 bits) is in the payload and is different from the “Type” (6 bits) in the Generic MAC header. Ex. 1013, 35-37, 49-50.

parameters and shows the parameters in Table 367 (part of which is reproduced below). Ex. 1013, 50, 665-666.

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

32. As shown in the table above, one of the parameters included in the TLV Encoded Information (of the RNG-RSP message) is the Basic CID. Ex. 1013, 50, 666. The Basic CID refers to the CID for the basic connection between the SS and BS, which is the connection used for ranging and therefore the same connection that is being identified by the CID in the Ranging Request. Ex. 1013, 7 (defining basic connection and connection identifier), 33 (“The basic connection is used by the BS MAC and SS MAC to exchange short, time-urgent MAC management messages” which would include the Ranging Request and Ranging

Response messages as specified in Table 14), 43 (showing Table 14 which shows that the Ranging Request and Ranging Response use the Basic connection). I note that there are other CIDs (such as the primary management CID, secondary management CID, and transport CIDs) for other connections and services, but that seems to be beyond what matters for my opinions here. Ex. 1013, 9 (explaining that primary management connection is used for delay-tolerant MAC management messages and secondary management connection is used to transport standards-based messages), 668 (explaining that “An SS shall support a Basic CID, a Primary Management CID, and 0 or more Transport CIDs” and a “Secondary Management CID”), 697 (explaining that CIDs are also assigned to service flows).

33. The Basic CID in the Ranging Response would have had the same 16 bit value as the CID in the Ranging Request in many situations, although it can be different in some Ranging Responses if the BS decides to change the basic connection. This is supported by WiMAX’s explanation about the value of the CID in the Ranging Request (see highlights below). Ex. 1013, 49.

Table 19—RNG-REQ message format

Syntax	Size	Notes
RNG-REQ_Message_Format() {		
Management Message Type = 4	8 bits	
Downlink Channel ID	8 bits	
TLV Encoded Information	<i>variable</i>	TLV specific
}		

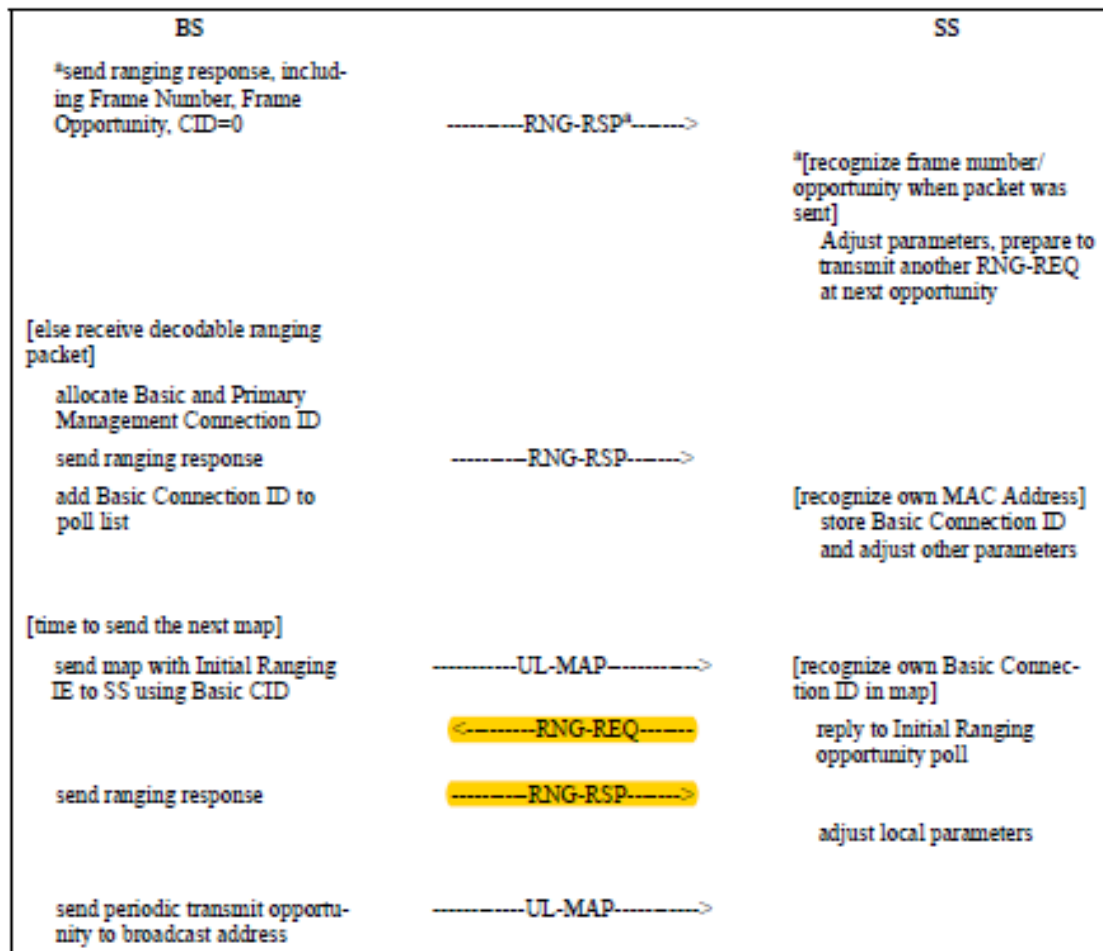
The CID field in the MAC header shall assume the following values when sent in an Initial Ranging interval:

- a) Initial ranging CID if the SS is attempting to join the network.
- b) Initial ranging CID if the SS has not yet registered and is changing downlink (or both downlink and uplink) channels.
- c) In all other cases, the Basic CID is used as soon as one is assigned in the RNG-RSP message.

If sent in a data grant interval, the CID is always equal to the Basic CID.

34. The fact that the value of the CID in the Ranging Request and value of the Basic CID in the Ranging Response would have been the same value is also supported by WiMAX’s explanation that “the same CID value is assigned to both members (uplink and downlink) of each connection pair.” Ex. 1013, 33. This situation (where the CID in the Ranging Request and the Basic CID in the Ranging Response have the same value) is shown in Table 115 of WiMAX (the part of the table on p. 177 is reproduced below). Ex. 1013, 176-177.

Table 115—Ranging and automatic adjustments procedure (continued)



35. As shown above, the highlighted Ranging Request (RNG-REQ) would have had a CID equal to the Basic CID (which the SS previously received) and the highlighted Ranging Response would have had TLV Information with the same value for the Basic CID. Ex. 1013, 49-50. A POSITA would have understood that this situation is disclosed by WiMAX, but to the extent Patent Owner argues otherwise, it at least would have been obvious because the BS and SS would have passed the CID/Basic CID back and forth so that each device is

able to identify which connection a message pertains to and placing the CID/Basic CID into the payload of the Ranging Response allows the SS to obtain the CID when parsing the payload (e.g., after stripping off the header) to determine whether to generate and send another Ranging Request.

36. Further, I note that the BS does not have to change the Basic CID. It appears that Patent Owner and Mr. Holobinko are relying on a particular situation in which the BS assigns the Basic CID during *initial ranging* such that it would be different from the CID in the *initial* Ranging Request. POR, 23 (“the CID sent in the initial ranging...”); Ex. 2007, ¶ 72 (“During an initial ranging procedure...”). First, I never limited my opinions to the *initial* ranging procedure as opposed to the *periodic* ranging procedure. Second, even in some initial ranging situations, the SS sends the Ranging Request with a previously assigned Basic CID. Ex. 1013, 199 (explaining that “the SS shall send a RNG-REQ message in an Initial Ranging interval” and that this “message is sent using the Basic CID of the SS”). Patent Owner and Mr. Holobinko appear to suggest that the CID is not known by the SS before initial ranging (POR, 23; Ex. 2007, ¶ 72), which is a possibility but WiMAX also describes that there are situations where the SS has previously received the Basic CID for use as the CID in the Ranging Request during initial ranging. Ex. 1013, 49 (“CID is always equal to the Basic CID” when it is previously sent in a data grant interval). Also, WiMAX explains that the Uplink

Map message (UL-MAP) includes a CID that provides the SS with the Basic CID (Ex. 1013, 48) and that the UL-MAP is provided to the SS ahead of initial ranging. Ex. 1013, 153-154 (explaining that UL-MAP provides Initial Ranging IE), 167 (UL-MAP allocates opportunities for initial ranging), 174 (see “start ranging process” in the bottom right of the Table 114 after UL-MAP sent and see discussion in Section 6.3.9.5.1).

37. Also, even though the Basic CID is optional for the Ranging Response, it should have been clear from my first declaration that I am relying on it being included as it would have been in at least some situations; otherwise it would not be an option. Ex. 1013, 50. Moreover, a POSITA would have at least found it obvious to include the Basic CID in the Ranging Response with the same value as the CID from the Ranging Request because that implementation would have been predictable. It is one of a finite number of implementations because the Basic CID is either included in the Ranging Response or it's not. And if the CID is included, it can only have a finite set of values. Further, a POSITA would have had an expectation of success in developing the BS to use the CID from the Ranging Request to set the Basic CID within the TLV Information of the Ranging Response. As I mentioned above, a POSITA would also have been motivated to include the Basic CID (with the same value of the CID in the Ranging Request) in the payload of the Ranging Response because it enables the CID to be obtained

when parsing the payload (e.g., after stripping off the header) to determine whether to generate and send another Ranging Request with that same CID too. Ex. 1013, 176-177 (showing multiple ranging requests).

38. In addition, I have also been asked to consider how WiMAX meets limitation 1A if it is interpreted more broadly such that a parameter of the probe request does not need to provide the actual value/content that is put into the payload of the probe (as Patent Owner appears to interpret it in the litigation and as Mr. Holobinko appears to interpret it in his deposition (see Section III.C above) and instead merely has to provide a parameter that indicates what the content in the payload will include. Under this interpretation, limitation 1A would have been met at least when a CID in an initial Ranging Request is set to a default value (e.g., zero), which would have caused the BS to generate the Ranging Response with TLV information having the Basic CID equal to some 16 bit value. Ex. 1013, 175 (CID for RNG-REQ for initial ranging set to a “non initialized SS value (zero)”), 176-177 (Table 115). Other parameters besides the CID/Basic CID would meet this interpretation too because all of the TLV information of the Ranging Response is specified based on the Ranging Request. Ex. 1013, 50. The Ranging Request has a management message type equal to 4 that allows the BS to identify it as a Ranging Request and determine the content that is to be sent in the Ranging Response payload which includes at least the TLV information. Ex. 1013, 42-43,

49-50. For example, at a minimum, the BS would see the Ranging Request and determine the content for the Ranging Status parameter that is required for the TLV information of the Ranging Response. Ex. 1013, 50. As another example, the Ranging Request having a management message type equal to 4 would dictate to the BS to send a Ranging Response message with a management message type equal to 5 and having a format defined by Table 20. Ex. 1013, 42-43 (explaining that the MAC Management Messages like RNG-REQ and RNG-RSP are in the payload of the MAC PDU), 49-50 (showing management message types in the payloads of the MAC PDU for defining the format of the RNG-REQ and RNG-RSP messages). This example would meet what Mr. Holobinko described as the meaning of the limitation of “wherein the first plurality of parameters at least specify content payload of the probe” in claim 1 because the management message type equal to 4 in the Ranging Request defines what the content payload (“but not the values, so to speak”) of the Ranging Response should be, which is Ranging Response having the format in Table 20. Ex. 1055, 78:3-83:21. To put it another way, the Ranging Request says “I want the Ranging Response” with the content that comes with it in there and the Ranging Response would give you that content in its payload. See Ex. 1055, 82:18-23 (“‘I want this test signal in there.’ The actual probe would give you that signal as part of the probe.”). As yet another example, the Ranging Response’s payload also includes the Uplink Channel ID,

which is defined by the Ranging Request (specifically, the BS would set the Uplink Channel ID based on the Downlink Channel ID in the RNG-REQ that tells the BS the downlink channel on which the SS received the UCD message that gave the SS the uplink channel to use for the RNG-REQ). Ex. 1013, 49 (Downlink Channel ID definition: “The identifier of the downlink channel on which the SS received the UCD describing the uplink on which this ranging request message is to be transmitted.”), 50 (Uplink Channel ID definition: “The identifier of the uplink channel on which the BS received the RNG-REQ to which this response refers.”).

39. Finally, I note that I consider the Ranging Code signal to be another example of a “Ranging Request” (although in a different form than the RNG-REQ message on p. 49) because it functions as a request for the BS to send the Ranging Response (RNG-RSP message). Ex. 1013, 204-213. Depending on how the claims are interpreted, the Ranging Code signal, which includes a ranging code index that is put into the TLV information (specifically in the Ranging code attributes parameter) of the Ranging Response, and the Ranging Response would also show the claimed probe request and probe. Ex. 1013, 50-51 (RNG-RSP includes Ranging code attributes parameter), 204-213 (Section 6.3.10.3 describing codes for OFDMA-based ranging), 576-579 (Section 8.4.7 describing codes for

OFDMA ranging), 665-666 (Section 11.6 describing RNG-RSP management message encodings including ranging code in Table 369).

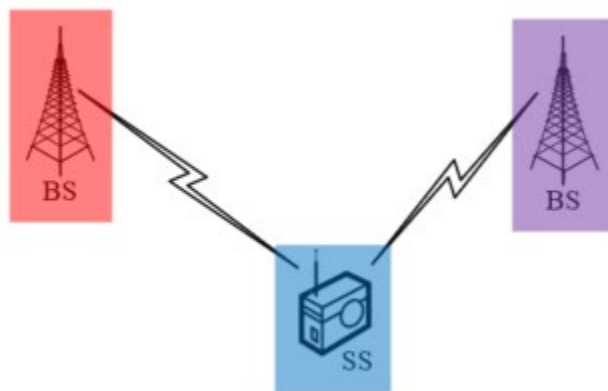
B. WiMAX Renders Obvious Dependent Claims 11 and 19

40. In this section, I address Patent Owner's and Mr. Holobinko's arguments that WiMAX does not teach the claimed "simultaneously using OFDMA" and that Petitioner has not shown this element is inherent. POR, 28-30. As I previously explained, WiMAX teaches multiple BSs independently transmitting a Ranging Response to an SS using OFDMA, and a POSITA would have understood that two Ranging Responses would have been transmitted simultaneously at least once. Ex. 1013, 50-51, 199-213; Ex. 1002, ¶¶ 250-259.

41. I note that my opinions regarding claims 11 and 19 are based on how a POSITA would have interpreted these claims. Specifically, a POSITA would have understood that the "simultaneously using OFDMA" in claims 11 and 19 merely recites a result that need only occur once. That is, a POSITA would have understood that nothing in these claims requires the first and second probes to be transmitted "simultaneously" on multiple occasions. Also, a POSITA would see that the claims do not recite anything about the first probe request and/or second probe request that causes the first probe and second probe to be transmitted "simultaneously using OFDMA." For example, there is nothing in the claims that coordinates the timing at which the two probes are transmitted. In contrast, Mr.

Holobinko's opinions that WiMAX does not have this feature appear to be based on him reading the claims in a way that requires a mechanism for dictating that the probes be sent simultaneously. See Ex. 1055, 117:3-118:13 ("My argument is, within WiMAX, that there is nothing to dictate that they be sent simultaneously, and there's no mechanism for doing -- for doing so.").

42. I note that Patent Owner and Mr. Holobinko do not dispute that, as shown in the drawing below (which I previously provided), a POSITA would have understood that the system of IEEE Std 802.16-2004 (WiMAX) includes a subscriber station (SS), such as a wireless access point (**blue**) communicating with multiple base stations (BS) (**red** and **purple**). Ex. 1002, ¶ 250.



43. They also do not dispute that a POSITA would have understood that the SS transmits one Ranging Request message to one base station and another Ranging Request message to the other base station and receives two Ranging Response messages and would have found it obvious for the SS to perform ranging with multiple BSs simultaneously, as I previously explained. Ex. 1002, ¶¶ 251-

258. Instead, they simply argue that WiMAX does not expressly disclose or suggest that the Ranging Response messages would have been transmitted simultaneously. But, even Mr. Holobinko seems to agree that “sometimes, by pure coincidence, the two Ranging Responses *might* be transmitted simultaneously.” Ex. 2007, ¶ 76. Mr. Holobinko also argues that the two Ranging Responses would not be transmitted downstream using OFDMA, but does not address that WiMAX discloses transmitting MAC messages on the downlink using OFDMA and that Zuckerman also provides evidence of this being known to a POSITA. Ex. 1013, 493-504 (in particular see Section 8.4.3.4); Ex. 1016, ¶¶ [0065]-[0067], [0131]-[0132], [0134], FIGs. 1A-1C (showing subscriber stations 50 and 51 each connected to multiple base stations 20 and 21). Mr. Holobinko also does not address that WiMAX specifically discloses transmitting Ranging Response messages (RNG-RSP) using OFDMA. Ex. 1013, 176 (“For OFDMA...the SS receives a RNG-RSP message”), 202 (discussion of periodic ranging for “all PHY layers” including transmission of RNG-RSP message), 204-213 (RNG-RSP messages sent using OFDMA), 665-666 (RNG-RSP encodings for “All” PHY layers including OFDMA and OFDMA-specific encodings). Further, a POSITA would have understood that using OFDMA, as with other multiple access schemes, to simultaneously transmit messages is obvious when you have “a multiple access

system designed for simultaneous access,” which is the situation in a WiMAX system having multiple BSs and multiple SSs. Ex. 1016, ¶ [0008].

C. Waxman Anticipates or Renders Obvious Independent Claims 1, 9, and 17 and Dependent Claims 11 and 19

44. In this section, I address Patent Owner’s and Mr. Holobinko’s arguments that Waxman (Ex. 1007) does not anticipate or render obvious the independent claims. In particular, I address their arguments that Waxman’s probe request and probe response are not a probe request and probe, respectively, and that Waxman’s probe is not a physical layer probe. I also address their arguments that Waxman does not anticipate or render obvious “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, and that Waxman-Zuckerman does not teach simultaneous probe transmissions using OFDMA (in claims 11 and 19).

1. Waxman’s Probe is a Probe

45. As I previously explained, Waxman describes systems and methods for extending the range of wireless communications between stations and an access point (AP). Ex. 1007, Abstract, ¶¶ [0001]-[0002], [0004], [0006], [0009], [0012], FIGs. 1, 3. In particular, Waxman discloses the key feature of the ’690 patent, which is a probe request that determines the form of a probe (called a probe response in Waxman). Ex. 1007, ¶¶ [0030], [0054]-[0055].

46. For example, Waxman's stations, e.g., as part of an active scanning process, transmit probe requests to APs specifying transmissions to the station be in a particular format. Ex. 1007, ¶¶ [0030], [0035]. The probe requests include, among other fields, a Requested Transmission Scheme (RTS) field indicating a requested or required transmission scheme. Ex. 1007, ¶¶ [0030], [0054]. After receiving the probe request, the AP transmits a probe response to the requesting station, based on a requested transmission scheme. Ex. 1007, ¶¶ [0037], [0055]. In this way, the AP sends communications in different transmission formats, based on various settings or requirements. Ex. 1007, ¶ [0041].

47. As I explained above in Section III.A, I disagree with Patent Owner's and Mr. Holobinko's attempt to limit the definition of probe to only channel characterization. Waxman is in the same field of art (specifically, communication networks) as the '690 patent. Ex. 1007, Abstract, ¶¶ [0001], [0009]; Ex. 1001, 1:12-14; Ex. 1055, 122:2-13. A POSITA would have understood that the term includes signals or messages for various uses and would not have limited the term to only channel assessment probes (although that would be one type of probe). Even the '690 patent itself provides various uses aside from channel characterization. See, e.g., 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. Additional uses for probes in the '690 patent include network issue diagnoses,

network maintenance, identifying hidden nodes, and setting modulation schemes. Waxman's probes are also described having these same uses. Ex. 1007, ¶¶ [0001]-[0009], [0012] (probes addressing issues in wireless communications in which "an extended connectivity range may not be achieved"), [0024]-[0028] (adapting BF scheme based on feedback from probe response), [0029]-[0030] (probe requests/responses sent if a station has not received a beacon signal to reach a hidden AP), [0031]-[0034] (probes with transmission scheme parameters that set modulation profiles), [0040]-[0045] (using probe requests and responses to obtain feedback for determining unreliable reception).

48. In particular, Waxman's probe responses also characterize communication channels. A POSITA would have understood that Waxman's probe response characterizes the channel so that the station is able to (i) assess whether the channel is reliable enough using the requested transmission scheme (which was requested in the probe request) and (ii) provide feedback to the AP based on the assessment. Ex. 1007, ¶¶ [0024] (discussing feedback), [0029] (discussing SNR and reliability determinations), [0036]-[0037] (discussing probe response as alternative to beacon), [0045] (discussing sending another probe request if channel is not reliable). Even if the probe response only had an acknowledgement or

approval of the request embedded in the probe request², as Patent Owner contends, that acknowledgement still provides information to the station for characterizing that channel, specifically indicating that the requested transmission scheme is approved for that channel. Even Mr. Holobinko acknowledged that the probe response is approving the use of the requested transmission scheme. Ex. 1055, 126:14-127:7. Thus, probes as discussed in Waxman also encompass Patent Owner’s limiting definition of probe: “a signal or message that characterizes the channel.” POR, 13.

2. Waxman’s Probe Request Parameters Specify Content Payload of The To-Be-Sent Probe Response and The Recipient of The Probe Response

49. As I previously explained, Waxman’s probe request includes various parameters for transmitting a probe response. While some parameters relate to a transmission scheme for the probe response (e.g., a Requested Transmission Scheme (RTS) parameter, number of antennas), the parameters in Waxman’s probe request also would have specified payload content for the probe response (e.g.,

² I note that Waxman discloses that “[t]he probe response *may, for example, include* an indication acknowledging or approving the request embedded in the probe request,” and therefore a POSITA would have understood that Waxman teaches the probe response having more than only an acknowledgement at least in some examples. Ex. 1007, ¶ [0037] (emphasis added).

information identifying the probe request, information indicating a station from which the probe request originated and an AP that received the probe request, information providing confirmation of a requested transmission scheme, information indicating an SSID of the requesting device, information confirming or modifying transmission parameters for subsequent communications, and the like). Ex. 1002, ¶¶ 342-344; Ex. 1007, ¶¶ [0013]-[0020], [0030]-[0034], [0037], [0049], [0054]. As one particular example, where the probe request specifies 802.11, the probe request includes an SSID parameter and requested information elements that are also included in the probe response payload. Ex. 1007, ¶¶ [0009], [0013]-[0020]; Ex. 1012, 84-85 (showing same parameters in both the “probe request frame body” and the “probe response frame body”); Ex. 1002, ¶¶ 343-346.

50. I disagree with Patent Owner and Mr. Holobinko that Waxman’s probe response is only a “simple acknowledgement.” POR, 32, 36. Waxman explains that “[t]he probe response *may, for example, include* an indication acknowledging or approving the request embedded in the probe request.” Ex. 1007, ¶ [0037] (emphasis added). Waxman describes that the probe response may “include” an acknowledgement, not that the probe response *is* an acknowledgement. This tells a POSITA that there is additional information in the probe response. As I explained in my first declaration (Ex. 1002, ¶¶ 342-356), a POSITA would have understood that the probe response would have had multiple

parameters to carry various data. In short, the probe responses sent by the AP would have been used by the stations to determine reception reliability and provide feedback, which indicates that the probe responses would have included parameters and data in those parameters to fulfill those purposes too and not merely provide an acknowledgement. Ex. 1007, ¶¶ [0024], [0028]-[0029], [0036]-[0037], [0045]. To give a simple example, a POSITA would have found it obvious for the probe response to include the number of antennas used when the probe request includes a parameter that requests a particular number of antennas to be used. Ex. 1007, ¶¶ [0030]-[0034], [0054]. If, for example, the probe request requested 4 antennas to be used and the AP was only able to use 2 antennas (e.g., only had 2 antennas), it would have been desirable for the probe response to indicate that only 2 antennas were used so the station can decide what transmission scheme to use. Ex. 1007, ¶ [0034]. Of course, if the AP used 4 antennas as requested, then the probe response would have indicated that 4 were used or otherwise confirmed that the requested number was used. Including this information in the probe response would have been well within the skill level of the POSITA and obvious from Waxman alone.

51. Even if the probe response only has an indication acknowledging or approving the request embedded in the probe request, the claim limitation is still met. In such an example, the acknowledgement indication forms payload content

for the probe response. Ex. 1007, ¶¶ [0030], [0036]-[0043], [0055]-[0056]. Because the acknowledgement or approval indication confirms if probe response parameters for a requested transmission scheme will be used in communications between that station and AP, a POSITA would have understood that the probe request parameters specify the acknowledgment/approval indication in the probe response.

52. As I explained above in Section III.C, I understand that “at least specify content payload of the probe” has become a point of dispute. In particular, in this proceeding, Patent Owner seemingly interprets this limitation to require the probe request and payload of the probe to have the same/identical value, while taking a broader interpretation in their infringement contentions (their infringement contentions rely on a P-MAP from DOCSIS 3.1 which does not have information that is the same/identical to information in the relied upon probes (Ex. 1050, 2-6; Ex. 1051, 125-130)). In at least the example in which the probe request complies with 802.11 as Waxman discloses, the probe request includes an SSID parameter and requested information elements that are also identically included in the probe response payload as shown in the tables reproduced below (Table 7-14 for the Probe Request and Table 7-15 for the Probe Response). Ex. 1007, ¶¶ [0009], [0013]-[0020]; Ex. 1012, 84-85; Ex. 1002, ¶¶ 343-346.

Table 7-14—Probe Request frame body

Order	Information	Notes
1	SSID	
2	Supported rates	
3	Request information	May be included if dot11MultiDomainCapabilityEnabled is true.
4	Extended Supported Rates	The Extended Supported Rates element is present whenever there are more than eight supported rates, and it is optional otherwise.
Last	Vendor Specific	One or more vendor-specific information elements may appear in this frame. This information element follows all other information elements.

Table 7-15—Probe Response frame body

Order	Information	Notes
1	Timestamp	
2	Beacon interval	
3	Capability	
4	SSID	
5	Supported rates	
6	FH Parameter Set	The FH Parameter Set information element is present within Probe Response frames generated by STAs using FH PHYs.
7	DS Parameter Set	The DS Parameter Set information element is present within Probe Response frames generated by STAs using Clause 15, Clause 18, and Clause 19 PHYs.
8	CF Parameter Set	The CF Parameter Set information element is present only within Probe Response frames generated by APs supporting a PCF.
9	IBSS Parameter Set	The IBSS Parameter Set information element is present only within Probe Response frames generated by STAs in an IBSS.
10	Country	Included if dot11MultiDomainCapabilityEnabled or dot11SpectrumManagementRequired is true.
11	FH Parameters	FH Parameters, as specified in 7.3.2.10, may be included if dot11MultiDomainCapabilityEnabled is true.
12	FH Pattern Table	FH Pattern Table information, as specified in 7.3.2.11, may be included if dot11MultiDomainCapabilityEnabled is true.
13	Power Constraint	Shall be included if dot11SpectrumManagementRequired is true.
14	Channel Switch Announcement	May be included if dot11SpectrumManagementRequired is true.
15	Quiet	May be included if dot11SpectrumManagementRequired is true.
16	IBSS DFS	Shall be included if dot11SpectrumManagementRequired is true in an IBSS.
17	TPC Report	Shall be included if dot11SpectrumManagementRequired is true.
18	ERP Information	The ERP Information element is present within Probe Response frames generated by STAs using ERPs and is optionally present in other cases.
19	Extended Supported Rates	The Extended Supported Rates element is present whenever there are more than eight supported rates, and it is optional otherwise.
20	RSN	The RSN information element is only present within Probe Response frames generated by STAs that have dot11RSNA-Enabled set to TRUE.
21	BSS Load	The BSS Load element is present when dot11QosOptionImplemented and dot11QBSSLoadImplemented are both true.
22	EDCA Parameter Set	The EDCA Parameter Set element is present when dot11QosOptionImplemented is true.
Last-1	Vendor Specific	One or more vendor-specific information elements may appear in this frame. This information element follows all other information elements, except the Requested Information elements.
Last-n	Requested information elements	Elements requested by the Request information element of the Probe Request frame.

53. Still further, Waxman even more clearly covers the broader interpretation of this limitation, that a parameter in the probe request only has to cause something (e.g., data or just a signal) to be sent in the payload of the probe. Even if a probe response includes only an acknowledgement or approval of

requested parameters embedded in a probe response, as the Patent Owner argues, that probe response still has payload content specified based on probe request parameters. For example, a POSITA would have understood that in at least one example that indication of acknowledgement or approval would include one value indicating approval of a requested parameter and another different value if a requested parameter is not approved.

54. I have previously explained that Waxman's probe request parameters also specify the recipient of the probe response (the claimed "second node" of limitation [1A]). Waxman explains that the AP transmits the probe response to the station from which the probe request originated. See Ex. 1007, ¶¶ [0037] (different probe responses in response to probe requests transmitted by station 102 versus station 103), [0040] ("Based on the probe request [from station 102], AP 105 may transmit data to station 102 *ensuring that station 102 receives the protected transmission(s) intended to be received by station 102, whereas other stations 101 and 103 do not receive the protected transmission(s)*"), [0041], [0048]-[0049] ("the probe request may include a parameter indicating a request that the AP transmit *to the station* ... [and] a probe response may be transmitted by the AP"); Ex. 1002, ¶¶ 343-346; Ex. 1055, 128:18-23. Waxman also describes scenarios in which different 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]. In order for Waxman's system to operate such that the AP 105 sends a probe response to station 102 (and not to stations 101 and 103) as Waxman describes, the probe request would have included a parameter specifying the probe response recipient station.

3. Waxman's Probe Responses are Physical Layer Probes

55. As I previously explained, Waxman's probe responses constitute physical layer probes. Ex. 1002, ¶¶ 403-408. In doing so, I gave the term "physical layer probe" its plain and ordinary meaning.

56. Patent Owner seeks to limit the meaning of physical layer probe to "a probe that characterizes attributes of the physical layer of the communications channel" (POR, 15) while Mr. Holobinko states the meaning is "a signal or message having a form used to characterize the communication channel's physical communication layer attributes." (Ex. 2007, ¶ 58). As I explained in Section III.B, a POSITA would not have limited the plain and ordinary meaning of "physical layer probe" to the constructions advanced by Patent Owner or Mr. Holobinko, as they cover just some of the many examples provided in the '690 patent. Based on the many examples for probes generally, additional examples of physical layer probes include a signal or message that diagnoses problems with the physical layer or with the ability of nodes to communicate on the physical layer, a signal or message that tests the physical layer or the ability of nodes to communicate on the

physical layer, a signal or message that adjusts communications over the physical layer, a signal or message that replicates a problem with the physical layer, a signal or message for reaching or discovering a distant or previously undetected node using the physical layer, and/or a signal or message that assists with network admissions to the physical layer. In short, as I stated above, the “physical layer probe” is a probe (for any of the example uses given in the ’690 patent) that relates to the physical layer (as opposed to upper layers of the OSI model like the application layer). Regardless, even with Patent Owner’s limited construction, Waxman still teaches “a probe that characterizes attributes of the physical layer of the communications channel.” POR, 15.

57. As I explained above, Waxman’s probe responses characterize the communication channel between the AP and the station. In several examples in Waxman, the probe requests and probe responses are used to set transmission scheme parameters between a respective station and AP. Transmission schemes pertain to the physical layer in a network communication model, as they define the method used to transmit raw data bits over a communication channel. Ex. 1007, ¶¶ [0012] (discussing communications links over shared access medium), [0020]-[0028]. The various transmission schemes discussed in Waxman, including space-time block code, beam forming, and cyclic delay diversity, specify how data is transmitted over the physical layer. Ex. 1007, ¶¶ [0030]-[0033]. Because the

probe request and probe responses in Waxman are for establishing, maintaining, and diagnosing these transmission schemes (as opposed to diagnosing an issue with upper layers like the application layer, for example), a POSITA would have understood Waxman's probe is the claimed "physical layer probe" under the plain and ordinary meaning of that term in view of the '690 patent (which doesn't provide any narrow definition) as I discussed above. Even Mr. Holobinko acknowledged that Waxman's probe response is not related to upper layers of the OSI model. Ex. 1055, 129:8-19.

58. Waxman's probe responses constitute physical layer probes because they are probes of the physical layer of the communication channel between an AP and a station. Indeed, Waxman discusses use of its probes for extended range wireless connectivity. Ex. 1007, ¶¶ [0002], [0012], [0030]. This extended range relates to how data flows between devices, which invokes an assessment of the physical layer. Even in an example in which Waxman's probe response only has an indication acknowledging or approving a request embedded in a probe request, that probe response still acknowledges that a certain transmission scheme works over a communication channel and thus characterizes a physical layer attribute of that channel (indicates that the signal to noise ratio is sufficient). Indeed, various additional portions of Waxman describe use of probes in relation to things that affect signal quality, such as providing implicit or explicit feedback for subsequent

transmissions, or selecting a transmission scheme to improve signal to interference-plus-noise ratio. Ex. 1007, ¶¶ [0024], [0028], [0044].

59. Finally, Patent Owner misuses my earlier testimony to suggest that I gave no additional weight to the term “physical layer probe” over the term “probe.” See POR, 39-40. But this is not true. I was simply trying to explain that a POSITA would have understood Waxman’s probe response is both the claimed “probe” and claimed “physical layer probe” because it pertains to the physical layer as opposed to upper layers like the application layer (e.g., Waxman is not using the probe request and response to check the application layer). I note that the ’690 patent never mentions the term “physical layer probe” (except in some of its claims) and never mentions any physical layer attributes being characterized from the probe so there is no basis for Mr. Holobinko’s narrow definition requiring the probe to be “a signal or message having a form used to characterize the communication channel’s physical communication layer attributes.” In arguing for his construction, Mr. Holobinko only cites to one piece of additional evidence outside of the ’690 patent, which is the Grinkemeyer patent. But even the Grinkemeyer patent shows that even though Waxman just calls it a “probe response,” that probe response is a physical layer probe. Ex. 2007, ¶¶50, 56; Ex. 2003, 15:49-51 (“***Probe messages are physical layer messages*** that are used to evaluate the physical network among nodes.”) (emphasis added).

4. Waxman, Particularly In View of Zuckerman, Teaches Dependent Claims 11 and 19

60. The Patent Owner's and Mr. Holobinko's arguments that Waxman does not teach the claimed "simultaneously using OFDMA" largely overlaps with arguments made for these claims in the WiMAX grounds. POR, 28-30.

61. As explained for the same claims in the WiMAX grounds, "simultaneously" transmitted probes need only occur once and the claims lack any recitation of any feature controlling the timing of probe transmissions. The clear teachings of the combination of Waxman and Zuckerman demonstrate a result that *would have* occurred, as I explained in my first declaration. Ex. 1002, ¶ 528 ("a POSITA *would have* understood and found it obvious that Waxman's stations would have been configured to employ OFDMA, as taught by Zuckerman, and would have received probe responses simultaneously"). Patent Owner cites to a Waxman example that uses a delay period in transmitting a probe response to a station. POR, 42; Ex. 1007, ¶ [0038]. But the back-off mechanism that is used to create the delay period is just an option as Waxman clearly states. Ex. 1007, ¶ [0038] ("In some embodiments, optionally, the probe response..."); Ex. 1055, 131:6-9. Furthermore, that option would not have been used in the combination of Waxman and Zuckerman because the main reason to use OFDMA is so that messages can be sent simultaneously without having to do this type of time multiplexing. Using OFDMA, the probe responses would have been transmitted

simultaneously on different subchannels so that the APs do not have to contend with each other to transmit them to the same station. The only thing that this back-off mechanism and delay period proves is that multiple APs would have been trying to transmit multiple probe responses at the same time as I previously argued would have been the case and a POSITA would have wanted to address the issue. Ex. 1055, 130:17-132:11. In my opinion, a POSITA would not have been discouraged to apply Zuckerman's OFDMA technique to Waxman, particularly since Waxman does not even mention OFDMA in paragraph [0038] as Mr. Holobinko also acknowledged (Ex. 1055, 133:3-6). To the contrary, and as I explained at my deposition, a POSITA would have found it obvious to apply OFDMA, which is a well-known multiple access scheme, based on Waxman's disclosure of using OFDM and other multiple access schemes. Ex. 2002, 112:3-114:18; Ex. 1007, ¶ [0009]. In short, where multiple APs are trying to communicate with the same station as Waxman discloses, OFDMA would have been an obvious choice to a POSITA. Waxman does not draw any distinction between uplinks and downlinks as Mr. Holobinko admitted (Ex. 1055, 180:3-22), and any such distinction would not be relevant because the decision to use OFDMA (and other multiple access schemes) is based on whether multiple devices are trying to communicate over a shared path, which is the case for Waxman's multiple APs trying to communicate to a single station.

D. DOCSIS 2.0 (Ranging Procedure) Anticipates Independent Claims 1 and 9; DOCSIS 2.0 (Test Procedure) In View Of ISO8802-2 Renders Obvious Independent Claims 1 and 9; and Both of These Grounds in view of Zuckerman Renders Obvious Independent Claim 17

62. In this section, I address Patent Owner's and Mr. Holobinko's arguments that DOCSIS 2.0 (which is Ex. 1010) does not anticipate or render obvious the independent claims. In particular, I address their arguments that DOCSIS 2.0's UCD message and Ranging Request are not a probe request and probe, respectively. I also address their arguments that DOCSIS 2.0's Test Procedure in view of ISO8802-2 does not render obvious "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.

1. DOCSIS 2.0's Ranging is a Type of Probing

63. Patent Owner and Mr. Holobinko argue that the UCD message cannot be the claimed "probe request." Patent Owner says that "the UCD message is decoupled from the Ranging Request" and Mr. Holobinko says that "[t]he UCD does not *request* anything." POR, 49; Ex. 2007, ¶ 103. But, they both ignore that the UCD message includes a Ranging Required parameter that causes ranging to be initiated and therefore causes the Ranging Request (which I mapped to the claimed "probe") to be sent. Ex. 1010, 135-139. Only at his deposition did Mr.

Holobinko acknowledge that the Ranging Required parameter in the UCD message would cause ranging in some cases (when the parameter is a 1 or 2), and clarify that his opinions about the UCD message not being a probe request are because the UCD doesn't always trigger every ranging procedure (which of course is irrelevant). Ex. 1055, 139:8-141:17. The Ranging Required parameter from Table 8-18, which shows the channel parameters in the TLV information of the UCD message, is shown below. Ex. 1010, 139.

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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64. DOCSIS 2.0 also explains how the UCD message is linked to the Ranging Request message and how the Ranging Request message is used to determine which downstream channel the CM is on. Ex. 1010, 483 (“The UCD messages contains a Downstream Channel ID so that the CMTS can determine with the RNG-REQ message which downstream channel the CM is on.”). Based on this and the table above, a POSITA would have understood that the UCD message is a probe *request* and the Ranging Request is a probe.

65. Patent Owner and Mr. Holobinko also argue that the Ranging Request message cannot be the claimed “probe,” but this argument appears to be mostly

based on their opinion that a probe cannot be a “request.” POR, 47 (“‘Ranging Request’ could not be a ‘probe’ because it is a ‘request’”); Ex. 2007, ¶ 102 (“especially true of the Ranging *Request*”). However, there is nothing in the ’690 patent and Patent Owner has not cited any other evidence that would limit a probe in this way. As I previously explained with respect to the claim construction of “probe,” the ’690 patent uses the term “probe” broadly to encompass many types of messages and certainly does not prevent a probe from acting like a request message. I note that even the general use of the term “probe” can mean to “question,” which supports that a probe signal/message could ask for (or request) something. Ex. 1041, 6.

66. In my opinion, a POSITA would understand that many messages go back and forth and are therefore sometimes referred to as a request or response. So it is my opinion that a POSITA would not be swayed by the use of the word “request” in the Ranging Request message and would still understand that message to be the claimed “probe.” In particular, a POSITA would have understood that the Ranging Request message in DOCSIS 2.0 is a probe because it is sent for ranging, which is a type of probing for similar reasons that WiMAX ranging is a type of probing. DOCSIS 2.0 states that “[r]anging is the process of acquiring the correct timing offset such that the cable modem’s transmissions are aligned to the correct mini-slot boundary.” Ex. 1010, 197. DOCSIS 2.0 also explains that “a

cable modem MUST synchronize to the downstream and learn the upstream channel characteristics through the Upstream Channel Descriptor MAC management message” and “MUST put together either an Initial Ranging Request message or a Ranging Request message.” Ex. 1010, 197. DOCSIS 2.0 states that “[a] Ranging Request MUST be transmitted...to determine network delay and request power adjustment.” Ex. 1010, 146. After the CMTS receives the Ranging Request message, the CMTS “MUST return a Ranging Response message addressed to the individual cable modem” and the “message MUST also contain information on RF power level adjustment and offset frequency adjustment as well as any timing offset corrections.” Ex. 1010, 197. Ranging is also used for providing equalization information, which the CM uses to set equalizer coefficients in order to account for micro-reflections on the channel. Ex. 1010, 74-76 (Section 6.2.15), 16 (Micro-reflections), 310. Also, the “ranging request/response steps MUST be repeated until the response contains a Ranging Successful notification or the CMTS aborts ranging.” Ex. 1010, 198. The transmissions of the UCD message and Ranging Requests and Ranging Responses to perform the ranging procedure and adjustments are also shown in Figures 11-4 through 11-8. Ex. 1010, 246-251. Based on all of these disclosures, a POSITA would have understood that the Ranging Request message is a probe because it is probing the CMTS to diagnose the uplink channel and to send timing and power adjustments. For these

reasons, a POSITA would have considered the Ranging Request message to be the claimed “probe.” This opinion is further supported by DOCSIS 3.1 (which Patent Owner relies on for asserting infringement), which describes one of its probes (the ECT Probe) and states that “this probe is used for ranging purposes.” Ex. 1051, 130 (Section 6.4.4.2). Similarly, in another section (Section 10.5.1.2), it says “A CMTS uses upstream probes for ranging-related functions.” Ex. 1051, 440.

67. Also for the same reasons the Ranging Request is the “probe” and because the adjustments relate to timing and power, which are attributes of the physical layer, a POSITA would have considered the Ranging Request message to be the claimed “physical layer probe,” as I previously explained in my first declaration. See Ex. 1002, ¶ 622.

68. Finally, the Ranging Request message of DOCSIS 2.0 also meets the Patent Owner’s narrow definition of “probe” and “physical layer probe.” DOCSIS 2.0 explains that the Ranging Request message is measured to determine the ranging status, which means the Ranging Request characterizes the channel. Ex. 1010, 261 (Section 11.3) (“The CMTS SHOULD NOT send a ranging status of CONTINUE in a RNG-RSP to any CMs in 2.0 mode unless the *ranging parameters measured on the corresponding RNG-REQ* are insufficient for the CMTS to guarantee proper reception of all burst types available to that CM.” (emphasis added)). Further, the Ranging Request message includes the “Pending

Till Complete” parameter that would have had a zero value 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. By providing this indication, the “Pending Till Complete” parameter characterizes the communication channel, and in particular characterizes attributes of the physical communication layer because timing, power, and frequency are physical layer attributes. See Ex. 1010, 24 (describing physical-layer parameters). The Ranging Request message also includes the Downstream Channel ID parameter which is “[t]he identifier of the downstream channel on which the CM received the UCD which described this upstream.” Ex. 1010, 146-147. DOCSIS 2.0 explains that the CMTS uses the Ranging Request message to determine which downstream channel the CM is on. Ex. 1010, 483 (“The UCD messages contains a Downstream Channel ID so that the CMTS can determine with the RNG-REQ message which downstream channel the CM is on.”). Since the Downstream Channel ID parameter identifies the downstream channel it is a characteristic of that channel. The CMTS would know the frequency of the downstream channel based on this Downstream Channel ID parameter and therefore in this way the Downstream Channel ID characterizes the frequency of the channel (which is a physical layer attribute). Ex. 1010, 100 (Section 6.3.3 Downstream Frequency Plan), 172 (Section 8.3.20.1.2.1 Downstream Frequency).

2. DOCSIS 2.0's Testing is a Type of Probing

69. Patent Owner and Mr. Holobinko argue that the Test signal (which for clarity I will refer to as a Test Response herein because it is the response to the Test Request (TST-REQ) message) cannot be the claimed “probe.” The Test Response depends on the Test Request message, and in particular a Mode parameter in the Test Request message. Ex. 1010, 185. If the Mode is 0, the CM (which receives the Test Request Message) disables all test modes and reboots. Ex. 1010, 185. If the Mode is not 0, “the CM MUST begin the test mode indicated in the Mode parameter, using the channel parameters included in the TST-REQ message.” Ex. 1010, 185 (DOCSIS uses the notation “!=0” to indicate “not equal to 0”). More specifically, if the Mode is 1, the CM transmits “a continuous (non-burst) upstream signal at the commanded modulation rate, carrier frequency, and power level.” Ex. 1010, 185, 98 (which also describes the transmission of this continuous signal in the test mode). And, if the mode is 2, the CM transmits “a continuous (non-burst), unmodulated (CW) upstream signal at the commanded carrier frequency, modulation rate and power level.” Ex. 1010, 185, 96 (which also describes the transmission of this continuous signal in the test mode).

70. Because these upstream signals (which form the Test Response) are sent in response to the Test Request message (which is a MAC Management message) and using parameters set by the Test Request, a POSITA would have

understood that they are used to test the communications channel (particularly the upstream channel) between the CMTS and CM. Ex. 1010, 132-134 (showing MAC management messages), 185-186 (Table 8-22 showing that the Test Request message is setting the modulation rate, frequency, and power for the Test Response so the CMTS is testing these aspects of the channel; otherwise the Test Request message would not be commanding the Test Response to use them). In addition, a POSITA would have understood that timing is being assessed and diagnosed using the Test Response because DOCSIS 2.0 describes that, for sending the Test Response, “[t]he CM tracks the downstream symbol clock and uses it to generate the upstream symbol clock as in normal synchronous operation.” Ex. 1010, 185. A POSITA would have also understood that the test procedure is being used for assessing timing because the test mode is also described as a test mode for testing timing jitter. Ex. 1010, 97-98 (Section 6.2.21.8), 508 (“CM test mode for testing phase noise and jitter of CM carrier and symbol timing”). Similarly, a POSITA would have understood that the test procedure is being used for assessing power because the test mode is also described as a test mode for testing carrier phase noise. Ex. 1010, 96 (Section 6.2.21.5), 508 (“CM test mode for testing phase noise and jitter of CM carrier and symbol timing”). Further, as I previously explained in my first declaration (see Ex. 1002, ¶ 609), a POSITA would have understood that the upstream signal in response to the Test Request assists in diagnosing a problem

with upstream signal timing or upstream required power level. Ex. 1010, 241-242 (describing need to scan to acquire a valid downstream signal and need to re-acquire upstream timing after interruption and after other attempts at recovering such as unsuccessful ranging), 489 (describing testing of SNR), 492-493 (testing adjacent channel interference), 625, 628. For the same reasons, a POSITA would have understood that the Test Response (specifically this upstream signal) is used for assessing the timing and power of the channel and therefore used for channel assessment (or characterizes the channel as Patent Owner puts it). Given that some of the example uses for a probe according to the '690 patent include channel assessment and network diagnosis (see Ex. 1001, 2:20-27, 4:25-38), a POSITA would have understood that the Test Response is the claimed “probe.”

71. I note that my opinions above are based on the understandings of a POSITA as I have defined the POSITA in my first declaration. Ex. 1002, ¶ 118. Patent Owner and Mr. Holobinko seem to underestimate what a POSITA would have understood from DOCSIS 2.0. Their main argument is that DOCSIS 2.0 does not expressly disclose what the test procedure does. POR, 50-51; Ex. 2007, ¶¶ 105-107. They essentially argue that the Test Request is only a message that is sent by a human operator. But, their argument ignores that a POSITA would have understood that the human operator is not causing the Test Request message to be

sent for no reason and they do not address all the parts of DOCSIS 2.0 that I relied on and still rely on (e.g., Ex. 1010, 96-98, 185).

72. I see that Patent Owner also criticizes my testimony for allegedly being “based on conjecture and what *could have been possible* rather than what the prior art actually teaches.” POR, 53. Again, they are taking my testimony out of context and ignoring that my opinions have set forth what a POSITA *would have understood*. See, e.g., Ex. 1002, ¶ 609 (“More specifically, a POSITA *would have understood* that the upstream signal in response to the Test Request assists in diagnosing a problem with upstream signal timing or upstream required power level.” (emphasis added)). When I said “presumably” during the deposition, I was referring to what a POSITA *would* have understood, and not just what might be a possibility. As shown by the following snippets, this is clearer when you consider my full testimony including my explanations that my engineering experience informed my opinions about the test procedure and my explanations that when I said “diagnosing a problem with the CM” in my first declaration (see Ex. 1002, ¶ 609), I was referring to problems *with the channel for communicating* with the CM (not simply problems with the CM).

See Ex. 2002, 118:18-119:18:

18 Q. What in pages 184 and 185 of Exhibit 1010,
19 the DOCSIS 2.0 spec --

20 A. Yeah.

21 Q. -- are you relying on to support your
22 proposition that "the upstream signal sent in
23 response to the Test Request message assists in
24 diagnosing a problem with the cable modem"? [As
25 read]

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1 A. Okay. So -- well, first of all, in -- in
2 diagnosing a problem with the cable modem, basically
3 referring to communications with the cable modem.
4 So I'm not saying it's a process to say, go out and
5 buy a new cable modem, that's not what I'm
6 inferring. I'm inferring it's when the
7 communications from the cable modem to the CMTS, so
8 effectively the communications channel.

9 Q. You mean whether the communications can
10 even happen?

11 A. Or how it happens.

12 Q. Where's the how it happens in -- in the
13 spec? I don't see that.

14 A. Well, presumably, the cable modem is
15 analyzing that test signal, that's the purpose of
16 sending 1, negative 1; 1, negative 1, and presuming
17 that the -- the CMTS is analyzing that information.

18 Otherwise, why would you send it?

See Ex. 2002, 121:10-122:7:

10 Q. I'd like you to tell me how DOCSIS 2.0
11 discloses that.
12 A. Well, Table A -- Table 8-22 shows channel
13 TLV parameters, and they include modulation rate,
14 frequency, power.
15 Q. That doesn't have anything to do with
16 changing modulation rate based on something about
17 the channel or based on something about the upstream
18 signal that you call the probe; correct?
19 MR. KRONENTHAL: Objection. Form.
20 THE WITNESS: Well, I'm an engineer that
21 works with these kind of things all the time. When
22 I transmit, a one -- a negative one signal that's
23 used to analyze the channel, and clearly the channel
24 TLV parameters are specifying, those are all
25 upstream parameters that are called out. So

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1 presumably, you're making tests and doing something
2 with it.
3 If you're asking, is it explicitly
4 described, what the CMTS does or what the program
5 that the network operator might have running behind
6 the CMTS, that may not be disclosed in this table,
7 but I see it as the purpose of the test mode.

See Ex. 2002, 122:19-123:25:

19 Q. Just before our break, you had testified
20 that those upstream signals are used to analyze the
21 channel.

22 In the paragraph we're looking at, though,
23 in Paragraph 609, it says that "the upstream signal
24 assists in diagnosing a problem with the cable
25 modem." [As read]

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1 You'd agree with me that analyzing the
2 channel and diagnosing a problem with the cable
3 modem are different things; correct?

4 A. Well, when I said cable modem, I was
5 referring to cable modem communications. As I said,
6 I wasn't referring to, do you need to replace your
7 cable modem. I was referring to the communications
8 from the cable modem.

9 Q. You don't say in this Paragraph 609 that
10 the upstream signal is used to analyze the
11 communications channel; do you?

12 A. Well, again, when -- when I said
13 diagnosing a problem with the cable modem, that's --
14 that was a general reference. So it could mean
15 communications from the cable modem, it could mean
16 it -- you know, it could mean either one. But I
17 wasn't trying -- I wasn't trying to limit it to, you
18 know, literally, do you have to go out and replace
19 your cable modem.

20 I mean, maybe you do, but that's the --
21 what I was saying is that that basically is testing
22 the channel, which could be -- you know, there's
23 lots of things that could happen in the channel. So
24 that's what I was referring to when I said a problem
25 with the cable modem.

See Ex. 2002, 124:19-125:5:

19	Q. Even though you weren't parsing every
20	sentence with half an hour of analyzing, you were
21	choosing your words carefully; weren't you?
22	A. Well, I -- I still think you can read the
23	problem with the cable modem as meaning as broadly
24	talking about problems that can occur either in the
25	cable modem or in the communications channel from
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1	the cable modem. I mean, I -- I've worked in
2	DOCSIS, and we'd frequently say, hey, there --
3	there's a problem on the cable modem side. And that
4	99 percent of the time is not the cable modem
5	itself; it's something in the channel.

73. Further, I disagree with Mr. Holobinko's statement that "A POSITA would further understand that the ordered (as opposed to randomized) set of 1s and -1s is not usable for channel diagnostics or for characterizing the channel, and so they would not expect the test process to be used in that way." Ex. 2007, ¶ 107. First, this even conflicts with the '690 patent, which states that the probe may be a "square wave or other easily analyzed signal for channel estimate purposes." Ex. 1001, 9:55-58. Even Mr. Holobinko acknowledged that the Test Response is a square wave (Ex. 1055, 154:15-156:22) and therefore admitted that the Test Response is one of the probes in the patent. Second, a POSITA would have understood that the Test Response signal of alternating 1s and -1s or constant sequence of 1s is usable (and in fact is being used) for assessing the timing of the channel and diagnosing timing problems because these signals are being sent based on the upstream symbol clock that is supposed to track the downstream symbol clock as though the CM was operating in normal synchronous operation. Ex.

1010, 185, 96-98. So, if the timing of the Test Response is off (from what would have been expected in the normal operation), then the CMTS (or its operator looking at a report) would have been able to determine that the channel might have a timing problem. IEEE 802.3-2008 (Ex. 1054) shows that a test using 2s and -2s (which is the same as the DOCSIS 2.0 test using 1s and -1s but with a potentially different magnitude) is usable for characterizing a channel, and therefore shows that Mr. Holobinko's testimony is incorrect. Ex. 1054, 471 (showing that a jitter test is performed when the test mode is 2 and explaining that "When transmit test mode 2 is enabled, the PHY shall transmit the data symbol sequence $\{+2, -2\}$ repeatedly on both channels"). It also makes technical sense to send a 1, -1 pattern since the QPSK (or other) digital modulation would be stressed to its maximum. In short, Mr. Holobinko is wrong that the square wave cannot be used to characterize a channel (Ex. 1055, 156:18-22), and even the patent shows he is wrong (Ex. 1001, 9:55-58). Accordingly, a POSITA would have understood that DOCSIS 2.0's testing procedure is more than just a "basic test that simply confirms the cable modem is capable of transmitting 1s and -1s in the amplitude and phase" as Mr. Holobinko alleges (Ex. 2007, ¶ 107). If one wanted to see if the cable modem is simply operating, there are other easier methods to check the cable modem operation, without having to generate (and transmit over the channel) the Test Response signal that DOCSIS 2.0 describes.

74. Mr. Holobinko's argument (Ex. 2007, ¶ 108) that the test procedure must be manually initiated by the operator and must occur before normal operation is irrelevant and does not change my opinions because the claims do not exclude the probe request from being manually initiated or limit when it is sent. Even Mr. Holobinko acknowledged that the claims do not require any particular mode of operation. Ex. 1055, 144:11-147:14. I am relying on the testing procedure actually being performed and a POSITA would have understood that it would have been. Also, I do not agree with Mr. Holobinko's assertion that "tying up the communication channel from normal use" is a "reason a POSITA would not be motivated to use this test process as a means of characterizing the channel." Ex. 2007, ¶ 108. On the contrary, tying up the channel from normal use would have indicated to a POSITA that the test process is assessing characteristics of and diagnosing potential problems with the physical layer of the channel during that time, because if there was a problem with the physical layer, a POSITA would not want to continue using the channel. And, just because there is a drawback from using the test procedure, does not mean that a POSITA would never have used it.

75. Regarding ISO8802-2 (which DOCSIS 2.0 expressly references for use with the test procedure), the Patent Owner and Mr. Holobinko admit that it discloses a Test command to test the logical link control *transmission path* between the CMTS and CM. POR, 51; Ex. 2007, ¶ 109. Therefore, they basically

admit that the test procedure is assessing the channel which would meet their definition for the “probe” (which Patent Owner defined as “a signal or message that is used to characterize (or assess) the communications channel (or path) between the two nodes”). Nevertheless, they go on to argue that it is not the same because they say that ISO8802-2’s test procedure does not “determine characteristics of a channel.” POR, 51. So they are essentially adding in another requirement that ISO8802-2 needs to describe what specific characteristic is *determined*. Ironically, the ’690 patent does not even describe determining a specific characteristic from its probe. While Patent Owner and Mr. Holobinko basically admit that ISO8802-2 discloses the claimed “probe” as I explained above, I recognize their admissions do not extend to their definition for the “physical layer probe.” However, the fact that ISO8802-2 pertains to testing/assessing the LLC transmission path (and not only the physical layer) does not take away from DOCSIS 2.0’s teachings to use the Test Response signals to assess (and diagnose problems with) the timing and power of the channel. That is, the test procedure according to DOCSIS 2.0 would still have involved assessing and diagnosing physical attributes of the channel.

76. Similarly, the fact that UCD messages are also used for providing channel characteristics is irrelevant and does not take away from the use of the test procedure to assess the channel, so I disagree with those arguments by Patent

Owner and Mr. Holobinko as well. POR, 51-52; Ex. 2007, ¶ 110. This argument is especially tenuous considering that the UCD messages are sent in the normal mode and the test procedure is a separate mode for testing/assessing the channel, as even Mr. Holobinko admitted (Ex. 2007, ¶ 108). Thus, the Test Request and Response are not duplicative of the UCD message, as they argue to try to undercut my opinions.³ Rather, these messages are used in different modes of operation which occur at different times. Mr. Holobinko's testimony is also inconsistent because he argues that the Test Request and Test Response are sent in a test mode "before" the UCD message is sent (Ex. 2007, ¶ 108; Ex. 1055, 163:25-165:18), but also argues that the Test Response would not characterize the channel because allegedly the channel characteristics are "already" communicated to the CM in the UCD message (Ex. 2007, ¶ 110). How can the CM already have the channel characteristics from the UCD message if the UCD message is not even sent until after the test mode? His testimony makes no sense. In any event, Patent Owner and Mr. Holobinko appear to miss a key point about the test procedure, which is that it provides a human operator with a way to force a test mode so that the

³Notably, their argument is undercut by their own infringement contentions that rely on DOCSIS 3.1 which has probes in addition to the UCD message. Ex. 1051, 103-130. If their argument made sense, then the probes they rely on would not characterize the channel either because the UCD message would.

channel can be tested/assessed separate from the channel assessments that would be performed during normal/usual operations (e.g., ranging). Ex. 1010, 184.

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

77. I understand that the Board's institution decision found that part of limitation [1A] ("wherein the first plurality of parameters at least specify content payload of the probe") was not shown to be in DOCSIS 2.0's test procedure. I note that Patent Owner only briefly mentions this (POR, 54) and Mr. Holobinko does not address it at all. However, I note that both Patent Owner and Mr. Holobinko both acknowledge (POR, 51; Ex. 2007, ¶ 109; Ex. 1055, 168:20-169:12) that ISO8802-2 discloses the Test response having an information field that is identical to an information field in the Test command. Ex. 1011, 53. As I explained in paragraphs 580 and 585-586 of my first declaration, in view of this disclosure of ISO8802-2 which DOCSIS expressly directs the POSITA to use for the Test Response (see Ex. 1010, 28), the Mode and channel parameters from the Test Request message in DOCSIS 2.0 would have been included in an information field (which is part of the payload) of the Test Response. Ex. 1055, 166:23-168:3 (confirming that the Test Request information includes the mode and channel parameters). Taking DOCSIS 2.0 and ISO8802-2 together, a POSITA would have understood that the Test Response includes at least one of the upstream signals (depending on the Mode) in DOCSIS 2.0 and the test response in ISO8802-2.

Because DOCSIS 2.0 taken together with ISO8802-2 discloses that the Mode and channel parameters would be carried over from the Test Request and put into the information field (payload) of the Test Response, it is my opinion that this meets the narrowest possible reading of “wherein the first plurality of parameters at least specify content payload of the probe” in limitation [1A].

78. If this identity aspect is not considered a requirement (which is what I understand Patent Owner’s position to be based on their infringement contentions relying on a P-MAP from DOCSIS 3.1 which does not have information that is placed into the relied upon probes (Ex. 1050, 2-6; Ex. 1051, 125-130), then this part of limitation [1A] is also met because the Mode parameter specifies whether the Test Response signal includes alternating 1s and -1s (if the Mode parameter is equal to 1) or a constant sequence of 1s (if the Mode parameter is equal to 2), as I also previously explained in my first declaration (see Ex. 1002, ¶ 580). Ex. 1010, 185. A POSITA would have understood that the alternating 1s and -1s or constant sequence of 1s is in the payload of the Test Response at least because it is not described as being in any header. Ex. 1010, 185.

E. DOCSIS 2.0 (Ranging Procedure) In View Of Zuckerman and DOCSIS 2.0 (Test Procedure) In View Of ISO8802-2 and Zuckerman Renders Obvious Dependent Claims 10, 11, 18, and 19

79. In this section, I explain how using OFDMA with DOCSIS-2.0 (with or without ISO8802-2) would have been obvious in view of Zuckerman. Patent

Owner and Mr. Holobinko argue that DOCSIS-2.0 and ISO8802-2 fail to anticipate or render obvious claims 10-11 and 18-19. POR, 54-57; Ex. 2007, ¶¶ 112-115. However, they both ignore that Zuckerman was additionally relied on for these claims, and particularly because Zuckerman shows it would have been obvious to implement a DOCSIS system with OFDMA. They only mention Zuckerman at the end and never discuss Zuckerman or address how it supports my opinions that using OFDMA would have been obvious. POR, 54-57; Ex. 2007, ¶ 115 (only mentioning Zuckerman at the very end of his declaration).

80. As I previously explained, Zuckerman acknowledges that “[c]able modems mostly use the DOCSIS standards for transferring data in parallel with dedicated CATV channels, which transfer the video channels over coax cables.” Ex. 1016, ¶ [0005]. This reference to DOCSIS would have been understood by a POSITA to be a reference to DOCSIS 2.0 given that Zuckerman was filed in 2006 (with priority to 2005) and DOCSIS 2.0 was initially released in 2001. Zuckerman explains that “[v]arious modulations can be used to carry the data over the coax.” Ex. 1016, ¶ [0005]. Zuckerman then goes on to expound on the advantages of OFDMA. Ex. 1016, ¶¶ [0006]-[0008], [0049], [0134], [0141]. And Zuckerman describes using OFDMA for both cable and wireless connections. Ex. 1016, ¶¶ [0015], [0041], [0048]-[0051], [0053]-[0054], [0058]-[0065], [0071]-[0072], [0076] (“the combination of OFDMA over coax introduces the unexpected result

of solving the problem of thermal noise buildup up to a predefined number of users.”), [0110]. In short and as I previously explained (see Ex. 1002, ¶ 667), based on Zuckerman’s teachings, a POSITA would have been motivated to implement the cable network of DOCSIS 2.0 to use OFDMA (and therefore send the ranging and test procedure messages using OFDMA) because OFDMA enables simultaneous access to the cable network by multiple users and supports high rate applications by using subcarriers to provide a high spectral efficiency, while reducing signal impairments from interference. Ex. 1016, ¶¶ [0006]-[0008], [0036], [0049]-[0052], [0076] (“OFDMA over coax introduces the unexpected result of solving the problem of thermal noise buildup up to a predefined number of users.”). A POSITA would have wanted to leverage these advantages in the cable network of DOCSIS 2.0 in which many users are accessing the network simultaneously and for receiving or sending voice and video data that benefit from high data rates. A POSITA would have also been motivated to use OFDMA in the DOCSIS 2.0 system because DOCSIS 2.0 itself describes using other multiple access schemes like TDMA, CDMA, and S-CDMA). Ex. 1010, 441-442, 113.

81. Instead of addressing my opinions based on Zuckerman, the Patent Owner and Mr. Holobinko just argue against DOCSIS 2.0 and seemingly give little, if any, consideration to the POSITA’s knowledge about OFDMA. However, as I previously explained, OFDMA was well known in the industry well before the

'690 patent's earliest priority date and the option and advantages of using OFDMA for DOCSIS 2.0 would have been understood. Ex. 1002, ¶¶ 665-666. It just wasn't implemented in DOCSIS 2.0 because of the greater processing requirements and associated costs, but the market was moving in the direction of those costs being worth the advantages. Ex. 1002, ¶ 665. This is also supported by Mr. Holobinko's testimony that "significant" expenses and complexity were reasons that another multiple access scheme, SCDMA, was not implemented in DOCSIS 2.0 even though it was well-known. Ex. 1055, 19:21-22:4. I also previously explained that a POSITA would have found it obvious (e.g., would have been motivated) to use OFDMA with a DOCSIS 2.0 system and would have had no problems successfully implementing it to achieve a practical and expected result because they are compatible. Ex. 1016, ¶¶ [0015], [0038]-[0039], [0052], [0065], [0075]. This is also evidenced by WiMAX (which was developed by borrowing much of the MAC layer from the DOCSIS standard) using OFDMA, as well as by DOCSIS 3.1 eventually implementing OFDMA. Thus, I disagree with Mr. Holobinko's assertion that "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." Ex. 2007, ¶ 113. I also note that although DOCSIS 3.1 was released after the earliest priority date of the '690 patent, it can take years for a standard

such as DOCSIS to be developed and released. I have personally designed and brought to market several products compliant with progressive releases of both DOCSIS and WiMAX. During this time period, I also actively participated in many relevant IEEE 802 standards committee meetings. I can say that OFDM / OFDMA was always on the radar to be adopted into DOCSIS, as it finally was with the release of DOCSIS version 3.1.

82. Further, in my first declaration (see Ex. 1002, ¶ 667), I stated that “OFDMA would have been useful in improving performance at the frequency bands used in the DOCSIS 2.0 system (e.g., 5-1000 MHz), although a POSITA would have understood that OFDMA works well for other frequency bands too. Ex. 1010, 15 (Radio Frequency definition).” Mr. Holobinko does not directly address my statement, but argues that the low portion of the RF spectrum is noisy. Ex. 2007, ¶ 114. While it is true that the RF spectrum at lower frequencies (like 5 MHz to 42 MHz) is noisy, this is an issue regardless of the chosen modulation. The lower frequency does not specifically deter a POSITA from using OFDMA (or make it not practical to use OFDMA), although a POSITA would have understood that OFDMA is more advantageous at higher frequencies. In other words, Mr. Holobinko’s point about noise does not negate the fact that OFDMA still operates in the 5 to 42 MHz frequency region primarily used for the uplink in DOCSIS 2.0. In fact, Zuckerman discloses using OFDMA “in the case of CATV coaxial line,

[for] uplink frequencies in the range of 5-65 Mhz,” which a POSITA would have clearly understood is a reference to DOCSIS 2.0. Ex. 1016, ¶¶ [0071], [0047]-[0049], [0066]; Ex. 1010, 1 (DOCSIS 2.0 explaining that it “supports upstream in the 5-65 MHz region”). Also, for the downlink, Zuckerman discloses using OFDMA for “RF frequencies in the range of 45-1000 Mhz in the case of CATV coaxial line,” which again corresponds to the frequency range in DOCSIS 2.0. Ex. 1016, ¶[0066]; Ex. 1010, 19 (Radio Frequency definition).

83. Finally, Mr. Holobinko suggests (Ex. 2007, ¶ 114) that OFDMA did not become viable until DOCSIS 3.1 moved to using higher frequencies, but this is backwards. They moved to higher frequencies because they eventually wanted to take advantage of OFDMA. In any event, when implementing DOCSIS 2.0 with OFDMA, a POSITA would have been motivated to use higher frequencies (because of the reduced noise and advantages of using OFDMA) and would have been able to successfully implement the system at the higher frequencies. I never intended the combination of DOCSIS 2.0 and Zuckerman to be limited to any particular frequency range. Even DOCSIS 2.0 recognizes that different cable spectrum practices can be adopted for different networks. Ex. 1010, 1. DOCSIS 2.0 even discusses that a different frequency range (5-65 MHz) is used in Europe and states that the “physical-layer technologies allow operators some flexibility within any frequency planning.” Ex. 1010, 1.

V. CONCLUSION

84. All of the statements made in this declaration of my own knowledge are true. All statements made based on information and belief are believed to be true. Further, these statements are made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under § 1001 of Title 18 of the United States Code.

Date: 2-28-2025


James G. Bertonis