

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 No.: IPR2024-00430

Patent No. 8,284,690 B2

Before JON M. JURGOVAN, FREDERICK C. LANEY, AND AARON W. MOORE,
Administrative Patent Judges.

Petitioner's Demonstrative Exhibit

Roadmap

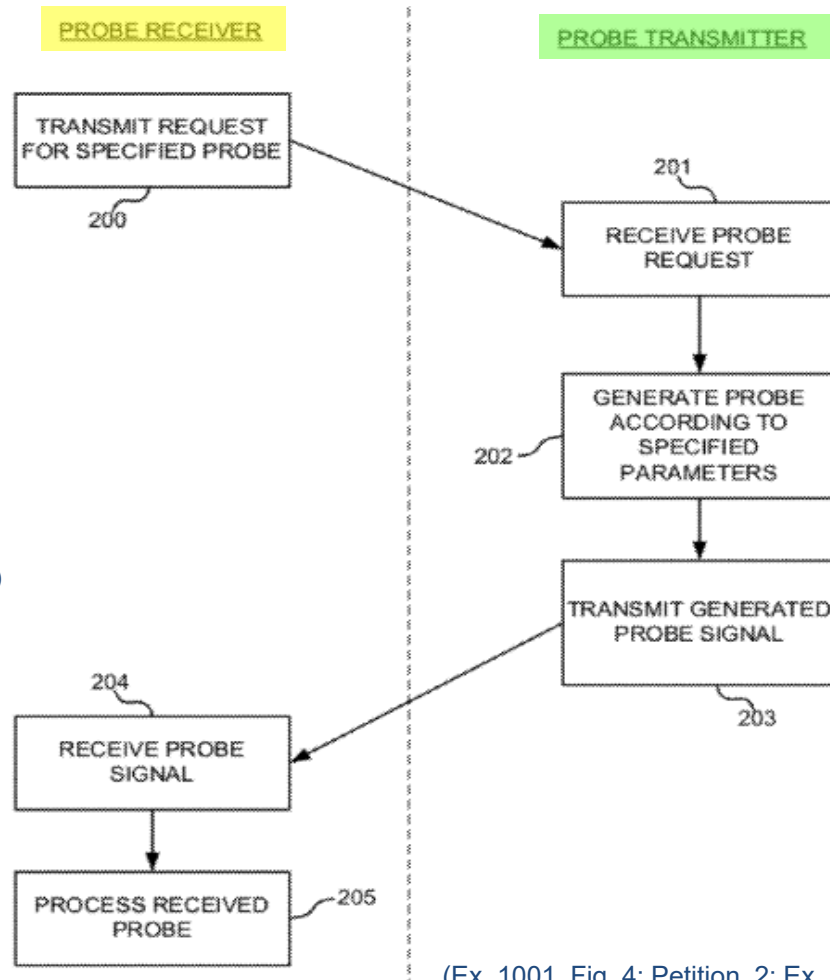
- Overview of the '690 Patent
- Instituted Grounds
- Claim Construction
- Grounds A and B: WiMAX
- Grounds D and E: Waxman
- Ground G: Waxman in view of Zuckerman
- Ground J: DOCSIS 2.0 Ranging
- Ground K: DOCSIS 2.0 Testing
- Ground L: DOCSIS 2.0 Ranging in view of Zuckerman
- Ground M: DOCSIS 2.0 Testing in view of Zuckerman

Overview of the '690 Patent

The patent is directed to a “Receiver Determined Probe”

A probe request (from the receiver) dictates a form of the probe (sent back from the transmitter).

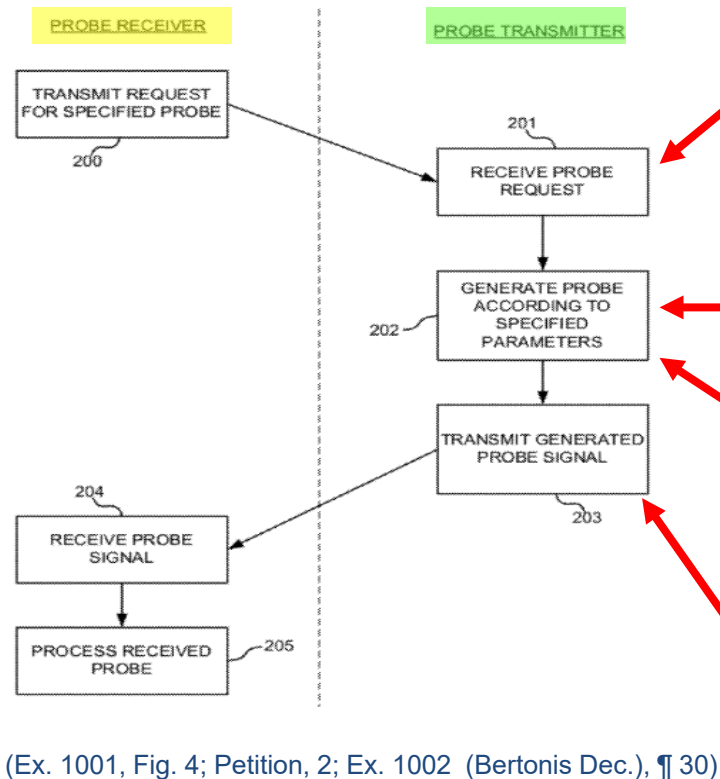
(Ex. 1002 (Bertonis Dec.), ¶¶28-30; Petition, 1-2)



(Ex. 1001, Fig. 4; Petition, 2; Ex. 1002 (Bertonis Dec.), ¶30)

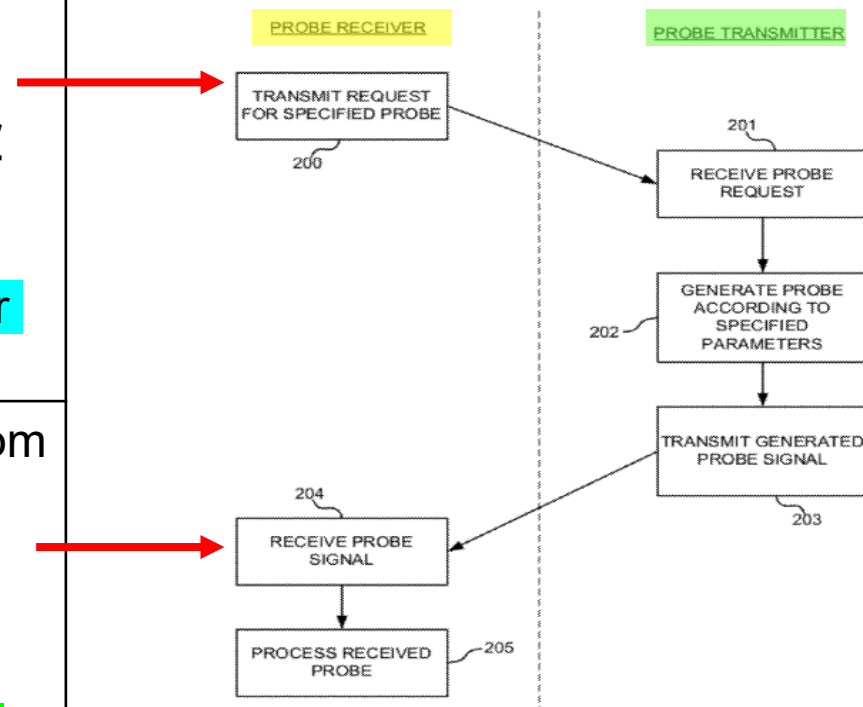
Independent Claim 1

[1PRE]	A method comprising:
[1A]	a) receiving in a first node , a probe request specifying a first plurality of parameters associated with the generation and transmission of a probe, wherein the first plurality of parameters at least specify content payload of the probe and a second node ;
[1B]	b) determining a second plurality of parameters associated with generation and transmission of the probe;
[1C]	c) generating the probe in accordance with the first plurality of parameters and the second plurality of parameters, wherein the probe has a form dictated by the first plurality of parameters ; and
[1D]	d) transmitting the probe from the first node to the second node . (Petition, 103)



Independent Claim 9

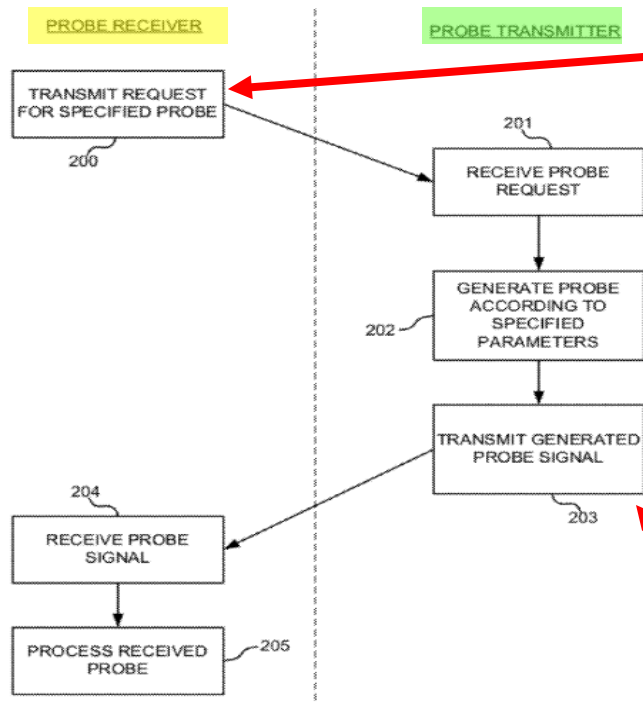
[9PRE]	A method comprising:
[9A]	a) a first node transmitting a probe request to a second node , the probe request specifying a first plurality of probe parameters for a physical layer probe , the first plurality of probe parameters comprising a form for the probe including a modulation profile for the probe ;
[9B]	b) the first node receiving the probe from the second node , wherein the probe is generated in accordance with the first plurality of parameters and in accordance with a second plurality of parameters determined by the second node .



(Ex. 1001, Fig. 4; Petition, 2; Ex. 1002 (Bertonis Dec.), ¶ 30)

Independent Claim 17

[17PRE]	A system, comprising:
[17A]	a) a first node on a communications network, the first node comprising a first processor and a first computer executable program code embodied on a first a computer readable medium, the first computer executable program code configured to transmit a probe request to a second node , on the communications network, the probe request specifying a first plurality of probe parameters for a physical layer probe , wherein the first plurality of probe parameters comprising at least a payload content for the probe and a modulation profile for the probe; and;
[17B]	b) the second node on the communications network, the second node comprising a second processor and a second computer executable program code embodied on a second computer readable medium, the second executable program code configured to:
[17C]	receive the probe request;
[17D]	determine a second plurality of parameters associated with generation and transmission of the probe;
[17E]	generate the probe in accordance with the first plurality of parameters and the second plurality of parameters, wherein the probe has a form dictated by the first plurality of parameters ; and
[17F]	transmit the probe to the first node .



(Petition, 105-106)

(Ex. 1001, Fig. 4; Petition, 2; Ex. 1002 (Bertonis Dec.), ¶ 30)

Prosecution History of the '690 Patent

- Allowance after one non-final Office Action (Ex. 1002 (Bertonis Dec.), ¶¶33-37; Petition, 2-3)
- Amendment prior to allowance:
 1. (Currently Amended) A method comprising:
 - a) receiving in a first node, a probe request specifying a first plurality of parameters associated with the generation and transmission of a probe, wherein the first plurality of parameters at least specify including the content of a content payload of the probe and a second node;
 - b) determining a second plurality of parameters associated with generation and transmission of the probe;
 - c) generating the probe in accordance with the first plurality of parameters and the second plurality of parameters, wherein the probe has a form dictated by the first plurality of parameters; and
 - [[b]] d) transmitting the probe from the first node to [[a]] the second node the probe having a form dictated by the parameters specified by the probe request.
(Ex. 1003, 125; Ex. 1002 (Bertonis Dec.), ¶35; Petition, 2-3)
- Argument prior to allowance:
 - Borran is silent regarding the limitations of “**a probe request** specifying a first plurality of parameters associated with the generation and transmission of a probe” and “**determining a second plurality of parameters** associated with generation and transmission of [a] probe” as well as “generating [a] probe in accordance with [a] first plurality of parameters and [a] second plurality of parameters, wherein the probe has a form dictated by the first plurality of parameters” as recited in claim 1. Ex. 1003, 131 (emphasis in the original). (Ex. 1002 (Bertonis Dec.), ¶36; Petition, 2-3)

Roadmap

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- **Instituted Grounds**
- Claim Construction
- Grounds A and B: WiMAX
- Grounds D and E: Waxman
- Ground G: Waxman in view of Zuckerman
- Ground J: DOCSIS 2.0 Ranging
- Ground K: DOCSIS 2.0 Testing
- Ground L: DOCSIS 2.0 Ranging in view of Zuckerman
- Ground M: DOCSIS 2.0 Testing in view of Zuckerman

WiMAX Grounds

Entropic's arguments:

- 1) Ranging Response does not meet its constructions for “probe” or “physical layer probe”
- 2) The Ranging Response's Basic CID is not specified by the Ranging Request

(Reply, 5-13; POR, 15-28; Sur-Reply, 15-18)

- 1) POR argued not inherent (even though Petitioner never said it was) and Sur-Reply argued that reasons simultaneous transmission might happen are not enough

(Reply, 14-15; POR, 28-30; Sur-Reply, 18-19)

None

(Reply, 15; POR, 30)

Ground	References	Basis	Claims Challenged
A	IEEE-802.16	§102	1-7, 9-10, 14-15
B	IEEE-802.16	§103	3-5, 8, 11-13, 16-24
C	IEEE-802.16 and Won	§103	8, 16, 24

(Petition, 4)

Waxman Grounds

Entropic's arguments:

- 1) Waxman's probe response does not meet its construction for "probe" or "physical layer probe"
- 2) Waxman's probe request does not "specify content payload" of the probe response
- 3) Waxman's probe request does not "specify...a second node" (although Sur-Reply does not contest feature is obvious)

(Reply, 15-20; POR, 30-41; Sur-Reply, 20-21)

- 1) POR attacked Waxman alone and Sur-Reply is silent

(Reply, 20-21; POR, 41-43; see *generally* Sur-Reply)

None

(Reply, 20; POR, 41)

Ground	References	Basis	Claims Challenged
D	Waxman	§102	1, 11, 14-19, 22-24
E	Waxman	§103	1, 11, 14-19, 22-24
F	Waxman and Giesberts	§103	3-5, 12-13, 20-21
G	Waxman and Zuckerman	§103	5, 10, 11, 18-19
H	Waxman, Giesberts, and Zuckerman	§103	5
I	Waxman and Won	§103	7-8, 15-16, 23-24

(Petition, 4)

DOCSIS Ranging Grounds

Entropic's arguments:

- 1) Ranging Request does not meet its construction for “probe” or “physical layer probe”

(Reply, 21-24; POR, 46-49; Sur-Reply, 21-23)

- 1) POR argued not obvious to use OFDMA for DOCSIS 2.0 and ignored Zuckerman for claims 10-11; Sur-Reply is silent

(Reply, 27; POR, 55-57; *see generally* Sur-Reply)

Ground	References	Basis	Claims Challenged
J	DOCSIS-2.0	§102	1-2, 6-7, 9, 14-15
K	DOCSIS-2.0 and ISO8802-2	§103	1-2, 6-7, 9, 14-15
L	DOCSIS-2.0 and Zuckerman	§103	8, 10-11, 16-19, 22-24

(Petition, 4)

DOCSIS Testing Grounds

Entropic's arguments:

- 1) Test Response does not meet its construction for “physical layer probe” (it is unclear if Entropic still disputes that the Test Response is not a “probe”)
- 2) POR only agreed with Board’s preliminary decision that Test Request does not “specify content payload” of the Test Response; Sur-Reply is silent

(Reply, 24-26; POR, 50-54; See Sur-Reply, 23-24 (arguing only “physical layer probe” in claim 9))

Ground	References	Basis	Claims Challenged
K	DOCSIS-2.0 and ISO8802-2	§103	1-2, 6-7, 9, 14-15
L	DOCSIS-2.0 and Zuckerman	§103	8, 10-11, 16-19, 22-24
M	DOCSIS-2.0, ISO8802-2, and Zuckerman	§103	8, 10-11, 16-19, 22-24

(Petition, 4)

- 1) POR argued not obvious to use OFDMA for DOCSIS 2.0 and ignored Zuckerman for claims 10-11; Sur-Reply is silent

(Reply, 27; POR, 55-57; *see generally* Sur-Reply)

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“Probe” should not be limited to Entropic’s narrow construction

- Entropic’s inconsistent statements highlight why Entropic’s claim constructions are overly narrow and should be rejected (Reply, 1-4)
- In the Charter litigation, Entropic argued against Charter’s construction that the Court adopted: (Reply, 1)
 - Charter court’s construction:

“probe” (’690 Patent, Claims 1, 7, 8, 9, 11)	“a signal transmitted to a network node that the network node can compare to a reference signal having a known form in order to determine characteristics of the channel on which the signal was transmitted”
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(Ex. 1005 (Charter Litigation), 104; POR, 9)

Entropic's Inconsistent Arguments From The Charter Litigation

- Entropic argued against the Charter court's construction: (Reply, 1-2)

Additionally, Charter's proposed construction imposes on "probe" a lengthy requirement of a specific function, in clear violation of the rule against importing the specification into the claim. See e.g. *Teleflex, Inc. v. Ficosa North America Corp.*, 299 F.3d 1313, 1324 (Fed. Cir. 2002).

(Ex. 1037 (Entropic's Opening Brief), 18; Reply, 1)

The specification describes how the receiver determined probes may be used in a variety of applications, and identifies several exemplary embodiments. See '690 Patent, 2:20-27, 6:59-7:11. Not only are these clearly characterized as exemplary embodiments; there is no indication that these embodiments require comparing with a "reference packet." Notably, the term "reference packet" appears nowhere in the specification. Entropic awaits Charter's explanation for its construction of this phrase to more meaningfully address it, if necessary.

(Ex. 1037 (Entropic's Opening Brief), 19; Reply, 1)

Charter also relies on the '690 Patent's description of prior art probes. See '690 Patent, 1:52-57. But these probes are criticized as limited and inflexible. *Id.* at 1:60-62. No POSITA would rely upon this discussion to limit the meaning of "probe" in the invention.

(Ex. 1038 (Entropic's Reply Brief), 6; Reply, 1-2)

Entropic's Changing Construction For "Probe"

- In the related litigation, Entropic initially proposed to use the Charter court's construction (Reply, 2; Ex. 1039 (Entropic's Proposed Constructions))
- Subsequently, the parties agreed to instead use plain and ordinary meaning (Reply, 2; Ex. 2001 (Joint Claim Construction Statement))
- Accordingly, Comcast's Petition asserts plain and ordinary meaning should apply (Petition, 6; Reply, 3)
- In the POPR, Entropic pulled a 180° and argued for the Charter court's construction (Reply, 2; POPR, 11-13)
- In the POR, Entropic dropped the Charter court's construction and presented new constructions (next slide) (Reply, 2)

“Probe” should not be limited to Entropic’s narrow construction

- Entropic’s narrow POR constructions: (Reply, 2)
 - (1) “a signal or message that **is used to** characterize (or assess) the communications channel (or path) between the two nodes” (POR, 11)
 - (2) “a signal or message that characterizes the channel” (POR, 13)
- These are directed to just one of the many examples of the “probe” in the ’690 patent (Reply, 3)

The presently disclosed method and apparatus relates generally to communication networks, and more particularly, some embodiments relate to channel assessment probes.

(Ex. 1001, 1:12-14; Reply, 3; Ex. 1036 (Bertonis Reply Dec.), ¶ 9)

In various embodiments, 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.

(Ex. 1001, 2:20-27; Reply, 3; Ex. 1036 (Bertonis Reply Dec.), ¶9)

- Entropic’s only alleged support for its narrow constructions is a few unrelated patents, which are far outweighed by the intrinsic evidence and Petitioner’s extrinsic evidence

(Reply, 3-4; Ex. 1036 (Bertonis Reply Dec.), ¶¶6-12 (citing Exs. 1042-1044))

“Probe” should be given its plain and ordinary meaning to cover the various example probes

- The '690 patent provides many example uses for probes but does not require any particular use or require any particular parameter in the

probe: (Reply 3; Ex. 1036 (Bertonis Dec.), ¶16)

- Reaching/Discovering nodes
- Network diagnosis
- Network maintenance
- Replicating a problem
- Assisting with modulation schemes

In many embodiments, network probes are used to perform various channel assessment or network maintenance procedures. For example, in a wired network, network node mobility may be fairly low and new nodes joining the network may be a relatively rare occurrence. In contrast to highly dynamic networks, such as wireless networks, wired networks are more stable, i.e., the channel conditions do not change frequently. In stable networks probing can be used to profile the channel conditions without introducing unacceptable network overhead. However, even with more dynamic networks, network probes can be used to diagnose problems. 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.

(Ex. 1001, 4:25-38; Reply, 3; Ex. 1036 (Bertonis Reply Dec.), ¶19)

- The Board’s Institution Decision likewise recognized the many probes in the '690 patent:

We question whether all of the different types of probes mentioned and claimed in the '690 patent would require comparison with a reference signal. See, e.g., Ex. 1001, 2:7–19. However, this is a matter best resolved, if necessary, on a full record at trial.

(Institution Decision, 15)

“Probe” should include ranging messages

- Even the probe Entropic alleges for infringement is used for ranging:

(Reply 3; Ex. 1036 (Bertonis Dec.), ¶¶19, 21, 52, 66, 78)

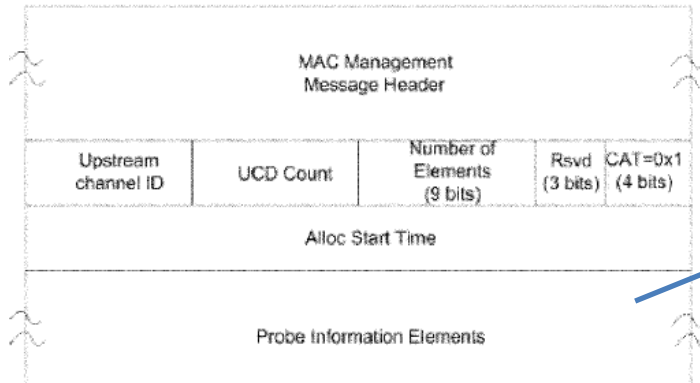


Figure 39 - Version 5 MAP Format for probe frames (P-MAPs)

Subc Skip/ECT	3 bits	If St bit =1, this field represents the Subcarrier Skipping to be used. If St=0 and PW=0, this field represents the ECT Control. Subcarrier Skipping is the number of subcarriers to be skipped between successive pilots in the probe. A value of zero implies no skipping of subcarriers and that all non-excluded subcarriers are used for probing. For staggered patterns, Subc Skip performs an additional function. (Subc Skip + 1) is the total number of symbols for which the staggered P-IE allocation applies. ECT control is used on FDX channels and defines whether a probe is used for ECT purposes (ECT Probe) or is to be used for ranging purposes (probe or non-ECT probe). 0= probe used for ranging purposes 1=probe used for Echo Cancellation Training (ECT probe) 2=reserved for future use
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10.5.1.2 Upstream Probes and RxMER Measurements

A CMTS uses upstream probes for ranging-related functions such as determining transmit pre-equalizer coefficients [DOCSIS PHYv3.1]. A CMTS also has the option of using an upstream probe to take an RxMER measurement. To do this, the CMTS grants P-IEs in a P-MAP message (Section 6.4.4) with the “MER” bit set. When the CMTS receives the probe transmission corresponding to such a grant, it performs the RxMER measurement and uses the results to populate the MIB object [DOCSIS OSSv3.1].

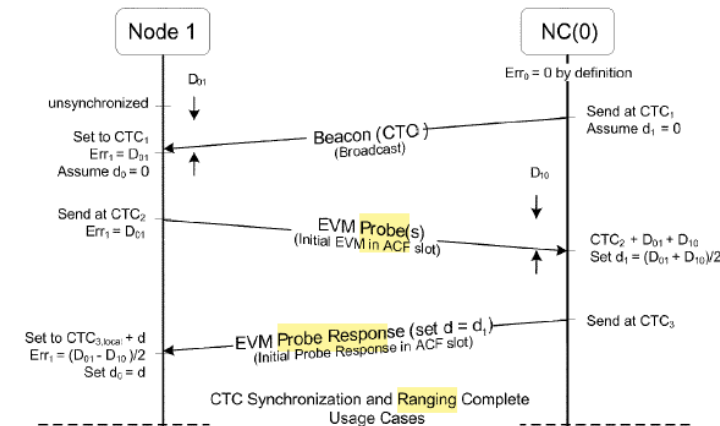
(Ex. 1051 (Entropic’s Infringement Evidence), 126-127, 130, 440; Reply, 6, 22, 23, 25, 26; Ex. 1036 (Bertonis Reply Dec.), ¶¶19, 21, 52, 66, 78)

- Another Entropic patent app. (Ex. 1045) describes a ranging method using probes:

(Reply 6; Ex. 1036 (Bertonis Reply Dec.), ¶21)

[0059] Depending on the embodiment utilized in a MoCA network, the synchronization and ranging operations illustrated in FIGS. 7 through 11 may be performed as part of only the EVM function, only the Beacon period, or as part of both. When the synchronization and ranging operations in accordance with this disclosure are implemented as only part of the EVM function, there are minimal changes needed to the MAC protocol in that only the EVM Probe response of the EVM function would require a delay field to transport the estimated propagation delay. FIG. 10 is diagram similar to FIG. 9 illustrating usage cases after a CTC synchronization and ranging is complete during an EVM function.

(Ex. 1045, [0059])



(Ex. 1045, Fig. 10)

“Probe” should not be limited to Entropic’s narrow construction

- Entropic’s own expert (Mr. Holobinko) even objects to Entropic’s constructions: (Reply, 2)

Q. What if we removed the words "having a form" from your definition in paragraph 47; would you agree with that definition?

MR. BLAIR: Object to the form.

THE WITNESS: Yes. I would object to removing the word "form."

(Ex. 1055 (Holobinko Dep. Tr.), 88:12-17; Reply, 2)

Q. So in your view, those words "having a form" are important to the definition of "probe"?

A. Yes.

(Ex. 1055 (Holobinko Dep. Tr.), 89:6-8; Reply, 2)

- Mr. Holobinko used a different construction: “a particular kind of signal or message having a form used to characterize the communication channel between the two nodes” (Ex. 2007 (Holobinko Dec.), ¶147; Reply, 2)

“Physical layer probe” also should not be limited to Entropic’s narrow construction

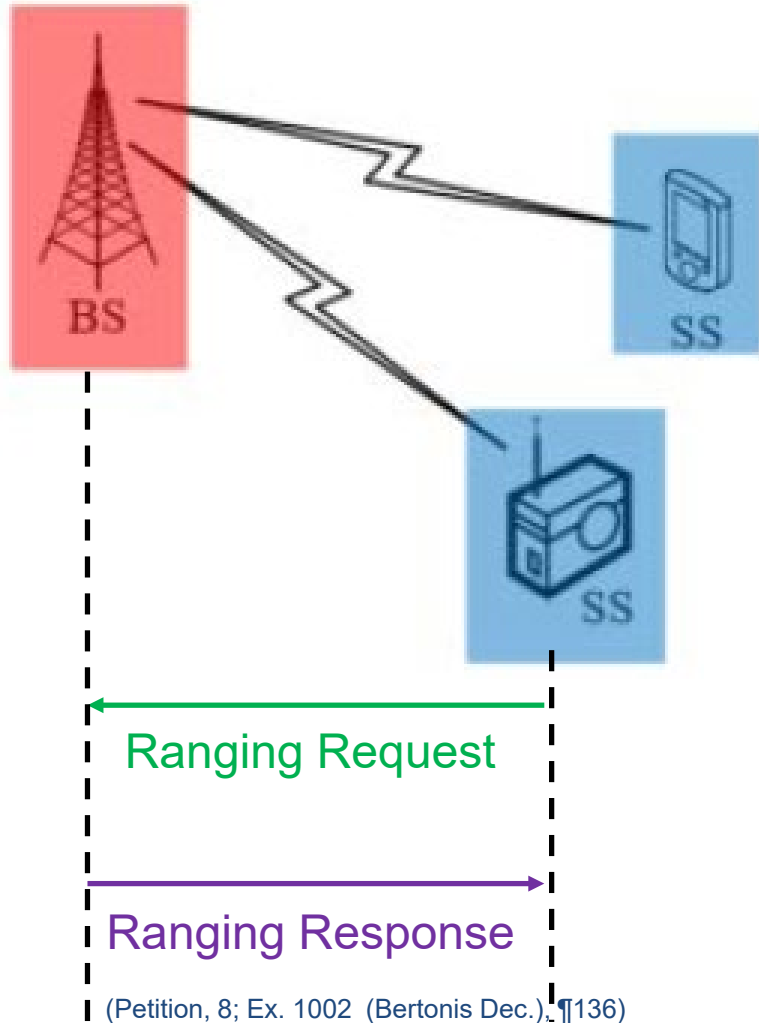
- Entropic’s “physical layer probe” construction: a probe that characterizes attributes of the physical layer of the communications channel (POR, 14-15)
- Entropic’s construction for “physical layer probe” is overly narrow for the same reasons that its construction for “probe” is overly narrow. (Reply, 4; Ex. 1036 (Bertonis Reply Dec.), ¶13)
- Physical layer probe should be treated as a probe (giving “probe” its plain meaning in view of the examples in the specification) relating to the physical layer (as opposed to higher layers, such as the application layer).

(Reply, 4; Ex. 1036 (Bertonis Reply Dec.), ¶14)

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WiMAX's Ranging Request and Ranging Response are the “Probe Request” and “Probe”



- The **Ranging Request** (“probe request”) and **Ranging Response** (“probe”) are used to acquire correct transmission parameters and maintain the RF link’s quality.

(Petition, 7-8; Ex. 1002 (Bertonis Dec.), ¶¶133-134)

Ranging is a collection of processes by which the SS and BS maintain the quality of the RF communication link between them. Distinct processes are used for managing uplink and downlink. Also some PHY modes

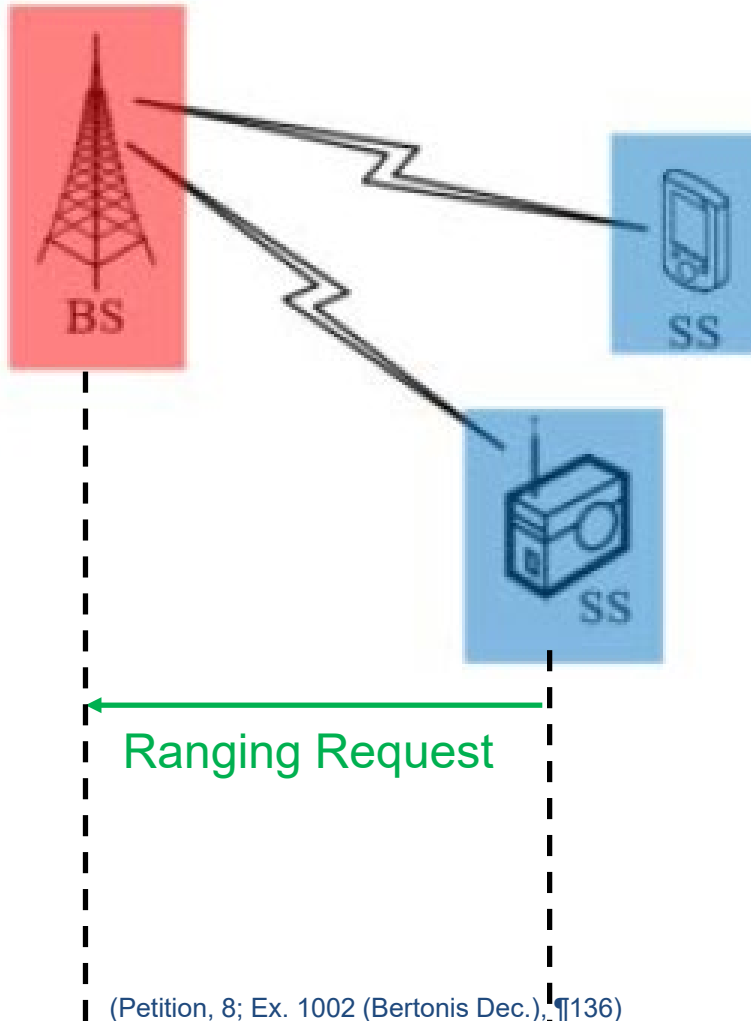
(Ex. 1013 (WiMAX), 199; Petition, 7-8; Ex. 1002 (Bertonis Dec.), ¶¶133-134)

Uplink ranging consists of two procedures—initial ranging and periodic ranging. 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 (WiMAX), 202; Petition, 7-8; Ex. 1002 (Bertonis Dec.), ¶¶133-134)

(Petition, 8; Ex. 1002 (Bertonis Dec.), ¶136)

WiMAX's Ranging Request is the “Probe Request”



- The **Ranging Request (RNG-REQ)** is used to determine network delay and request power and/or downlink burst profile change.

(Petition, 8; Ex. 1002 (Bertonis Dec.), ¶137)

6.3.2.3.5 Ranging request (RNG-REQ) message

An 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**. The format of the RNG-REQ message is shown in Table 19. The RNG-REQ message may be sent in Initial Ranging and data grant intervals.

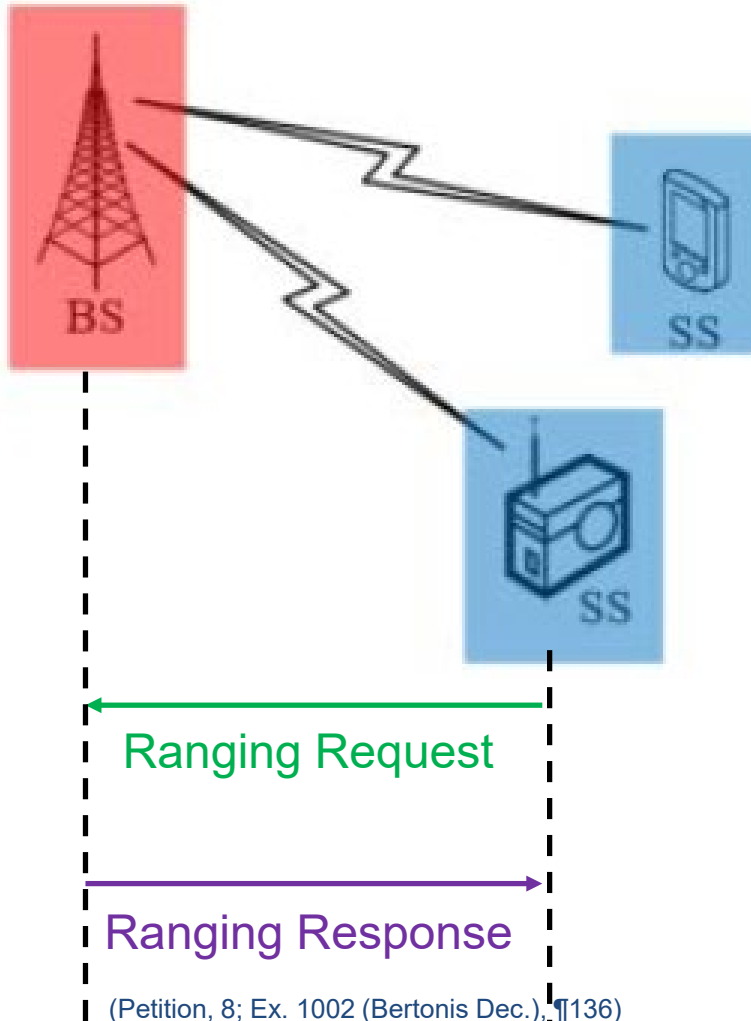
Table 19—RNG-REQ message format

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

(Ex. 1013 (WiMAX), 49; Petition, 8; Ex. 1002 (Bertonis Dec.), ¶137)

WiMAX's Ranging Response is the “Probe”

- The Ranging Response (RNG-RSP) is responsive to the Ranging Request (RNG-REQ) and used to provide a Ranging Status and send corrections (e.g., time and power). (Petition, 16-18; Ex. 1002 (Bertonis Dec.), ¶¶152-153)



(Petition, 8; Ex. 1002 (Bertonis Dec.), ¶136)

6.3.2.3.6 Ranging response (RNG-RSP) message

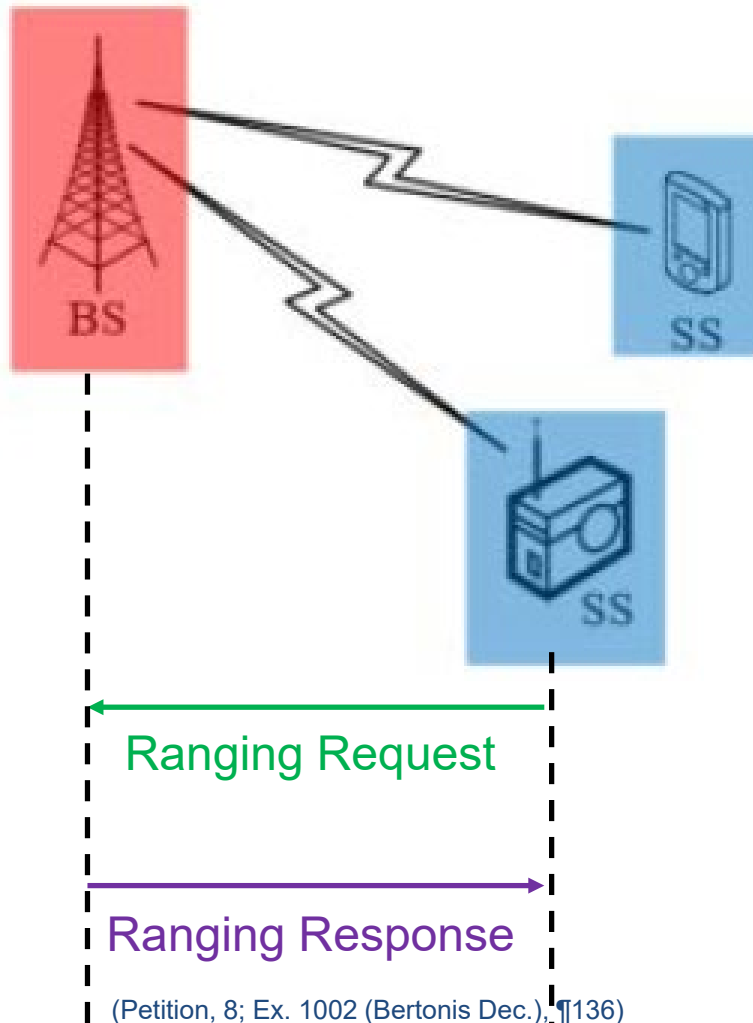
An RNG-RSP shall be transmitted by the BS in response to a received RNG-REQ. In addition, it may also be transmitted asynchronously to send corrections based on measurements that have been made on other received data or MAC messages. As a result, the SS shall be prepared to receive an RNG-RSP at any time, not just following an RNG-REQ transmission.

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	variable	TLV specific
}		

(Ex. 1013 (WiMAX), 50; Petition, 16-18; Ex. 1002 (Bertonis Dec.), ¶¶152-153)

WiMAX's Ranging Response is also the “Physical Layer Probe”



- The Ranging Response (RNG-RSP) is the “probe” for reasons on previous slide.
(Petition, 16-18; Ex. 1002 (Bertonis Dec.), ¶¶152-153)
- Ranging Response is not related to upper layers (e.g., application layer). (Ex. 1036 (Bertonis Reply Dec.), ¶24; Reply 8-9)
- Ranging Response is related to the Physical Layer because it corrects time and power.
(Ex. 1036 (Bertonis Dec.), ¶24; Reply 8-9)

The following parameters may be included in the RNG-RSP message:

Timing Adjust Information

If this field is not included, no adjustment shall be made

Power Adjust Information

If this field is not included, no adjustment shall be made

(Ex. 1013 (WiMAX), 50; Ex. 1036 (Bertonis Reply Dec.), ¶20; Reply 6)

WiMAX's Ranging Response is the “Probe” Even Under Entropic's Construction

- Ranging Response provides timing and power corrections as a result of assessing the channel. (Reply, 6; Ex. 1036 (Bertonis Reply Dec.), ¶20)
- Mr. Holobinko conceded the Ranging Response includes parameters about the channel:

Q. Is it your understanding that WiMAX's ranging response includes only parameters for adjusting the timing and power?

A. The response can include some other parameters about the channel as well. But those

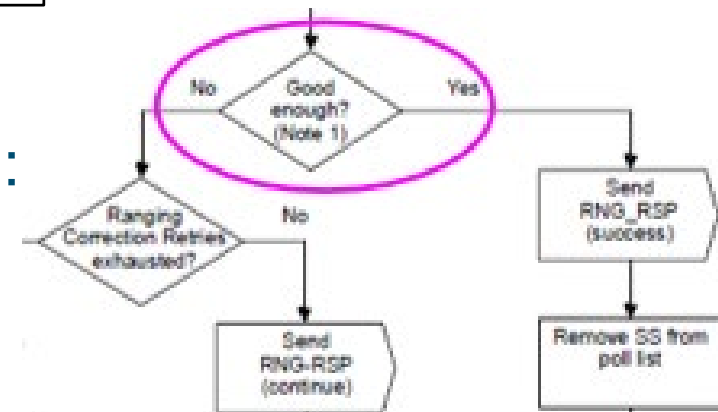
(Ex. 1055 (Holobinko Tr.), 98:19-24; Reply, 8)

- Ranging Response has a Ranging Status that characterizes the channel:

(Reply, 7-8; Ex. 1036, ¶23)

Ranging Status	4	1	Used to indicate whether uplink messages are received within acceptable limits by BS. 1 = continue, 2 = abort, 3 = success, 4 = rerange	All
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(Ex. 1013 (WiMAX), 665; Reply, 8; Ex. 1036 (Bertonis Reply Dec.), ¶23)



(Ex. 1013 (WiMAX), 181; Reply, 8; Ex. 1036 (Bertonis Reply Dec.), ¶23)

WiMAX's Ranging Response is the “Physical Layer Probe” Even Under Entropic's Construction

- WiMAX's Ranging Response 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.

(Reply, 8-9; Ex. 1036 (Bertonis Reply Dec.), ¶24; Ex. 1013 (WiMAX), 199, 202)

- Timing and power are physical parameters.

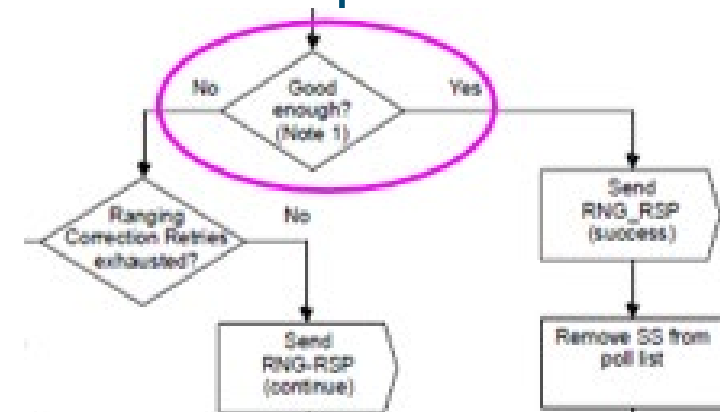
(Reply, 8; Ex. 1036 (Bertonis Reply Dec.), ¶24)

- WiMAX's Ranging Response includes the Ranging Status for indicating whether the uplink messages are acceptable timing and power limits.

(Reply, 9; Ex. 1036 (Bertonis Reply Dec.), ¶24)

Ranging Status	4	1	Used to indicate whether uplink messages are received within acceptable limits by BS. 1 = continue, 2 = abort, 3 = success, 4 = rerange	All
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(Ex. 1013 (WiMAX), 665; Reply, 8; Ex. 1036 (Bertonis Reply Dec.), ¶23)



(Ex. 1013 (WiMAX), 181; Reply, 8; Ex. 1036 (Bertonis Reply Dec.), ¶23)

Entropic's Only Other Argument For Claims 1 and 17 Fails

- Entropic incorrectly argues that WiMAX's Ranging Request does not have a plurality of parameters that "specify content payload of the probe" (in [1A]) or "compris[e]...a payload content for the probe" (in [17A]). (Reply, 9-13; POR, 22-28)

- The Ranging Request has a CID that specifies the Basic CID in the TLV Information of the **Ranging Response (RNG-RSP)**. (Petition, 13-15; Ex. 1002 (Bertonis Dec.), ¶¶148-149; Reply, 9-13; Ex. 1036 (Bertonis Reply Dec.), ¶¶25-38)

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	variable	TLV specific
}		

(Ex. 1013 (WiMAX); Reply, 10; Ex. 1036 (Bertonis Reply Dec.), ¶30)

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 DCI 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

(Reply, 11; Ex. 1036 (Bertonis Reply Dec.), ¶31)

Entropic's Only Other Argument For Claims 1 and 17 Fails

- Entropic's Sur-Reply admits that "the SS sends a RNG-REQ using that CID; and then the BS sends a RNG-RSP that *may* also use that CID:"

However, WiMAX Table 367 plainly states that the "Basic CID" is assigned by the base station (BS) at initial access. Ex. 1013, 666. The BS is the node that *receives* the RNG-REQ and then *transmits* the RNG-RSP. See Ex. 2007, ¶ 62. This means that the RNG-REQ does not *specify* the Basic CID for use in the probe response. It is the other way around. The BS assigns the Basic CID for both it and the SS to use; the SS sends a RNG-REQ using that CID; and then the BS sends a RNG-RSP that *may* also use that CID. See *id.* But that "may" is critical. The BS dictates the CID, and it can decide to change the CID from what was transmitted in the RNG-REQ. Mr. Bertonis acknowledges this very point. See Ex. 1036, ¶ 33 (admitting that the Basic CID "can be different in some Ranging Responses if the BS decides to change the basic connection").

(Sur-Reply, 17)

Under Entropic's Litigation Read And Holobinko's Read, WiMAX Clearly Meets "at least specify content payload"

(Reply, 13; Ex. 1036 (Bertonis Reply Dec.), ¶38)

- Mr. Holobinko's testimony:

THE WITNESS: If we go back to Figure 5 -- actually to Figure 4, excuse me, Block 202. And I addressed this before.

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.

(Ex. 1055 (Holobinko Tr.), 78:13-21; Reply, 13)

- Under these reads, all information of the Ranging Response payload is specified based on receiving the Ranging Request (Reply, 13; Ex. 1036 (Bertonis Reply Dec.), ¶38)
- For example, Type=4 in RNG-REQ specifies generating RNG-RSP with Type=5 and appropriate TLV information (at least Ranging Status):

(Reply, 13; Ex. 1036, ¶38)

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	variable	TLV specific
}		

(Ex. 1013 (WiMAX), 49; Reply, 13; Ex. 1036 (Bertonis Reply Dec.), ¶38)

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	variable	TLV specific
}		

(Ex. 1013 (WiMAX), 50; Reply, 13; Ex. 1036 (Bertonis Reply Dec.), ¶38)

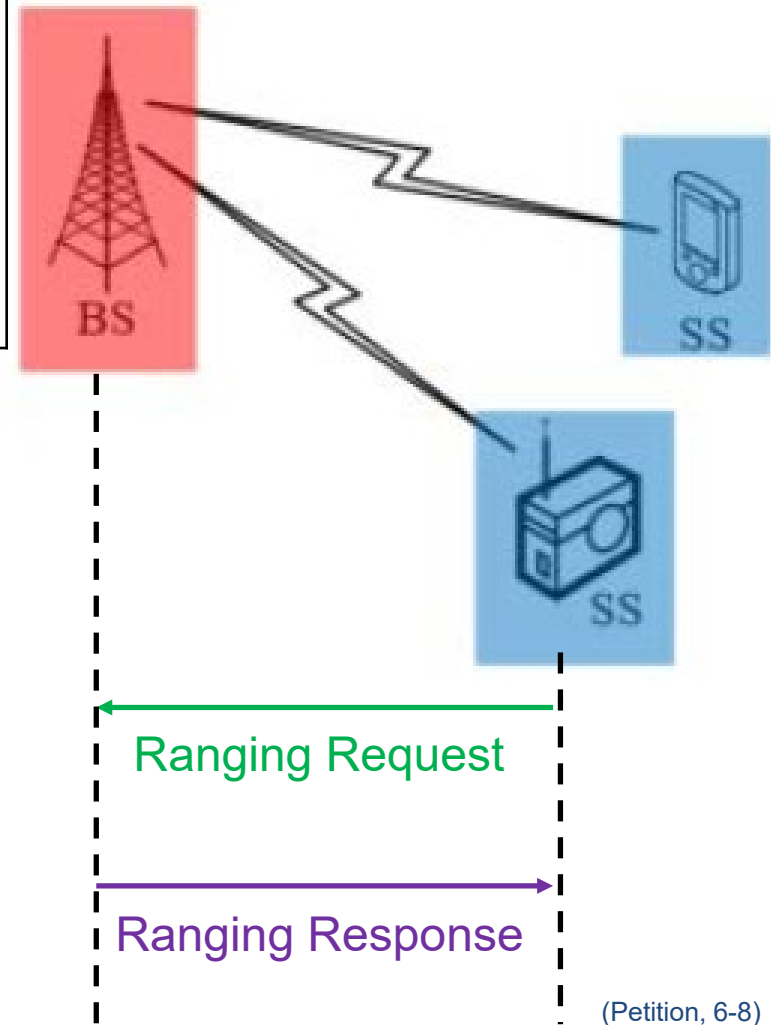
WiMAX Discloses Limitation [1A]

[1A]

a) receiving in a **first node**, a **probe request** specifying a first plurality of parameters associated with the generation and transmission of **a probe**, wherein the first plurality of parameters at least specify content payload of the probe and a **second node**;

WiMAX discloses the **base station (BS)** receiving the **Ranging Request** (“probe request”) from the **subscriber station (SS)** and responding with the **Ranging Response** (“probe”).

(Petition, 8; Ex. 1002 (Bertonis Reply Dec.), ¶¶136-137)



WiMAX Discloses Limitation [1A]

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

WiMAX's **Ranging Request** specifies a **plurality of parameters** including Management Message Type, Downlink Channel ID, and TLV Encoded Information, which includes even more parameters.

(Petition, 8-16; Ex. 1002 (Bertonis Dec.), ¶¶137-147)

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	variable	TLV specific
}		

(Ex. 1013 (WiMAX), 49; Petition, 8; Ex. 1002 (Bertonis Dec.), ¶137)

Table 364—**RNG-REQ message** encodings

Name	Type (1 byte)	Length	Value (variable-length)	PHY Scope
Requested Downlink Burst Profile	1	1	Bits 0-3: DIUC of the downlink burst profile requested by the SS for downlink traffic. Bits 4-7: 4 LSB of Configuration Change Count value of DCD defining the burst profile associated with DIUC.	All
SS MAC Address	2	6	The MAC address of the SS	All
Ranging Anomalies	3	1	A parameter indicating a potential error condition detected by the SS during the ranging process. Setting the bit associated with a specific condition indicates that the condition exists at the SS. Bit #0 — SS already at maximum power. Bit #1 — SS already at minimum power. Bit #2 — Sum of commanded timing adjustments is too large.	All
AAS broadcast capability	4	1	0 = SS can receive broadcast messages 1 = SS cannot receive broadcast messages	SCa, OFDM, OFDMA

(Ex. 1013 (WiMAX), 664; Petition, 9; Ex. 1002 (Bertonis Dec.), ¶138)

WiMAX Discloses Limitation [1A]

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

WiMAX's **Ranging Request** has a Generic MAC header that includes the **CID parameter**.

(Petition, 12-15; Ex. 1002 (Bertonis Dec.), ¶¶143-147)

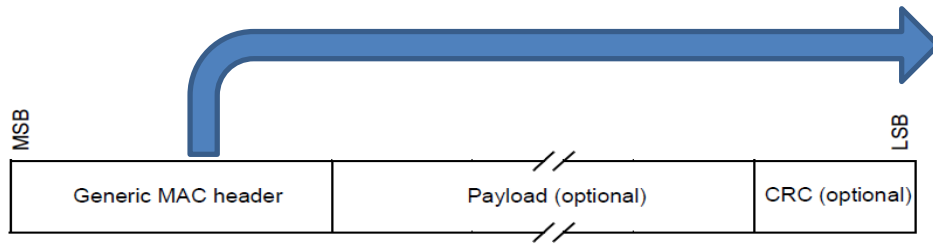


Figure 18—MAC PDU formats
(Ex. 1013 (WiMAX), 35; Petition, 12)

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 $g(D) = D^8 + D^7 + D^6 + D^5 + 1$ 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.

(Ex. 1013 (WiMAX), 37; Petition, 13)

WiMAX Discloses Limitation [1A]

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

The CID parameter in the **Ranging Request** specifies the **Basic CID** in the **TLV Information**, which is part of the payload of the **Ranging Response**.

(Petition, 13-15; Ex. 1002 (Bertonis Dec.), ¶¶148-149; Reply, 9-13; Ex. 1036 (Bertonis Reply Dec.), ¶¶25-38)

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	variable	TLV specific
}		

(Ex. 1013 (WiMAX), 50; Reply, 10; Ex. 1036 (Bertonis Reply Dec.), ¶30)

Table 367—RNG-RSP message encodings (continued)

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

(Ex. 1013, 665-666; Reply, 11; Ex. 1036 (Bertonis Reply Dec.), ¶31)

WiMAX Discloses Limitation [1A]

[1A]

a) receiving in a first node, a **probe request** specifying a first plurality of parameters associated with the generation and transmission of a probe, **wherein the first plurality of parameters at least specify** content payload of the probe and **a second node**;

WiMAX's **Ranging Request** has a **SS MAC Address** parameter that specifies the **subscriber station (SS)** that is sending the **Ranging Request** and will receive the **Ranging Response**.

(Petition, 9, 15-16; Ex. 1002 (Bertonis Dec.), ¶150)

Table 364—**RNG-REQ message** encodings

Name	Type (1 byte)	Length	Value (variable-length)	PHY Scope
Requested Downlink Burst Profile	1	1	Bits 0–3: DIUC of the downlink burst profile requested by the SS for downlink traffic. Bits 4–7: 4 LSB of Configuration Change Count value of DCD defining the burst profile associated with DIUC.	All
SS MAC Address	2	6	The MAC address of the SS	All
Ranging Anomalies	3	1	A parameter indicating a potential error condition detected by the SS during the ranging process. Setting the bit associated with a specific condition indicates that the condition exists at the SS. Bit #0 — SS already at maximum power. Bit #1 — SS already at minimum power. Bit #2 — Sum of commanded timing adjustments is too large.	All
AAS broadcast capability	4	1	0 = SS can receive broadcast messages 1 = SS cannot receive broadcast messages	SCa, OFDM, OFDMA

(Ex. 1013 (WiMAX), 664; Petition, 9; Ex. 1002 (Bertonis Dec.), ¶138)

WiMAX Discloses Limitation [1B]

[1B] b) determining a second plurality of parameters associated with generation and transmission of the **probe**;

WiMAX's Ranging Request causes the base station (BS) to determine numerous parameters for generating and transmitting the **Ranging Response**.

(Petition, 16-18; Ex. 1002 (Bertonis Dec.), ¶¶152-154)

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	variable	TLV specific
}		

(Ex. 1013 (WiMAX), 50; Petition, 16; Ex. 1002 (Bertonis Dec.), ¶152)

Table 367—RNG-RSP message encodings

Name	Type (1 byte)	Length	Value (variable-length)	PHY Scope
Timing Adjust	1	4	Tx timing offset adjustment (signed 32-bit). The time required to advance SS transmission so frames arrive at the expected time instance at the BS. Units are PHY specific (see 10.3).	All
Power Level Adjust	2	1	Tx Power offset adjustment (signed 8-bit, 0.25 dB units) Specifies the relative change in transmission power level that the SS is to make in order that transmissions arrive at the BS at the desired power. When subchannelization is employed, the subscriber shall interpret the power offset adjustment as a required change to the transmitted power density.	All
Offset Frequency Adjust	3	4	Tx frequency offset adjustment (signed 32-bit, Hz units) Specifies the relative change in transmission frequency that the SS is to make in order to better match the BS. (This is fine-frequency adjustment within a channel, not reassignment to a different channel.)	All
Ranging Status	4	1	Used to indicate whether uplink messages are received within acceptable limits by BS. 1 = continue, 2 = abort, 3 = success, 4 = rerange	All
Downlink frequency override	5	4	Center frequency, in kHz, of new downlink channel where the SS should redo initial ranging. If this TLV is used, the Ranging Status value shall be set to 2. Shall be used for licensed bands only.	SCa OFDM OFDMA
Uplink channel ID override	6	1	Licensed bands: The identifier of the uplink channel with which the SS is to redo initial ranging (not used with PHYs without channelized uplinks). License-exempt bands: The Channel Nr (see 8.5.1) where the SS should redo initial ranging.	All

(Ex. 1013 (WiMAX), 665-666; Petition, 17; Ex. 1002 (Bertonis Dec.), ¶153)

WiMAX Discloses Limitation [1C]

[1C]

c) generating the probe in accordance with the first plurality of parameters and the second plurality of parameters, wherein the **probe** has a form dictated by the first plurality of parameters; and

The **Ranging Request's Requested Downlink Burst Profile** provides a downlink burst profile (including a downlink frequency and FEC Code type (see next slide)) to be used by the BS to format the **Ranging Response**.

(Petition, 9-12, 18-19; Ex. 1002 (Bertonis Dec.), ¶¶138-142, 155-157)

Table 364—RNG-REQ message encodings

Name	Type (1 byte)	Length	Value (variable-length)	PHY Scope
Requested Downlink Burst Profile	1	1	Bits 0–3: DIUC of the downlink burst profile requested by the SS for downlink traffic. Bits 4–7: 4 LSB of Configuration Change Count value of DCD defining the burst profile associated with DIUC.	All
SS MAC Address	2	6	The MAC address of the SS	All
Ranging Anomalies	3	1	A parameter indicating a potential error condition detected by the SS during the ranging process. Setting the bit associated with a specific condition indicates that the condition exists at the SS. Bit #0 — SS already at maximum power. Bit #1 — SS already at minimum power. Bit #2 — Sum of commanded timing adjustments is too large.	All
AAS broadcast capability	4	1	0 = SS can receive broadcast messages 1 = SS cannot receive broadcast messages	SCa, OFDM, OFDMA

(Ex. 1013 (WiMAX), 664; Petition, 9; Ex. 1002 (Bertonis Dec.), ¶138)

Table 143—Mapping of burst profile to DIUC

Burst profile	DIUC
Downlink Burst Profile 1	0
Downlink Burst Profile 2	1
Downlink Burst Profile 3	2
Downlink Burst Profile 4	3
Downlink Burst Profile 5	4
Downlink Burst Profile 6	5
Downlink Burst Profile 7	6
Downlink Burst Profile 8	7
Downlink Burst Profile 9	8
Downlink Burst Profile 10	9
Downlink Burst Profile 11	10
Downlink Burst Profile 12	11
Downlink Burst Profile 13	12
<i>reserved</i>	13
Gap	14
End of DL-MAP	15

(Ex. 1013 (WiMAX), 315; Petition 10; Ex. 1002 (Bertonis Dec.), ¶139)

WiMAX Discloses Limitation [1C]

[1C]

c) generating the probe in accordance with the first plurality of parameters and the second plurality of parameters, wherein the **probe** has a form dictated by the first plurality of parameters; and

The **Ranging Response** has a form dictated by the Requested Downlink Burst Profile parameter that provides a downlink frequency and FEC Code type (which includes a modulation type).

(Petition, 10-12, 18-19; Ex. 1002 (Bertonis Dec.), ¶¶138-142, 155-157)

Table 359—DCD PHY-common burst profile encodings

Name	Type (1 byte)	Length	Value (variable length)
Frequency	1	4	Downlink frequency (kHz)

(Ex. 1013 (WiMAX), 660; Petition, 11; Ex. 1002 (Bertonis Dec.), ¶141)

Table 363—DCD burst profile encodings—WirelessMAN-OFDMA

Name	Type (1 byte)	Length	Value (variable length)
FEC Code type	150	1	0 = QPSK (CC) 1/2 1 = QPSK (CC) 3/4 2 = 16-QAM (CC) 1/2 3 = 16-QAM (CC) 3/4 4 = 64-QAM (CC) 2/3 5 = 64-QAM (CC) 3/4 6 = QPSK (BTC) 1/2 7 = QPSK (BTC) 3/4 or 2/3 8 = 16-QAM (BTC) 3/5 9 = 16-QAM (BTC) 4/5 10 = 64-QAM (BTC) 2/3 or 5/8 11 = 64-QAM (BTC) 5/6 or 4/5 12 = QPSK (CTC) 1/2 13 = QPSK (CTC) 2/3 14 = QPSK (CTC) 3/4 15 = 16-QAM (CTC) 1/2 16 = 16-QAM (CTC) 3/4 17 = 64-QAM (CTC) 2/3 18 = 64-QAM (CTC) 3/4 19 = 64-QAM (CTC) 5/6 20 = QPSK (ZT CC) 1/2 21 = QPSK (ZT CC) 3/4 22 = 16-QAM (ZT CC) 1/2 23 = 16-QAM (ZT CC) 3/4 24 = 64-QAM (ZT CC) 2/3 25 = 64-QAM (ZT CC) 3/4 26..255 = <i>Reserved</i>
DIUC Mandatory exit threshold	151	1	0–63.75 dB CINR at or below where this DIUC can no longer be used and where this change to a more robust DIUC is required, in 0.25 dB units. See Figure 81.
DIUC Minimum entry threshold	152	1	0–63.75 dB The minimum CINR required to start using this DIUC when changing from a more robust DIUC is required, in 0.25 dB units. See Figure 81.

(Ex. 1013 (WiMAX), 663; Petition 11; Ex. 1002 (Bertonis Dec.), ¶141)

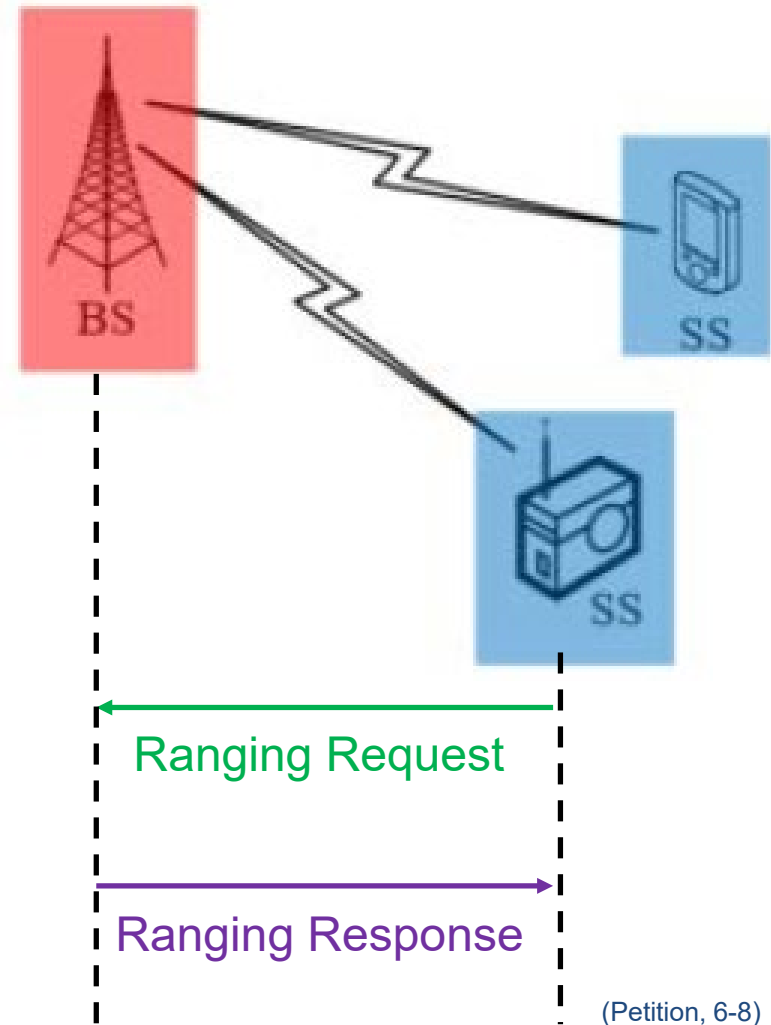
WiMAX Discloses Limitation [1D]

[1D]

d) transmitting the **probe** from the **first node** to the **second node**.

WiMAX discloses the **base station (BS)** transmitting the **Ranging Response** to the **subscriber station (SS)**.

(Petition, 19; Ex. 1002 (Bertonis Dec.), ¶158)



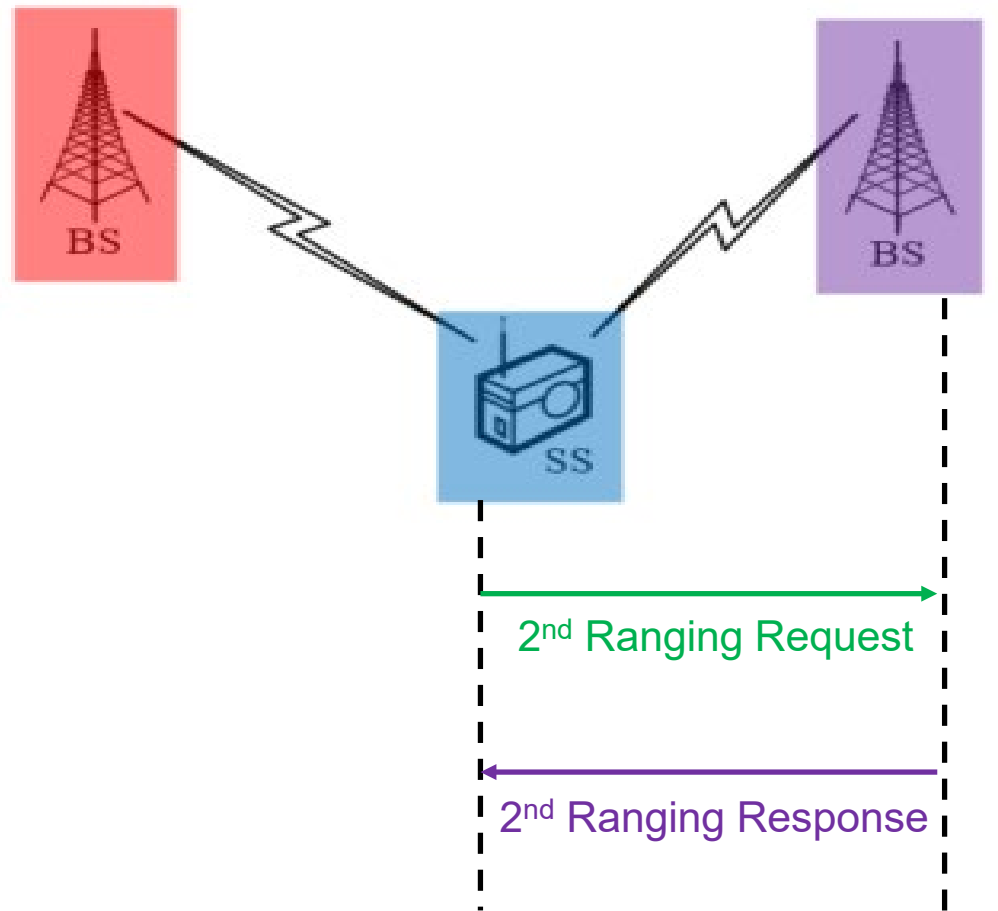
(Petition, 6-8)

WiMAX Teaches Limitation [11A]

[11A]	a) the first node transmitting a second probe request to a third node ;
-------	--

A POSITA would have understood that the **SS** communicates with multiple BSs (e.g., **first BS** and **second BS**) and therefore transmits a **2nd Ranging Request** to the **second BS**.

(Petition, 36; Ex. 1002 (Bertonis Dec.), ¶¶250-252)



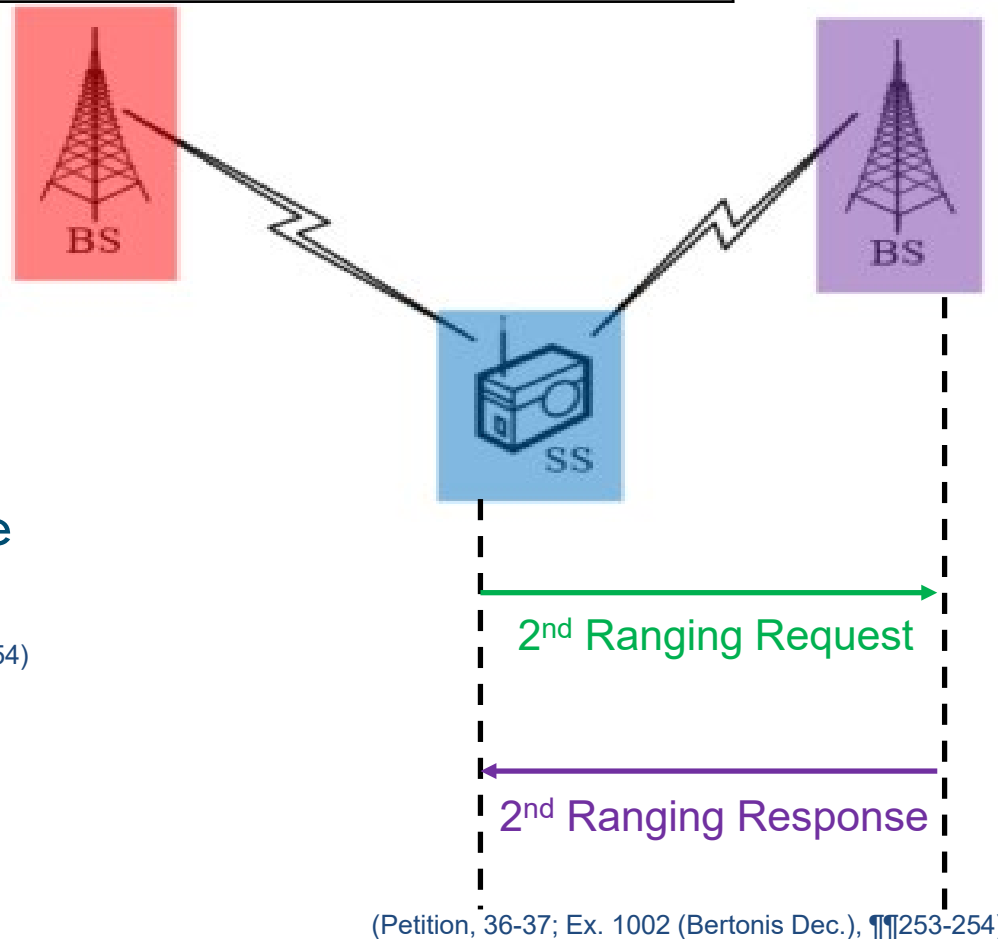
(Petition, 36; Ex. 1002 (Bertonis Dec.), ¶¶250-251)

WiMAX Teaches Limitation [11B]

[11B] b) and the **first node** receiving a **second probe** from the **third node**, wherein the **second probe** is generated according to the **second probe request**; and

The **SS** receives a **2nd Ranging Response** from the **second BS** that is generated according to the **2nd Ranging Request**.

(Petition, 36-37; Ex. 1002 (Bertonis Dec.), ¶¶253-254)



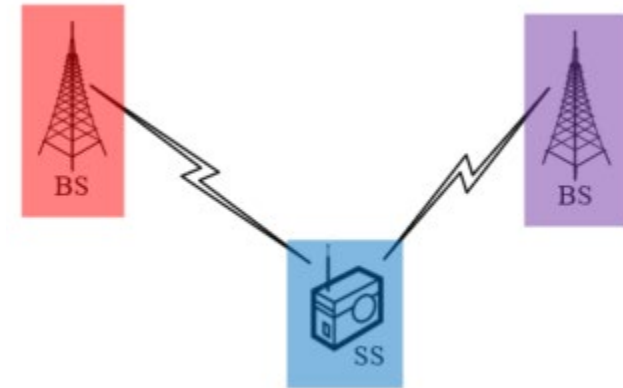
(Petition, 36-37; Ex. 1002 (Bertonis Dec.), ¶¶253-254)

WiMAX Teaches Limitation [11C]

[11C]	wherein the first probe and second probe are transmitted simultaneously using OFDMA.
-------	--

- Ranging Responses (“first probe and second probe”) would have been transmitted through the OFDMA PHY layer and therefore would have been modulated for transmission through it.
(Petition, 27-28, 37; Ex. 1002 (Bertonis Dec.), ¶256)
- The transmission timing for each Ranging Response is based on when a BS receives a Ranging Request and when the BS has a slot for transmitting Ranging Responses.
(Petition, 37; Ex. 1002 (Bertonis Dec.), ¶¶257-258)
- A POSITA would have been motivated to perform ranging with multiple base stations simultaneously and understood that there would have been situations in which the first BS transmits the first Ranging Response and the second BS transmits the second Ranging Response, simultaneously.

(Petition, 38; Ex. 1002 (Bertonis Dec.), ¶¶257-258)



(Petition, 38; Ex. 1002 (Bertonis Dec.), ¶256)

Entropic's POR Argument for Claim 11 is Premised on an Inherency Argument Petitioner Never Made

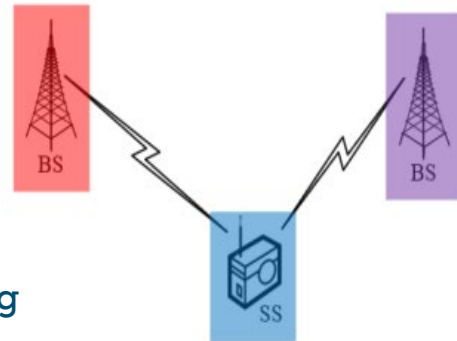
- Entropic's entire POR argument was that [11C] is not inherent, but Comcast asserted obviousness. (Reply, 14-15)

- In the POR, Entropic did not dispute that:

- a POSITA would have understood that WiMAX includes a subscriber station (SS) communicating with multiple base stations (BS);
 - 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

(Reply, 14; Ex. 1036 (Bertonis Reply Dec.), ¶¶42-43)

(Petition, 38; Ex. 1002 (Bertonis Dec.), ¶256)



- Entropic and Mr. Holobinko complain that it would arise by “chance” or “sometimes,” but that is sufficient to meet [11C]. (Reply, 14-15)

- Limitation [11C] merely recites a result that need only occur once – it does not recite any feature that coordinates the timing at which the two probes are transmitted.

(Reply, 15; Ex. 1036 (Bertonis Reply Dec.), ¶41)

11. The method of claim 9, further comprising:
a) the first node transmitting a second probe request to a third node;
b) and the first node receiving a second probe from the third node, wherein the second probe is generated according to the second probe request; and
wherein the first probe and second probe are transmitted simultaneously using OFDMA.

(Ex. 1001 ('690 patent), claim 11)

Roadmap

- Overview of the '690 Patent
- Instituted Grounds
- Claim Construction
- Grounds A and B: WiMAX
- Grounds D and E: Waxman
- Ground G: Waxman in view of Zuckerman
- Ground J: DOCSIS 2.0 Ranging
- Ground K: DOCSIS 2.0 Testing
- Ground L: DOCSIS 2.0 Ranging in view of Zuckerman
- Ground M: DOCSIS 2.0 Testing in view of Zuckerman

Waxman's Probe Request is the “Probe Request”

- To extend connectivity range in a wireless network, and as part of an active scanning process, Waxman discloses sending a **probe request** from a **station (STA)** to an **access point (AP)**.

(Petition, 48; Ex. 1002, ¶¶330-331)

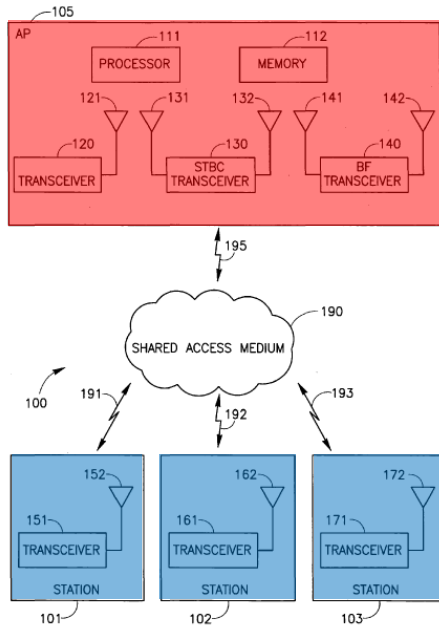


FIG. 1

(Ex. 1007 (Waxman), FIG. 1; Petition, 48; Ex. 1002 (Bertonis Dec.), ¶336)

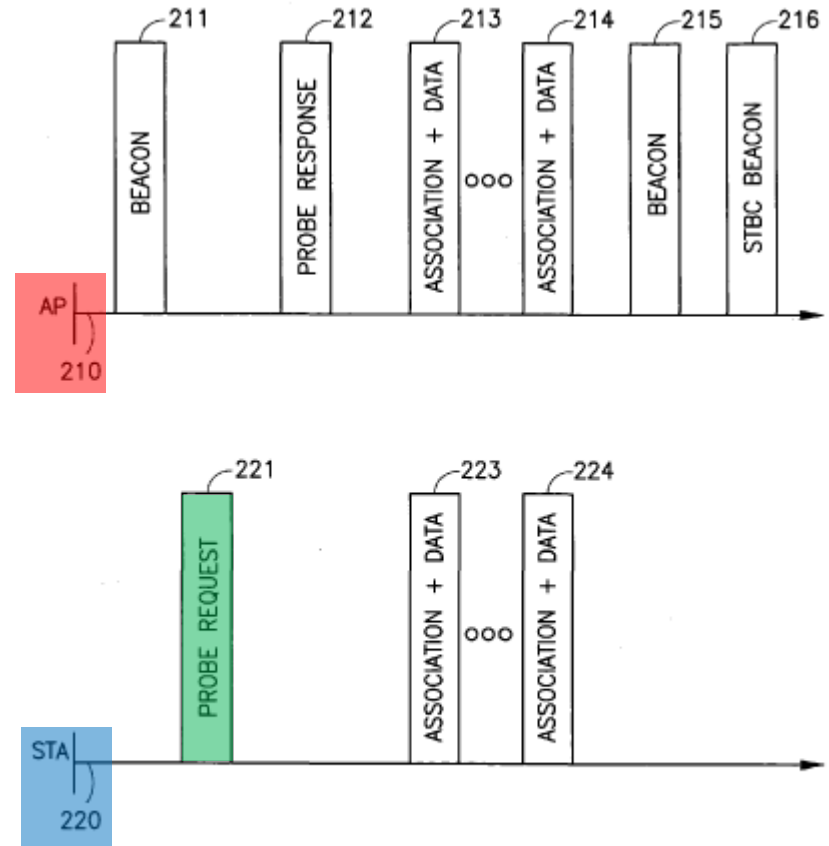


FIG. 2

(Ex. 1007 (Waxman), FIG. 2; Petition, 48, 52; Ex. 1002 (Bertonis Dec.), ¶339)

Waxman's Probe Response is the “Probe”

- Waxman's **probe response** is sent from the **access point (AP)** to the **station (STA)** in response to the **probe request**.

(Petition, 49-52; Ex. 1002 (Bertonis Dec.), ¶¶344-345)

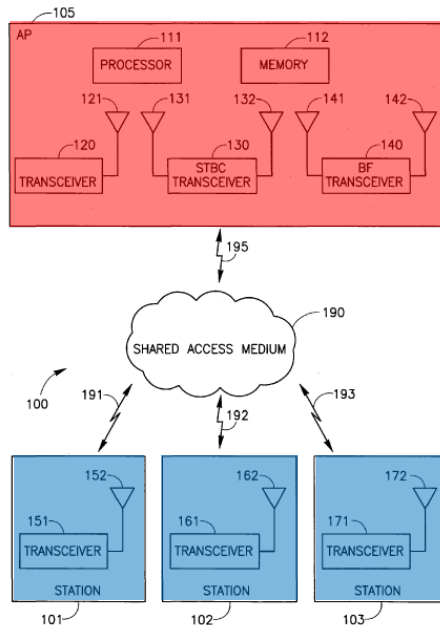


FIG. 1

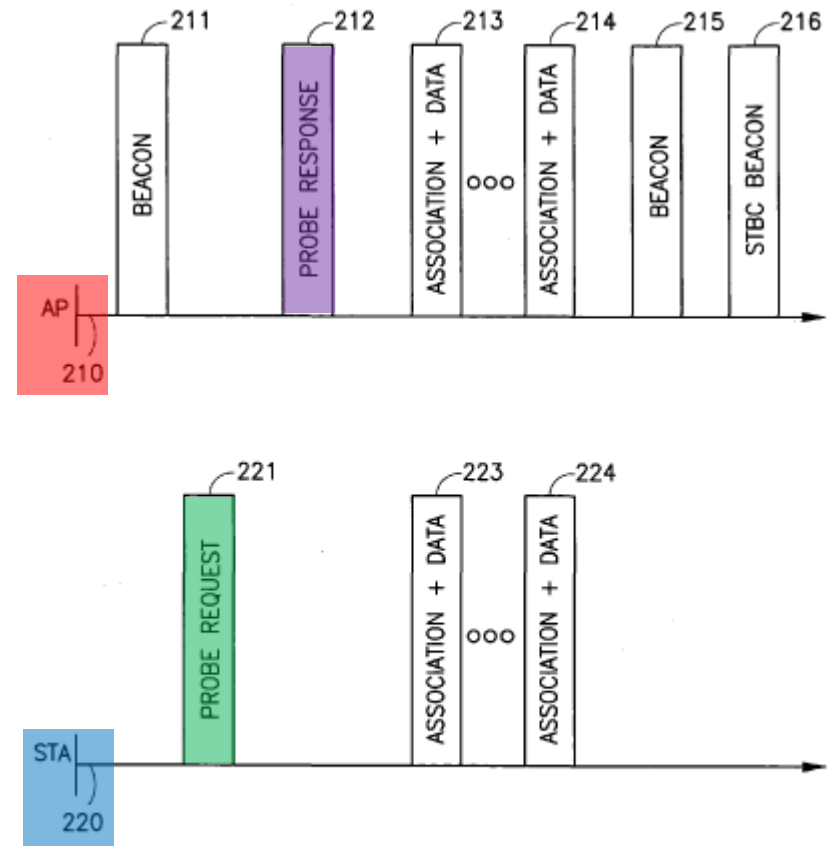


FIG. 2

(Ex. 1007 (Waxman), FIG. 2; Petition, 48-52; Ex. 1002 (Bertonis Dec.), ¶¶339-345)

(Ex. 1007 (Waxman), FIG. 1; Petition, 48; Ex. 1002 (Bertonis Dec.), ¶336)

Waxman's Probe Response is also the “Physical Layer Probe”

- Waxman's **probe response** is the “probe” for reasons on previous slide.
- Waxman's **probe response** is related to the physical layer, as opposed to upper layers (e.g., application layer).
(Reply, 19; Ex. 1036 (Bertonis Reply Dec.), ¶59)
- Waxman's **probe response** is a physical layer probe because it is used to evaluate whether a requested transmission scheme may be used for the physical layer.
(Reply, 19; Ex. 1036 (Bertonis Reply Dec.), ¶¶57-59)
- The Board's Institution Decision correctly found that Waxman discloses “physical layer probes.” (Reply, 19)

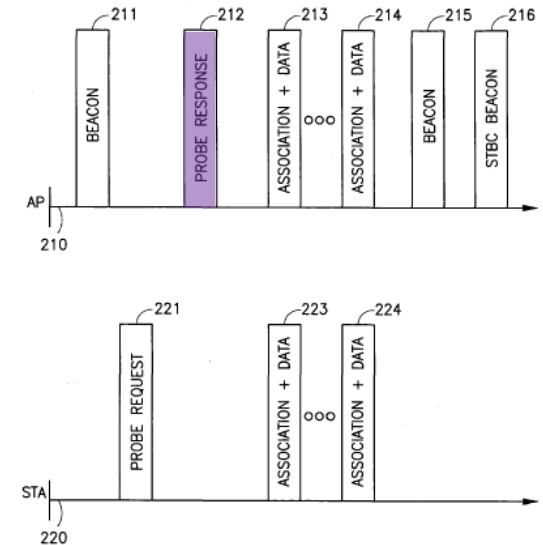


FIG. 2

(Ex. 1007 (Waxman), FIG. 2; Petition, 51-52)

We do not agree with Patent Owner's arguments. Petitioner presents sufficient evidence that Waxman discloses “physical layer probes” that are packets comprising preambles and payloads. Ex. 1002 ¶¶ 405–407. In addition, Waxman's paragraphs 42, 43, and 55 expressly state that the probe response may be transmitted from the AP to a station using STBC or BF modulation. Hence, Patent Owner's arguments do not undermine

(Institution Decision, 30; Reply, 19)

Waxman's Probe Response is the "Probe" Even Under Entropic's Construction

- Entropic argues that Waxman's probe response "is unlike the 'probe' of the '690 Patent because Waxman does not disclose that the response characterizes the communication channel between the AP and the station." (Reply, 16; POR 32-33)
- But, Waxman uses the same term in the same field of art. (Reply, 16; Ex. 1036 (Bertonis Reply Dec.), ¶47)
- At least by approving the probe request, Waxman's probe response characterizes the channel as acceptable for the requested transmission scheme. (Reply, 16; Ex. 1036 (Bertonis Reply Dec.), ¶48)

Waxman's Probe Response is the “Physical Layer Probe” Even Under Entropic's Construction

- Waxman's probe response approves use of the requested transmission scheme and at least in this way characterizes attributes of the physical layer of the communications channel between the AP and station. (Reply, 19; Ex. 1036 (Bertonis Reply Dec.), ¶57)
- Transmission schemes control how data is transmitted over the physical layer. (Reply, 19; Ex. 1036 (Bertonis Reply Dec.), ¶57)
- Even if Waxman's probe response has only an acknowledgement, it still acknowledges that a certain transmission scheme works over a communication channel and thus characterizes a physical layer attribute of that channel. (Reply, 16; Ex. 1036 (Bertonis Reply Dec.), ¶58)

Waxman Teaches Limitation [1A]

[1A]

a) receiving in a **first node**, a **probe request** specifying a first plurality of parameters associated with the generation and transmission of a **probe**, wherein the first plurality of parameters at least specify content payload of the **probe** and a **second node**;

Waxman discloses the **access point (AP)** receiving the **Probe Request** from the **station (STA)**.

(Petition, 48; Ex. 1002 (Bertonis Dec.), ¶¶339-341)

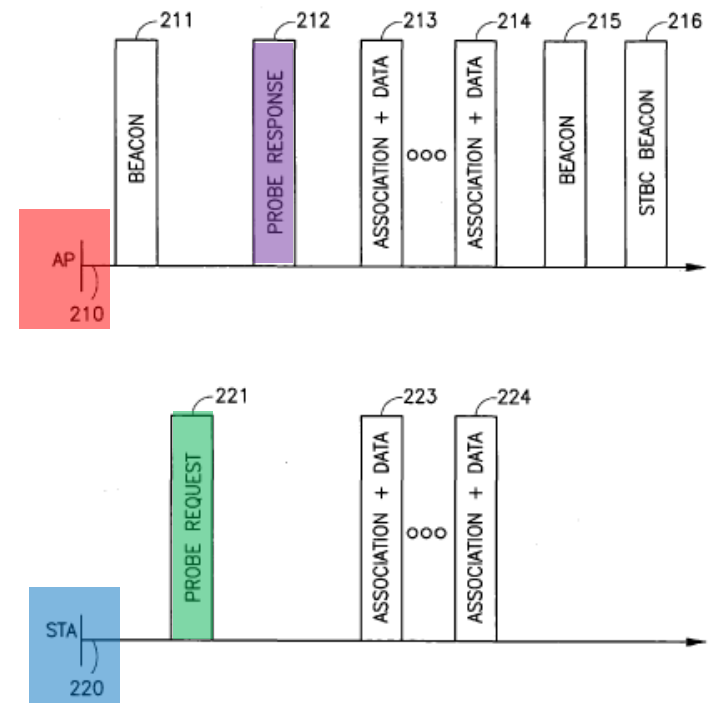


FIG. 2

(Ex. 1007 (Waxman), FIG. 2; Petition 48; Ex. 1002 (Bertonis Dec.), ¶339)

Waxman Teaches Limitation [1A]

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

Waxman's **probe request** specifies a **plurality of parameters** including a Requested Transmission Scheme (RTS) parameter, a number of antennas to be used, and other attributes.

(Petition, 49; Ex. 1002 (Bertonis Dec.), ¶¶342-344)

[0030] Stations 101, 102 and/or 103 may perform an active scanning, e.g., may transmit a probe request. The probe request may include a Requested Transmission Scheme (RTS) field, which may include a value of a RTS parameter or other indication. The value of the RTS param-

(Ex. 1007 (Waxman), [0030]; Petition, 49)

[0035] In some embodiments, the probe request may be used for active scanning by a station, for example, to indicate (e.g., using a value of a parameter in a field of the probe request) a requested transmission scheme, a requested number of transmission antennas to be used, and/or other attributes of a requested transmission scheme.

(Ex. 1007 (Waxman), [0035]; Petition, 49)

Waxman Teaches Limitation [1A]

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

- In response to the **probe request**, Waxman's **probe response** provides at least an acknowledgment or approval. (Reply, 16-17; Ex. 1036 (Bertonis Reply Dec.), ¶¶49-51)
- This acknowledgement is specified by the **probe request** because “embedded in the probe request” is a request for the acknowledgment. (Reply, 17; Ex. 1036 (Bertonis Reply Dec.), ¶51)
- Entropic even admits this acknowledgement would have been in the payload of the **probe response**. (Reply, 17; POR 36)

[0037] Additionally or alternatively, in response to the probe request, AP 105 may transmit a probe response if AP 105 is able to transmit using the requested transmission scheme. The probe response may, for example, include an indication acknowledging or approving the request embedded in the probe request. The probe response may be transmitted by AP 105 using the transmission scheme requested in the probe request. For example, in response to

(Ex. 1007 (Waxman), [0037]; Reply, 17)

Waxman Teaches Limitation [1A]

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

- Where the **probe request** complies with 802.11 (an example in Waxman), the **probe request** includes an **SSID** parameter that is also included in the **probe response** payload.

(Reply, 18; Ex. 1002 (Bertonis Dec.), ¶¶343-346; Ex. 1036 (Bertonis Reply Dec.), ¶52)

- In this example, the **probe response's** payload includes the identical value (e.g., **SSID**) provided in the **probe request**, meeting even the narrowest of interpretations.

(Reply, 18; Ex. 1036 (Bertonis Reply Dec.), ¶52)

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.

(Ex. 1012 (IEEE 802.11), 84; Reply, 18)

Table 7-15—**Probe Response** frame body

Order	Information	Notes
1	Timestamp	
2	Beacon interval	
3	Capability	
4	SSID	
5	Supported rates	

(Ex. 1012 (IEEE 802.11), 85; Reply, 18)

Waxman Teaches Limitation [1A]

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

- Waxman's AP transmits the probe response to the station from which the **probe request** originated.
(Reply, 18; Ex. 1036 (Bertonis Reply Dec.), ¶54)
- For the AP to send a probe response to a particular station (and not other stations), the **probe request** would have included a parameter specifying the recipient station of the probe response.
(Reply, 18; Ex. 1036 (Bertonis Reply Dec.), ¶54)
- Regarding specifying a second node, Waxman teaches even more than the '690 patent. (Reply, 18)

[0040] In some embodiments, for example, station 102 may transmit a probe request indicating that AP 105 is requested to transmit data to station 102 using STBC. Based on the probe request, AP 105 may transmit data to station 102 using STBC, for example, using protected transmission(s), e.g., 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) intended by AP 105 to be received by station 102.

(Ex. 1007 (Waxman), [0040]; Reply, 18)

[0048] As indicated at block 221, a probe request may be transmitted by the station. For example, the probe request may include a parameter indicating a request that the AP transmit to the station using STBC communication.

(Ex. 1007 (Waxman), [0048]; Reply, 18)

Waxman Teaches Limitation [1B]

[1B]	b) determining a second plurality of parameters associated with generation and transmission of the probe ;
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- In generating the **probe response**, Waxman's AP determines based on the probe request and other information that a certain extended-range transmission scheme is requested (e.g., TADS). (Petition, 50)
 - To send the probe response using STBC, the AP determines parameters for a matrix, e.g., based on a number of antennas and time slots for blocks of data. (Petition, 50; Ex. 1002 (Bertonis Dec.), ¶¶347-349)
 - For the AP to send the probe response using BF, the AP would have had to determine parameters for setting beam direction, including determining weights. (Petition, 50; Ex. 1002 (Bertonis Dec.), ¶350)
- It would have been obvious for the AP to determine multiple parameters for sending the **probe response** because Waxman teaches dynamically generating a probe response according to the requested transmission scheme and other attributes in the probe response. (Petition, 51; Ex. 1002 (Bertonis Dec.), ¶¶355-356)

Waxman Teaches Limitation [1C]

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

- Waxman teaches parameters of the probe request including a transmission scheme that entails specifying a form for the **probe response**.
(Petition, 51-52; Ex. 1002 (Bertonis Dec.), ¶¶357-362)
- Entropic does not dispute that Waxman's **probe response** having the requested transmission scheme meets [1C].
(Reply, 1)

[0030] Stations 101, 102 and/or 103 may perform an active scanning, e.g., may transmit a probe request. The probe request may include a Requested Transmission Scheme (RTS) field, which may include a value of a RTS parameter or other indication. The value of the RTS parameter may indicate to AP 105 a transmission scheme (e.g., a TADS) requested by stations 101, 102 and/or 103. In some embodiments, for example, the AP 105 may determine, e.g., based on a received probe request and/or other information, that AP 105 is requested or required to transmit data to a certain station using a certain extended-range transmission scheme, for example, TADS, STBC, BF, or the like; and may transmit data (e.g., subsequent data packets, including header portions and data portions) to that station using the requested or required scheme.

(Ex. 1007 (Waxman), [0030]; Ex. 1002 (Bertonis Dec.), ¶342)

[0042] In some embodiments, for example, based on the probe request transmitted by station 102, the AP 105 may transmit data packets to station 102 using STBC communication. Substantially entire packets transmitted by AP 105 to

(Ex. 1007 (Waxman), [0042]; Ex. 1002 (Bertonis Dec.), ¶343)

[0043] Similarly, for example, based on the probe request transmitted by station 103, the AP 105 may transmit data packets to station 103 using BF communication. Substan-

(Ex. 1007 (Waxman), [0043]; Ex. 1002 (Bertonis Dec.), ¶343)

Waxman Teaches Limitation [1D]

[1D]

d) transmitting the **probe** from the **first node** to the **second node**.

Waxman discloses the **access point (AP)** transmitting the **probe response** to the **station (STA)**.

(Petition, 52; Ex. 1002 (Bertonis Dec.), ¶¶363-365)

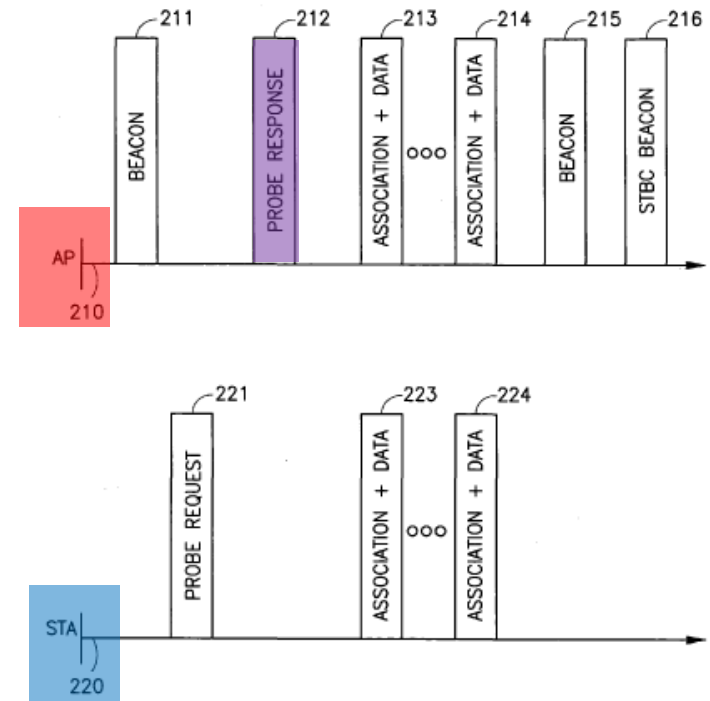


FIG. 2

(Ex. 1007 (Waxman), FIG. 2; Petition, 52; Ex. 1002 (Bertonis Dec.), ¶363)

Roadmap

- Overview of the '690 Patent
- Instituted Grounds
- Claim Construction
- Grounds A and B: WiMAX
- Grounds D and E: Waxman
- Ground G: Waxman in view of Zuckerman
- Ground J: DOCSIS 2.0 Ranging
- Ground K: DOCSIS 2.0 Testing
- Ground L: DOCSIS 2.0 Ranging in view of Zuckerman
- Ground M: DOCSIS 2.0 Testing in view of Zuckerman

Waxman Teaches Limitation [11A]

[11A] a) the **first node** transmitting a **second probe request** to a third node;

One of Waxman's stations would have transmitted **another probe request** to another AP (not shown in FIG. 1).

(Petition, 59; Ex. 1002 (Bertonis Dec.), ¶427)

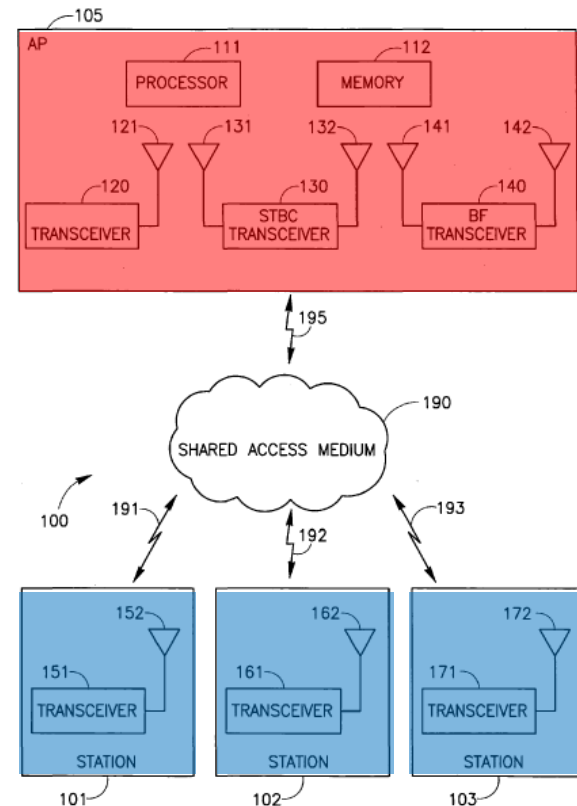


FIG. 1

[0052] FIG. 3 is a schematic flow-chart of a method of extended-range wireless communication in accordance with an embodiment of the invention. Operations of the method may be implemented, for example, by system 100 of FIG. 1, by stations 102 and/or 103 of FIG. 1, by AP 105 of FIG. 1, and/or by other suitable stations, APs, transceivers, units, devices, and/or systems.

(Ex. 1007 (Waxman), [0052]; Petition, 59; Ex. 1002 (Bertonis Dec.), ¶427)

(Ex. 1007 (Waxman), FIG. 1; Petition, 59; Ex. 1002 (Bertonis Dec.), ¶427)

Waxman Teaches Limitation [11B]

[11B] b) and the **first node** receiving a **second probe** from the third node, wherein the **second probe** is generated according to the **second probe request**; and

One of Waxman's stations would have received **another probe response** from another AP (not shown in FIG. 1) based on parameters specified in the **other probe request** sent to that AP.

(Petition, 59; Ex. 1002 (Bertonis Dec.), ¶428)

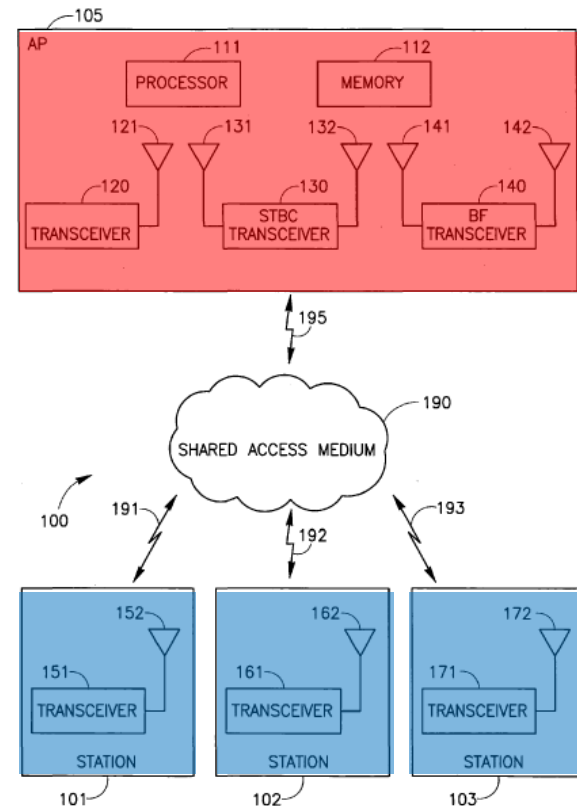


FIG. 1

(Ex. 1007 (Waxman), FIG. 1; Petition, 59; Ex. 1002 (Bertonis Dec.), ¶427)

Waxman-Zuckerman Teaches Limitation [11C]

[11C]	wherein the first probe and second probe are transmitted simultaneously using OFDMA.
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- **Waxman teaches using OFDMA based on teaching use of OFDM and other multiple access schemes (e.g., TDMA, CDMA).**
(Petition, 59; Ex. 1002 (Bertonis Dec.), ¶429; Ex. 1036 (Bertonis Reply Dec.), ¶61)
- **To the extent, Waxman does not teach using OFDMA, Zuckerman does.**
(Petition, 66; Ex. 1002 (Bertonis Dec.), ¶¶525-526)
- **It would have been obvious to combine Waxman and Zuckerman to transmit probe responses simultaneously using OFDMA because a POSITA would have been motivated to take advantage of the benefits of using OFDMA including more efficient simultaneous communications.**

(Petition, 66-67; Ex. 1002 (Bertonis Dec.), ¶¶529-532)

Some embodiments of the invention may be used in conjunction with one or more types of wireless communication signals and/or systems, for example, Radio Frequency (RF), Infra Red (IR), Frequency-Division Multiplexing (FDM), **Orthogonal FDM (OFDM)**, Time-Division Multiplexing (TDM), **Time-Division Multiple Access (TDMA)**, Extended TDMA (E-TDMA), General Packet Radio Service (GPRS), Extended GPRS, **Code-Division Multiple Access (CDMA)**, Wideband CDMA (WCDMA), CDMA 2000, Multi-Carrier Modulation (MDM), Discrete Multi-Tone (DMT), or the like. Embodiments of the invention may be used in various other apparatuses, devices, systems and/or networks.

(Ex. 1007 (Waxman), [0009]; Petition, 59; Ex. 1002 (Bertonis Dec.), ¶429; Reply, 21; Ex. 1036 (Bertonis Reply Dec.), ¶61)

[0008] The orthogonal frequency division multiple access (OFDMA) system, a multiple access system designed for **simultaneous access by multiple users**, is applied to OFDM. OFDMA divides an allocated frequency band into N subcarriers and allocates them to groups, for simultaneous use by multiple links. Supporting high rate applications, multiple subcarriers may be assigned to a single user. **On the forward link from a base station to a plurality of users**, the subcarrier groups, allocated to the respective mobile stations, are transferred simultaneously, while at the same time synchronizing with one another, and thereby guaranteeing mutual orthogonality of the subcarriers.

(Ex. 1016 (Zuckerman), [0008]; Petition, 66-67; Ex. 1002 (Bertonis Dec.), ¶527)

Entropic's POR Argument for Claim 11 Impermissibly Attacks Waxman Alone

- Entropic's assertion that Petitioner's Waxman-Zuckerman combination "flies in the face" of Waxman's disclosure of a delay period is severely flawed. (Reply, 21; POR 42)
- Waxman explicitly states that this feature is **optional**. (Reply, 21; Ex. 1007 (Waxman), [0038])
- In the Waxman-Zuckerman combination, the delay period would not have been employed because probe responses would have been transmitted simultaneously on different subchannels so that the APs do not have to contend with each other to transmit to the same station. (Reply, 21; Ex. 1036 (Bertonis Reply Dec.), ¶¶60-61)
- Entropic's Sur-Reply did not respond to Petitioner's Reply arguments on this issue. (See generally Sur-Reply)

[0038] In some embodiments, optionally, the probe response may be transmitted by AP 105 utilizing a "back-off" mechanism, for example, a random or pseudo-random delay period, e.g., to allow other access points to contend for communication with the station that transmitted the probe request.

(Ex. 1007 (Waxman), [0038])

Roadmap

- Overview of the '690 Patent
- Instituted Grounds
- Claim Construction
- Grounds A and B: WiMAX
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- Ground J: DOCSIS 2.0 Ranging
- Ground K: DOCSIS 2.0 Testing
- Ground L: DOCSIS 2.0 Ranging in view of Zuckerman
- Ground M: DOCSIS 2.0 Testing in view of Zuckerman

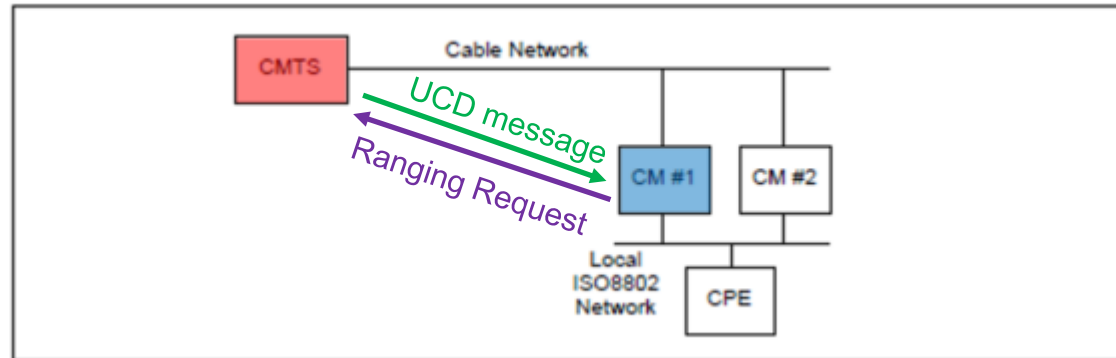
DOCSIS 2.0's UCD message and Ranging Request are the “Probe Request” and “Probe”

- DOCSIS 2.0's ranging acquires the correct timing to align **CM#1's** transmissions to the correct slot.

(Petition, 72; Ex. 1002 (Bertonis Dec.), ¶565)

- CM#1** obtains upstream channel characteristics from the **Upstream Channel Descriptor (UCD) message** (“probe request”) and sends a **Ranging Request** (“probe”).

(Petition, 72; Ex. 1002 (Bertonis Dec.), ¶565)



(Petition, 72; Ex. 1002 (Bertonis Dec.), ¶563)

9.3.3 Ranging

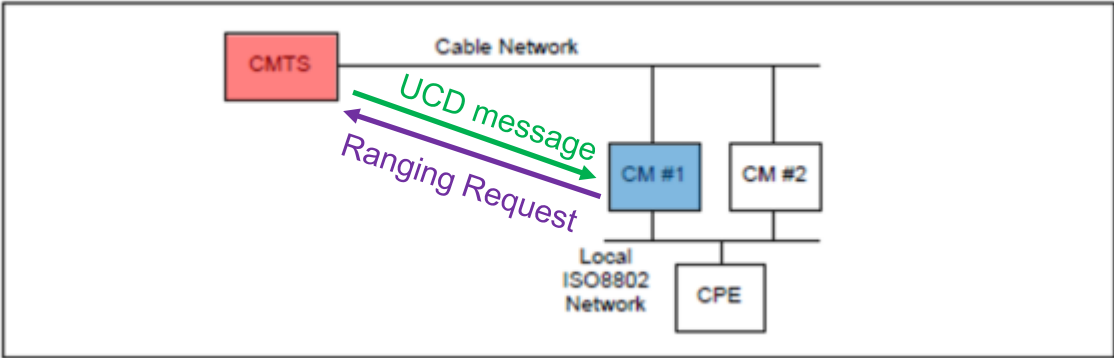
Ranging is the process of acquiring the correct timing offset such that the cable modem's transmissions are aligned to the correct mini-slot boundary. The timing delays through the PHY layer MUST be relatively constant with the exception of the timing offsets specified in Section 6.2.19.4 related to modulation rate changes to accommodate a legacy DOCSIS upstream receiver implementation. For TDMA, any variation in the PHY delays MUST be accounted for in the guard time of the upstream PMD overhead.¹

(Ex. 1010 (DOCSIS 2.0), 197; Petition 72 ; Ex. 1002 (Bertonis Dec.), ¶565)

DOCSIS 2.0's UCD message is the “Probe Request”

- The **UCD message** is not “decoupled from the Ranging Request.”

(Reply, 23; Ex. 1036 (Bertonis Reply Dec.), ¶¶63-64)



(Petition, 72; Ex. 1002 (Bertonis Dec.), ¶563)

- The **UCD message** includes a Ranging Required parameter that causes the **Ranging Request** to be sent.

(Reply, 22-23; Ex. 1036 (Bertonis Reply Dec.), ¶¶63-64)

Ranging Required	16	1	0= no ranging required 1= unicast initial ranging required 2= broadcast initial ranging required If this value is non-zero and the UCD change count does not match the UCD currently in effect, the CM MUST perform ranging as specified by this TLV before using any other transmit opportunities with the new UCD parameters. If ranging is required, and the CM is already registered, then it MUST maintain its SIDs and not re-register. If this value is 0 or this TLV is omitted, no ranging is required.
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(Ex. 1010 (DOCSIS 2.0), 135-139; Reply 22-23)

DOCSIS 2.0's Ranging Request is the “Probe” and “Physical Layer Probe”

- DOCSIS 2.0's **Ranging Request** is a “probe” because it is sent for ranging, which is a type of probing.

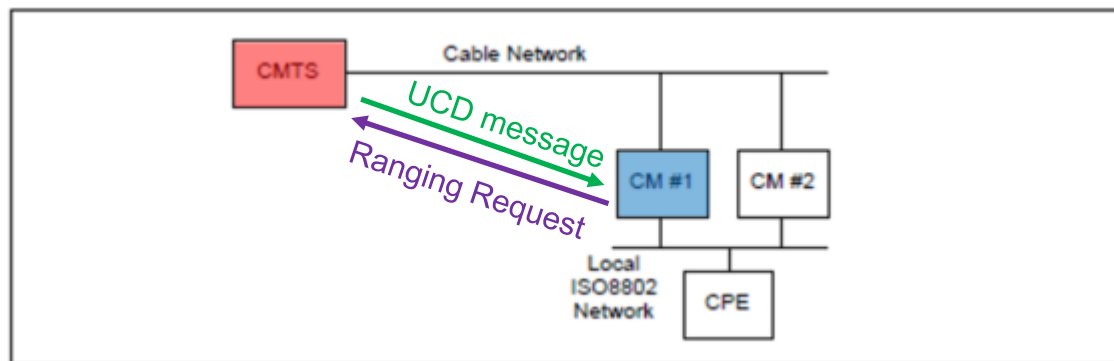
(Reply, 23; Ex. 1036 (Bertonis Reply Dec.), ¶¶65-67)

- A POSITA would have understood that the **Ranging Request** probes the **CMTS** to diagnose the uplink channel and send timing and power adjustments.

(Reply, 23; Ex. 1036 (Bertonis Reply Dec.), ¶¶65-67)

- Even the allegedly infringing probes are used for ranging.

(Reply, 23; Ex. 1036 (Bertonis Reply Dec.), ¶¶65-67)



(Petition, 72; Ex. 1002 (Bertonis Dec.), ¶¶563)

Remote RF signal level adjustment at the CM is performed through a periodic ranging function using the RNG-REQ and RNG-RSP MAC messages. This is similar to initial ranging and is shown in Figure 11-16 and Figure 11-17. On receiving a RNG-RSP, the CM MUST NOT transmit until the RF signal has been adjusted in accordance with the RNG-RSP and has stabilized (refer to Section 6). When operating in 2.0 mode, the CM MUST NOT transmit anything other than RNG-REQs, if it has been suspended by receiving a RNG-RSP with a ranging status of CONTINUE, until such time as it receives a RNG-RSP with a ranging status of SUCCESS. When operating in 1.x mode, the CM should continue normal operation and MUST NOT suspend on-going data transmission if it receives a RNG-RSP with a ranging status of CONTINUE.

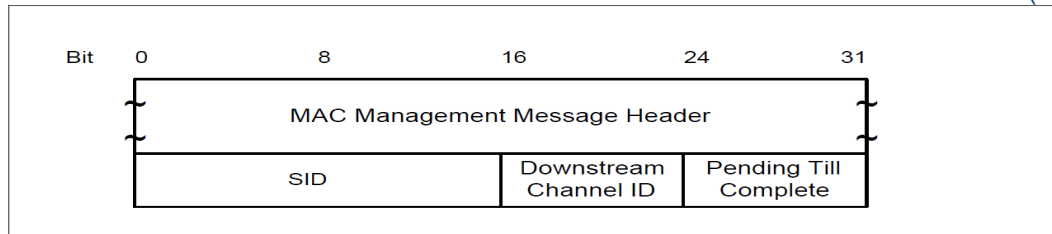
The CMTS SHOULD NOT send a ranging status of CONTINUE in a RNG-RSP to any CMs in 2.0 mode unless the ranging parameters measured on the corresponding RNG-REQ are insufficient for the CMTS to guarantee proper reception of all burst types available to that CM. Additionally, upon sending a RNG-RSP with ranging status of CONTINUE to a CM in 2.0 mode, the CMTS SHOULD schedule another Periodic Ranging opportunity for the CM quickly so that the CM can return to a ranging status of SUCCESS as quickly as possible.

(Ex. 1010 (DOCSIS 2.0), 261; Ex. 1036 (Bertonis Reply Dec.), ¶¶68)

DOCSIS 2.0's Ranging Request is the “Probe” and “Physical Layer Probe” Even Under Entropic's Constructions

- Ranging Request characterizes a channel by providing the Downstream Channel ID and/or a zero value in the “Pending Till Complete” parameter.

(Reply, 23; Ex. 1036 (Bertonis Reply Dec.), ¶68)



(Ex. 1010 (DOCSIS 2.0), 147; Reply, 23; Ex. 1002 (Bertonis Dec.), ¶572)

Figure 8-21 Packet PDU Following the Timing Header

- Downstream Channel: identifies the downstream channel on which the CM received the UCD which described the upstream channel used for the Ranging Request (Ex. 1010 (DOCSIS 2.0), 146-147; Reply, 23; Ex. 1036 (Bertonis Reply Dec.), ¶68)

- Pending Till Complete: 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 (DOCSIS 2.0), 146-147; Reply, 23; Ex. 1036 (Bertonis Reply Dec.), ¶68)

Entropic Does Not Dispute That DOCSIS 2.0's Ranging Meets All Other Elements of Independent Claims

(Reply, 23-24)

- Downstream Channel ID in UCD message specifies the Downstream Channel ID in the Ranging Request's payload (claimed "wherein the first plurality of parameters at least specify content payload of the probe")

(Petition 76; Ex. 1010 (DOCSIS 2.0), 136-137, 146-147; Ex. 1002 (Bertonis Dec.), ¶¶572-573)

- UCD message includes a source address that specifies the CMTS (claimed "wherein the first plurality of parameters at least specify...a second node")

(Petition 76; Ex. 1010 (DOCSIS 2.0), 133, 136, 146-147; Ex. 1002 (Bertonis Dec.), ¶¶574-575)

- UCD message's modulation rate and frequency parameters are used to dictate the Ranging Request's form (claimed "wherein the probe has a form dictated by the first plurality of parameters")

(Petition 81; Ex. 1010 (DOCSIS 2.0), 137; Ex. 1002 (Bertonis Dec.), ¶¶588-590)

Undisputed

(See generally POR)

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- Ground K: DOCSIS 2.0 Testing
- Ground L: DOCSIS 2.0 Ranging in view of Zuckerman
- Ground M: DOCSIS 2.0 Testing in view of Zuckerman

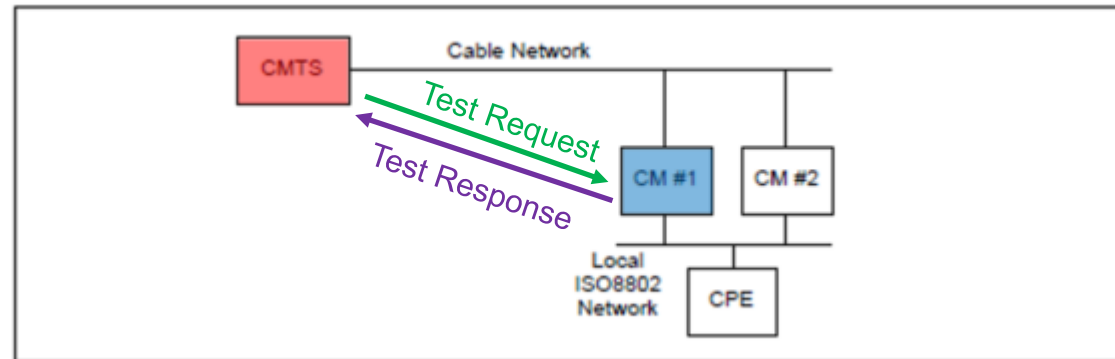
DOCSIS 2.0's Test Request and Test Response are the “Probe Request” and “Probe”

- In DOCSIS 2.0's test procedure, the **CMTS** sends a **Test Request** to **CM#1**.

(Petition, 76-77; Ex. 1002 (Bertonis Dec.), ¶¶563, 576-577)

- If **Test Request's** Mode parameter is 1 or 2, **CM#1** sends an upstream signal (referred to as a “**Test Response**”) to the **CMTS**.

(Petition, 76-79; Ex. 1002 (Bertonis Dec.), ¶¶577-579)



(Petition, 72, 76-77; Ex. 1002 (Bertonis Dec.), ¶¶563, 576-577)

Mode 0 = Disable all test modes and reboot

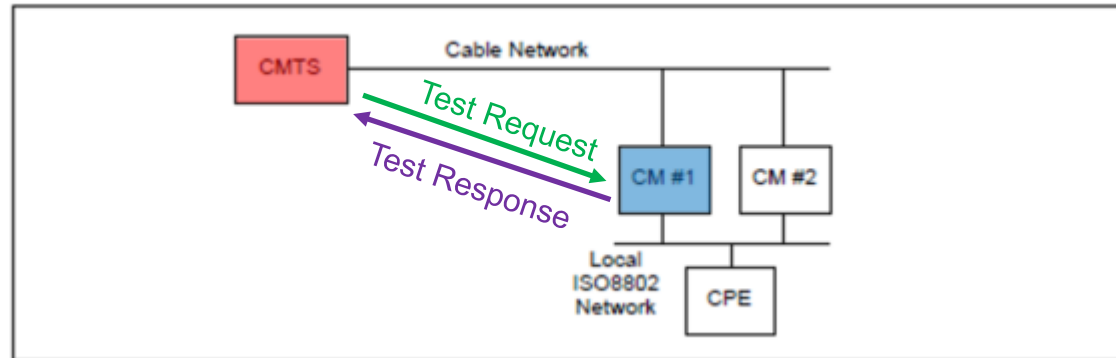
- 1 = Transmit a continuous (non-burst) upstream signal at the commanded modulation rate, carrier frequency, and power level. The chip sequence at the spreader output is replaced with an alternating binary sequence (1, -1, 1, -1, 1, -1,...) at nominal amplitude, equal on I and Q. The CM tracks the downstream symbol clock and uses it to generate the upstream symbol clock as in normal synchronous operation.
- 2 = Transmit a continuous (non-burst), unmodulated (CW) upstream signal at the commanded carrier frequency, modulation rate and power level. This is equivalent to replacing the chip sequence at the spreader output with the constant sequence (1, 1, 1, 1, 1, 1,...) at nominal amplitude, equal on both I and Q. The CM tracks the downstream symbol clock and uses it to generate the upstream symbol clock as in normal synchronous operation.

(Ex. 1010 (DOCSIS 2.0), 185; Petition, 77; Ex. 1002 (Bertonis Dec.), ¶577)

DOCSIS 2.0's Test Response is the “Probe” and “Physical Layer Probe”

- DOCSIS 2.0's **Test Response** is for testing the channel between the **CMTS** and **CM#1** to diagnose timing or power problems.

(Reply 24-26; Ex. 1036 (Bertonis Reply Dec.), ¶¶ 69-70; Petition, 83; Ex. 1002 (Bertonis Dec.), ¶¶ 609-610)



(Petition, 72, 76-77; Ex. 1002 (Bertonis Dec.), ¶¶ 563, 576-577)

6.2.21.5 Carrier Phase Noise

The upstream transmitter total integrated phase noise (including discrete spurious noise) MUST be less than or equal to -46 dBc summed over the spectral regions spanning 200 Hz to 400 kHz above and below the carrier.

The upstream transmitter total integrated phase noise (including discrete spurious noise) MUST be less than or equal to -44 dBc summed over the spectral regions spanning 8 kHz to 3.2 MHz above and below the carrier.

The CM MUST provide a **test mode** in which:

- A continuous (non-burst) unmodulated (CW) upstream signal is transmitted at the commanded carrier frequency, modulation rate and level. This is equivalent to replacing the chip sequence at the spreader output with the constant sequence (1, 1, 1, 1, 1, 1, ...) at nominal amplitude, equal on both I and Q.

(Ex. 1010 (DOCSIS 2.0), 96; Petition 76; Ex. 1002 (Bertonis Dec.), ¶¶ 576-577, 624-625)

6.2.21.8 Modulation Timing Jitter

...

The CM MUST provide a **test mode** in which:

- A continuous (non-burst) upstream signal is transmitted at the commanded carrier frequency, modulation rate and level.
- The chip sequence at the spreader output is replaced with an alternating binary sequence (1, -1, 1, -1, 1, -1, ...) at nominal amplitude, equal on both I and Q.
- The CM tracks the downstream symbol clock and uses it to generate the upstream symbol clock as in normal synchronous operation.

(Ex. 1010 (DOCSIS 2.0), 97-98; Petition 76; Ex. 1002 (Bertonis Dec.), ¶¶ 576-577, 624-625)

DOCSIS 2.0's Test Response is the “Probe” and “Physical Layer Probe” Even Under Entropic's Constructions

- Test Response is used for channel assessment and to diagnose timing and power problems at the physical layer. (Reply, 24-25; Ex. 1036 (Bertonis Reply Dec.), ¶¶70, 73-75)
- Test Response includes a square wave that the '690 patent expressly describes as an example probe “for channel estimate purposes.”

In some alternative embodiments, the probe requests specify time-domain probes. For example, a probe request may specify a time domain probe to generate a square wave or other easily analyzed signal for channel estimate purposes. In

(Reply, 24; Ex. 1036 (Bertonis Reply Dec.), ¶73)

(Ex. 1001 ('690 patent), 9:55-58; Reply, 24; Ex. 1036 (Bertonis Reply Dec.), ¶73)

- Mr. Holobinko's arguments are meritless and conflict with the '690 patent:

modem. See Ex. 1002, ¶¶ 576–581, 585–587, 591–593. Although DOCSIS 2.0 does not explicitly state what the testing process is used for, a POSITA would understand it is a basic test that simply confirms the cable modem is capable of transmitting 1s and -1s in the amplitude and phase. A POSITA would further understand that the ordered (as opposed to randomized) set of 1s and -1s is not useable for channel diagnostics or for characterizing the channel, and so they would not expect the test process to be used in that way.

(Reply, 24; Ex. 1036 (Bertonis Reply Dec.), ¶73)

(Ex. 2007 (Holobinko Dec.), ¶107; Ex. 1036 (Bertonis Reply Dec.), ¶73)

The Only Other Dispute Is Whether The Test Request Specifies Content Payload Of The Test Response

- Aside from agreeing with the Board's preliminary decision, Entropic never argues that the Test Request fails to specify the content payload of the Test Response. (Reply, 24; POR 54)
- The Test Request's Mode parameter specifies the payload of the Test Response: if Mode=1, Test Response includes signal with 1s and -1s; if Mode=2, Test Response includes signal with 1s.

Mode 0 = Disable all test modes and reboot

1 = Transmit a continuous (non-burst) upstream signal at the commanded modulation rate, carrier frequency, and power level. The chip sequence at the spreader output is replaced with an alternating binary sequence (1, -1, 1, -1, 1, -1,...) at nominal amplitude, equal on I and Q. The CM tracks the downstream symbol clock and uses it to generate the upstream symbol clock as in normal synchronous operation.

2 = Transmit a continuous (non-burst), unmodulated (CW) upstream signal at the commanded carrier frequency, modulation rate and power level. This is equivalent to replacing the chip sequence at the spreader output with the constant sequence (1, 1, 1, 1, 1, 1,...) at nominal amplitude, equal on both I and Q. The CM tracks the downstream symbol clock and uses it to generate the upstream symbol clock as in normal synchronous operation.

(Petition 79; Ex. 1002 (Bertonis Dec.), ¶580; Reply, 24; Ex. 1036 (Bertonis Reply Dec.), ¶78)

(Ex. 1010 (DOCSIS 2.0), 185; Reply, 26; Ex. 1036 (Bertonis Reply Dec.), ¶78)

- This teaches “at least specify content payload of the probe” (in [1A]) under Entropic's litigation position. (Reply, 24; Ex. 1036 (Bertonis Reply Dec.), ¶78; Ex. 1051 (Entropic Infringement Evid.) 126-130; Ex. 1052 (Markman Tr.), 62:2-71:18)

DOCSIS 2.0 In View Of ISO8802-2 Further Teaches The Test Request Specifies Content Payload Of The Test Response

- DOCSIS 2.0 expressly states to use ISO8802-2 for Test Response (Petition, 71, 79; Ex. 1002 (Bertonis Dec.), ¶¶560, 580; Reply, 26; Ex. 1036 (Bertonis Reply Dec.), ¶77)

The CM and CMTS also MUST function as LLC hosts. As such, the CM and CMTS MUST respond appropriately to TEST and XID requests per [ISO8802-2]. (Ex. 1010 (DOCSIS 2.0), 28; Petition 79; Ex. 1002 (Bertonis Dec.), ¶580)

- ISO8802-2 discloses Test Response having information field from Test Request (Petition, 79; Ex. 1002 (Bertonis Dec.), ¶580; Reply, 26; Ex. 1036 (Bertonis Reply Dec.), ¶77)

5.4.1.2.2 Test (TEST) response

The TEST response PDU shall be used to reply to the TEST command PDU. The TEST response PDU shall have its F bit set to the value of the P bit in the TEST command PDU. An information field, if present in the TEST command PDU, shall be returned in the corresponding TEST response PDU. If the LLC cannot accept (Ex. 1011 (ISO8802-2), 53; Petition 79; Ex. 1002 (Bertonis Dec.), ¶580)

- Thus, Mode and channel parameters in the Test Request would have specified the information field of the Test Response. (Petition, 71, 79; Ex. 1002 (Bertonis Reply Dec.), ¶¶560, 580; Reply, 26; Ex. 1036 (Bertonis Reply Dec.), ¶77)

Entropic Does Not Dispute That DOCSIS 2.0's Test Procedure Meets All Other Elements of Independent Claims

- Test Request includes a source address that specifies the CMTS (claimed “wherein the first plurality of parameters at least specify...a second node”) (Petition 79; Ex. 1010 (DOCSIS 2.0), 133; Ex. 1002 (Bertonis Dec.), ¶¶580-581)
- Test Request's parameters (specifically the modulation rate, carrier frequency, and power level) are used to dictate the Test Response's form (claimed “wherein the probe has a form dictated by the first plurality of parameters”) (Petition 81; Ex. 1010 (DOCSIS 2.0), 185-186; Ex. 1002 (Bertonis Dec.), ¶¶591-593)

Table 8-22 Channel TLV Parameters

Name	Type (1 byte)	Length (1 byte)	Value (variable length)
Modulation Rate	1	1	Multiples of base rate of 160 kHzc. (Value is 1, 2, 4, 8, 16, or 32.). This TLV MUST be present if the test mode is 1.

Table 8-22 Channel TLV Parameters (Continued)

Frequency	2	4	Upstream carrier frequency (Hz). This TLV MUST be present if the test mode is 1 or 2.
Power	3	1	This TLV specifies the power (unsigned 8-bit, dBmV units) at which the CM MUST transmit the TST-REQ message. This TLV MUST be present if the test mode is 1 or 2.
S-CDMA US ratio numerator 'M'	4	2	The numerator (M) of the M/N ratio relating the downstream symbol clock to the upstream modulation clock. This TLV MUST be present if the test mode is 1. This TLV MUST be present if the test mode is 2 and the operation is synchronous.
S-CDMA US ratio denominator 'N'	5	2	The denominator (N) of the M/N ratio relating the downstream symbol clock to the upstream modulation clock. This TLV MUST be present if the test mode is 1. This TLV MUST be present if the test mode is 2 and the operation is synchronous.

(Ex. 1010 (DOCSIS 2.0), 185-186; Petition 81; Ex. 1002 (Bertonis Dec.), ¶577)

Roadmap

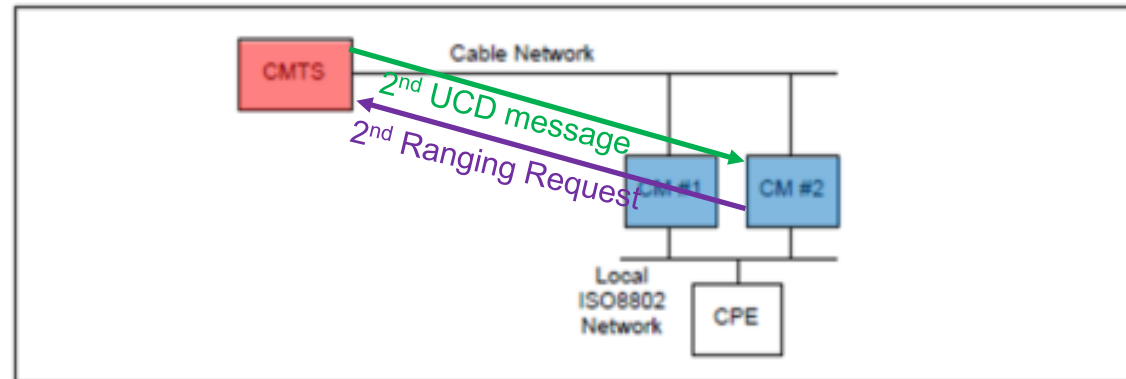
- Overview of the '690 Patent
- Instituted Grounds
- Claim Construction
- Grounds A and B: WiMAX
- Grounds D and E: Waxman
- Ground G: Waxman in view of Zuckerman
- Ground J: DOCSIS 2.0 Ranging
- Ground K: DOCSIS 2.0 Testing
- Ground L: DOCSIS 2.0 Ranging in view of Zuckerman
- Ground M: DOCSIS 2.0 Testing in view of Zuckerman

DOCSIS 2.0 Ranging Teaches Limitation [11A]

[11A]	a) the first node transmitting a second probe request to a third node ;
-------	--

In addition to transmitting a first UCD message to CM#1, the **CMTS** transmits a **second UCD message** (“second probe request”) to **CM#2** (“third node”).

(Petition, 90; Ex. 1002 (Bertonis Dec.), ¶¶673-674)



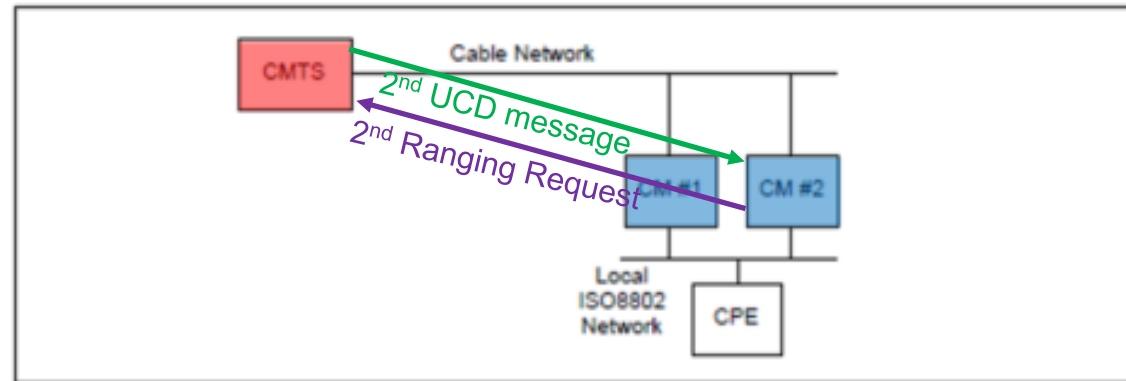
(Ex. 1010 (DOCSIS 2.0), 29, FIG. 5-3; Petition, 91; Ex. 1002 (Bertonis Dec.), ¶¶673-674)

DOCSIS 2.0 Ranging Teaches Limitation [11B]

[11B] b) and the **first node** receiving a **second probe** from the **third node**, wherein the **second probe** is generated according to the **second probe request**; and

The **CMTS** receives a **second Ranging Request** (“second probe”) from **CM#2**, wherein the **second Ranging Request** is generated according to the **second UCD message**.

(Petition, 91; Ex. 1002 (Bertonis Dec.), ¶¶677-678)



(Ex. 1010 (DOCSIS 2.0), 29, FIG. 5-3; Petition, 91; Ex. 1002 (Bertonis Dec.), ¶¶673-674)

DOCSIS 2.0 Ranging-Zuckerman Teaches Limitation [11C]

[11C]	wherein the first probe and second probe are transmitted simultaneously using OFDMA.
-------	--

- **Zuckerman teaches using OFDMA for cable networks implementing DOCSIS.**
(Reply, 27; Ex. 1036 (Bertonis Reply Dec.), ¶¶79-82; Petition, 89-90, 92; Ex. 1002, ¶681)
- **As a result of using OFDMA, in at least some cases, both Ranging Requests would have been transmitted simultaneously. This would have happened because the UCD messages that trigger them would have been sent simultaneously or near simultaneously so that the ranging procedure would be performed on multiple channels simultaneously.** (Petition, 92; Ex. 1002 (Bertonis Dec.), ¶682)
- **A POSITA would have been motivated to configure the system to transmit these messages simultaneously because it efficiently uses the bandwidth and because ranging is required to ensure correct timing of communications between the CMTS and CMs.** (Petition, 92; Ex. 1002 (Bertonis Dec.), ¶683)

[0005] Cable modems mostly use the DOCSIS standards for transferring data in parallel with dedicated CATV channels, which transfer the video channels over coax cables. Various modulations can be used to carry the data over the coax, while the most common modulation used today over Coax is single carrier. In xDSL modems a similar approach

(Ex. 1016 (Zuckerman), [0005]; Petition, 89; Ex. 1002, ¶666; Reply, 27; Ex. 1036, ¶80)

[0049] In one embodiment of the invention, OFDM or OFDMA modulation is implemented. This embodiment has the ability to transmit/receive the same OFDM or OFDMA physical layer modulation signal via both the wired and the wireless portions of the network. As a result, the Hybrid

(Ex. 1016 (Zuckerman), [0049]; Petition, 89; Ex. 1002, ¶666; Reply, 27; Ex. 1036, ¶80)

[0008] The orthogonal frequency division multiple access (OFDMA) system, a multiple access system designed for simultaneous access by multiple users, is applied to OFDM. OFDMA divides an allocated frequency band into N subcarriers and allocates them to groups, for simultaneous use by multiple links. Supporting high rate applications, multiple subcarriers may be assigned to a single user. On the forward link from a base station to a plurality of users, the subcarrier groups, allocated to the respective mobile stations, are transferred simultaneously, while at the same time synchronizing with one another, and thereby guaranteeing mutual orthogonality of the subcarriers.

(Ex. 1016 (Zuckerman), [0008]; Petition, 89; Ex. 1002, ¶666; Ex. 1036, ¶80)

Entropic's Argument for Claim 11 Ignores Zuckerman and Misuses DOCSIS 3.1

- The incorporation of OFDMA in DOCSIS 3.1 does not undermine the obvious use of OFDMA with DOCSIS 2.0 in view of Zuckerman. (Reply, 27)
- The number of years between DOCSIS 2.0 and DOCSIS 3.1 does not indicate non-obviousness, much less obviate reliance on Zuckerman.
(Reply, 27; *See Iron Grip Barbell Co. v. USA Sports, Inc.*, 392 F.3d 1317, 1325 (Fed. Cir. 2004))
- A POSITA would have been motivated to adapt DOCSIS 2.0 to use OFDMA because OFDMA's advantages were well-known (as Zuckerman establishes) and the market was moving toward OFDMA before the '690 patent. (Reply, 27)
- DOCSIS 3.1 shows the compatibility and practicality of using OFDMA in DOCSIS 2.0's cable network. (Reply, 27)

Roadmap

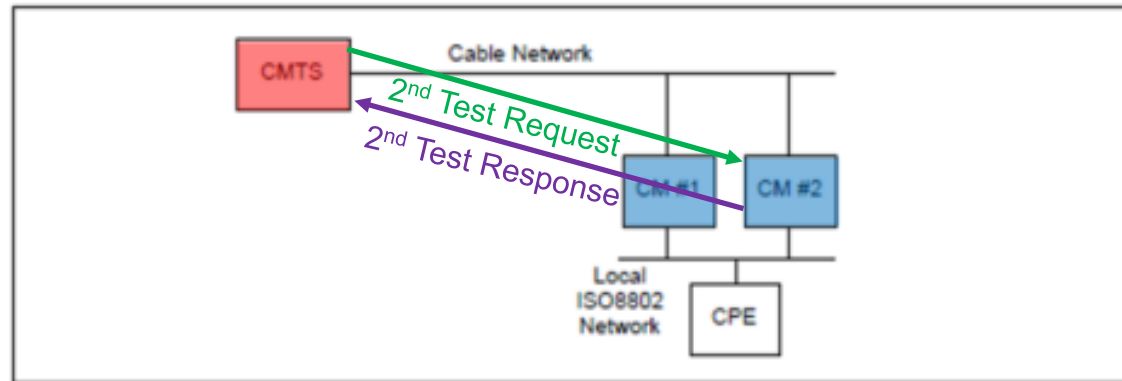
- Overview of the '690 Patent
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- Grounds A and B: WiMAX
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- Ground J: DOCSIS 2.0 Ranging
- Ground K: DOCSIS 2.0 Testing
- Ground L: DOCSIS 2.0 Ranging in view of Zuckerman
- Ground M: DOCSIS 2.0 Testing in view of Zuckerman

DOCSIS 2.0 Testing Teaches Limitation [11A]

[11A]	a) the first node transmitting a second probe request to a third node ;
-------	--

In addition to transmitting a first Test Request to CM#1, the **CMTS** transmits a **second Test Request** (“second probe request”) to **CM#2** (“third node”).

(Petition, 91; Ex. 1002 (Bertonis Dec.), ¶¶675-676)



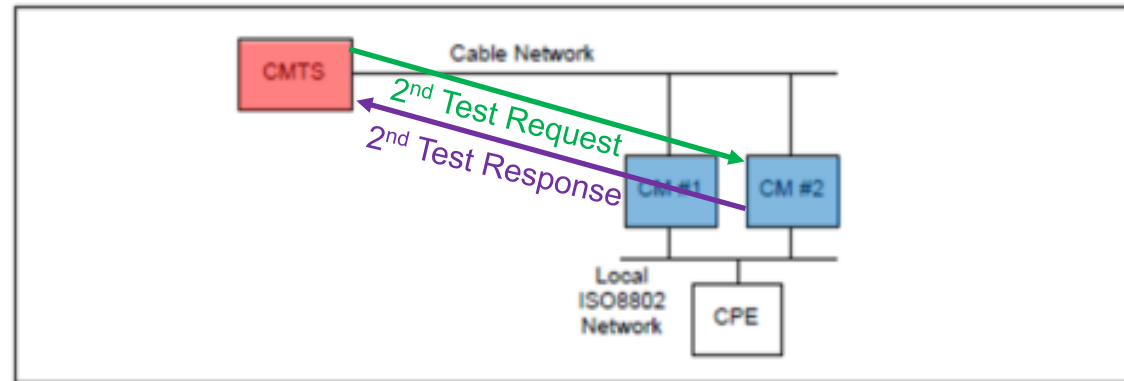
(Ex. 1010 (DOCSIS 2.0), 29, FIG. 5-3; Petition, 91; Ex. 1002 (Bertonis Dec.), ¶¶675-676)

DOCSIS 2.0 Testing Teaches Limitation [11B]

[11B] b) and the **first node** receiving a **second probe** from the **third node**, wherein the **second probe** is generated according to the **second probe request**; and

The **CMTS** receives a **second Test Response** (“second probe”) from **CM#2**, wherein the **second Test Response** is generated according to the **second Test Request**.

(Petition, 91; Ex. 1002 (Bertonis Dec.), ¶¶679-680)



(Ex. 1010 (DOCSIS 2.0), 29, FIG. 5-3; Petition, 91; Ex. 1002 (Bertonis Dec.), ¶¶675-676)

DOCSIS 2.0 Testing-Zuckerman Teaches Limitation [11C]

[11C] wherein the first probe and second probe are transmitted simultaneously using OFDMA.

- **Zuckerman teaches using OFDMA for cable networks implementing DOCSIS.**
(Reply, 27; Ex. 1036 (Bertonis Reply Dec.), ¶¶79-82; Petition, 89-90, 92; Ex. 1002, ¶681)
- **As a result of using OFDMA, in at least some cases, both Test Responses would have been transmitted simultaneously. This would have happened because the Test Requests that trigger them would have been sent simultaneously or near simultaneously so that the testing procedure would be performed on multiple channels simultaneously.** (Petition, 92; Ex. 1002 (Bertonis Dec.), ¶685)
- **A POSITA would have been motivated to configure the system to transmit these signals simultaneously because it efficiently uses the bandwidth and because testing of multiple CMs simultaneously would have been desirable given the number of CMs connected to a CMTS.**
(Petition, 92; Ex. 1002 (Bertonis Dec.), ¶686)

[0005] Cable modems mostly use the DOCSIS standards for transferring data in parallel with dedicated CATV channels, which transfer the video channels over coax cables. Various modulations can be used to carry the data over the coax, while the most common modulation used today over Coax is single carrier. In xDSL modems a similar approach

(Ex. 1016 (Zuckerman), [0005]; Petition, 89; Ex. 1002, ¶666; Reply, 27; Ex. 1036, ¶80)

[0049] In one embodiment of the invention, OFDM or OFDMA modulation is implemented. This embodiment has the ability to transmit/receive the same OFDM or OFDMA physical layer modulation signal via both the wired and the wireless portions of the network. As a result, the Hybrid

(Ex. 1016 (Zuckerman), [0049]; Petition, 89; Ex. 1002, ¶666; Reply, 27; Ex. 1036, ¶80)

[0008] The orthogonal frequency division multiple access (OFDMA) system, a multiple access system designed for simultaneous access by multiple users, is applied to OFDM. OFDMA divides an allocated frequency band into N subcarriers and allocates them to groups, for simultaneous use by multiple links. Supporting high rate applications, multiple subcarriers may be assigned to a single user. On the forward link from a base station to a plurality of users, the subcarrier groups, allocated to the respective mobile stations, are transferred simultaneously, while at the same time synchronizing with one another, and thereby guaranteeing mutual orthogonality of the subcarriers.

(Ex. 1016 (Zuckerman), [0008]; Petition, 89; Ex. 1002, ¶666; Ex. 1036, ¶80)

Entropic's Argument for Claim 11 Ignores Zuckerman and Misuses DOCSIS 3.1

Entropic's argument for claim 11 against DOCSIS 2.0 Testing in view of Zuckerman is the same as its argument against DOCSIS 2.0 Ranging in view of Zuckerman and thus it fails for the same reasons:

- The incorporation of OFDMA in DOCSIS 3.1 does not undermine the obvious use of OFDMA with DOCSIS 2.0 in view of Zuckerman. (Reply, 27)
- The number of years between DOCSIS 2.0 and DOCSIS 3.1 does not indicate non-obviousness, much less obviate reliance on Zuckerman.
(Reply, 27; See *Iron Grip Barbell Co. v. USA Sports, Inc.*, 392 F.3d 1317, 1325 (Fed. Cir. 2004))
- A POSITA would have been motivated to adapt DOCSIS 2.0 to use OFDMA because OFDMA's advantages were well-known (as Zuckerman establishes) and the market was moving toward OFDMA before the '690 patent. (Reply, 27)
- DOCSIS 3.1 shows the compatibility and practicality of using OFDMA in DOCSIS 2.0's cable network. (Reply, 27)

Backup Slides

WiMAX Backup Slides

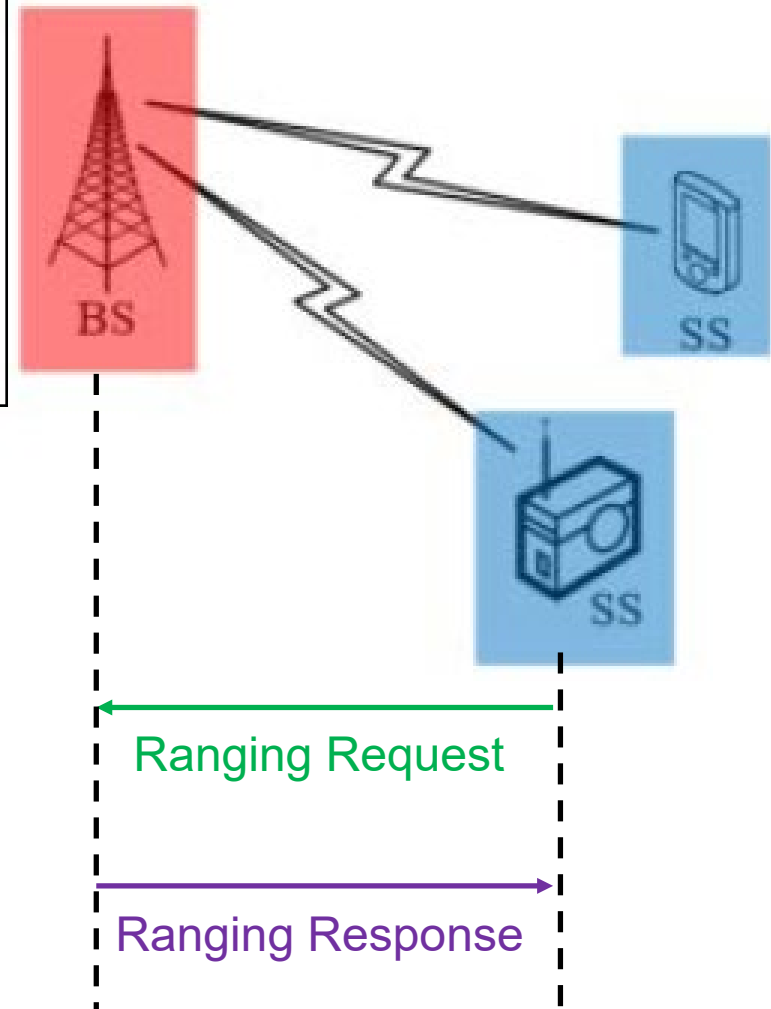
WiMAX Discloses Limitation [9A]

[9A]

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

WiMAX discloses a **subscriber station (SS)** transmitting the **Ranging Request** to a **base station (BS)**.

(Petition, 34-35; Ex. 1002 (Bertonis Dec.), ¶¶179-180)



(Petition, 6-8 34-35; Ex. 1002 (Bertonis Dec.), ¶¶179-180)

WiMAX Discloses Limitation [9A]

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

WiMAX's **Ranging Request** specifies a **plurality of parameters** including Management Message Type, Downlink Channel ID, and TLV Encoded Information (which includes even more parameters) for generating and transmitting the **Ranging Response**. (Petition, 34-35; Ex. 1002 (Bertonis Dec.), ¶¶181-190)

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	variable	TLV specific
}		

(Ex. 1013 (WiMAX), 49; Petition, 8, 34-35; Ex. 1002 (Bertonis Dec.), ¶180)

Table 364—**RNG-REQ message** encodings

Name	Type (1 byte)	Length	Value (variable-length)	PHY Scope
Requested Downlink Burst Profile	1	1	Bits 0-3: DIUC of the downlink burst profile requested by the SS for downlink traffic. Bits 4-7: 4 LSB of Configuration Change Count value of DCD defining the burst profile associated with DIUC.	All
SS MAC Address	2	6	The MAC address of the SS	All
Ranging Anomalies	3	1	A parameter indicating a potential error condition detected by the SS during the ranging process. Setting the bit associated with a specific condition indicates that the condition exists at the SS. Bit #0 — SS already at maximum power. Bit #1 — SS already at minimum power. Bit #2 — Sum of commanded timing adjustments is too large.	All
AAS broadcast capability	4	1	0 = SS can receive broadcast messages 1 = SS cannot receive broadcast messages	SCa, OFDM, OFDMA

(Ex. 1013 (WiMAX), 664; Petition, 9, 34-35; Ex. 1002 (Bertonis Dec.), ¶181)

WiMAX Discloses Limitation [9A]

- [9A] a) a first node transmitting a probe request to a second node, the **probe request** specifying a first plurality of probe parameters for a physical layer probe, **the first plurality of probe parameters comprising a form for the probe including a modulation profile for the probe**;

The Ranging Request's Requested Downlink Burst Profile parameter comprises a downlink burst profile (including a modulation profile (see next slide)) to be used by the BS to format the Ranging Response.

(Petition, 9-12, 18-19; Ex. 1002 (Bertonis Dec.), ¶¶138-142, 155-157)

Table 364—RNG-REQ message encodings

Name	Type (1 byte)	Length	Value (variable-length)	PHY Scope
Requested Downlink Burst Profile	1	1	Bits 0-3: DIUC of the downlink burst profile requested by the SS for downlink traffic. Bits 4-7: 4 LSB of Configuration Change Count value of DCD defining the burst profile associated with DIUC.	All
SS MAC Address	2	6	The MAC address of the SS	All
Ranging Anomalies	3	1	A parameter indicating a potential error condition detected by the SS during the ranging process. Setting the bit associated with a specific condition indicates that the condition exists at the SS. Bit #0 — SS already at maximum power. Bit #1 — SS already at minimum power. Bit #2 — Sum of commanded timing adjustments is too large.	All
AAS broadcast capability	4	1	0 = SS can receive broadcast messages 1 = SS cannot receive broadcast messages	SCa, OFDM, OFDMA

(Ex. 1013 (WiMAX), 664; Petition, 9; Ex. 1002 (Bertonis Dec.), ¶138)

Table 143—Mapping of burst profile to DIUC

Burst profile	DIUC
Downlink Burst Profile 1	0
Downlink Burst Profile 2	1
Downlink Burst Profile 3	2
Downlink Burst Profile 4	3
Downlink Burst Profile 5	4
Downlink Burst Profile 6	5
Downlink Burst Profile 7	6
Downlink Burst Profile 8	7
Downlink Burst Profile 9	8
Downlink Burst Profile 10	9
Downlink Burst Profile 11	10
Downlink Burst Profile 12	11
Downlink Burst Profile 13	12
<i>reserved</i>	13
Gap	14
End of DL-MAP	15

(Ex. 1013 (WiMAX), 315; Petition 10; Ex. 1002 (Bertonis Dec.), ¶139)

WiMAX Discloses Limitation [9A]

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

The Requested Downlink Burst Profile parameter provides the FEC Code type which includes a modulation type (e.g., QPSK, 16-QAM, etc.).

(Petition, 10-12, 18-19; Ex. 1002 (Bertonis Dec.), ¶¶138-142, 155-157)

Table 363—DCD burst profile encodings—WirelessMAN-OFDMA

Name	Type (1 byte)	Length	Value (variable length)
FEC Code type	150	1	0 = QPSK (CC) 1/2 14 = QPSK (CTC) 3/4 1 = QPSK (CC) 3/4 15 = 16-QAM (CTC) 1/2 2 = 16-QAM (CC) 1/2 16 = 16-QAM (CTC) 3/4 3 = 16-QAM (CC) 3/4 17 = 64-QAM (CTC) 2/3 4 = 64-QAM (CC) 2/3 18 = 64-QAM (CTC) 3/4 5 = 64-QAM (CC) 3/4 19 = 64-QAM (CTC) 5/6 6 = QPSK (BTC) 1/2 20 = QPSK (ZT CC) 1/2 7 = QPSK (BTC) 3/4 or 2/3 21 = QPSK (ZT CC) 3/4 8 = 16-QAM (BTC) 3/5 22 = 16-QAM (ZT CC) 1/2 9 = 16-QAM (BTC) 4/5 23 = 16-QAM (ZT CC) 3/4 10 = 64-QAM (BTC) 2/3 or 5/8 24 = 64-QAM (ZT CC) 2/3 11 = 64-QAM (BTC) 5/6 or 4/5 25 = 64-QAM (ZT CC) 3/4 12 = QPSK (CTC) 1/2 26..255 = Reserved 13 = QPSK (CTC) 2/3
DIUC Mandatory exit threshold	151	1	0–63.75 dB CINR at or below where this DIUC can no longer be used and where this change to a more robust DIUC is required, in 0.25 dB units. See Figure 81.
DIUC Minimum entry threshold	152	1	0–63.75 dB The minimum CINR required to start using this DIUC when changing from a more robust DIUC is required, in 0.25 dB units. See Figure 81.

(Ex. 1013 (WiMAX), 663; Petition 11; Ex. 1002 (Bertonis Dec.), ¶141)

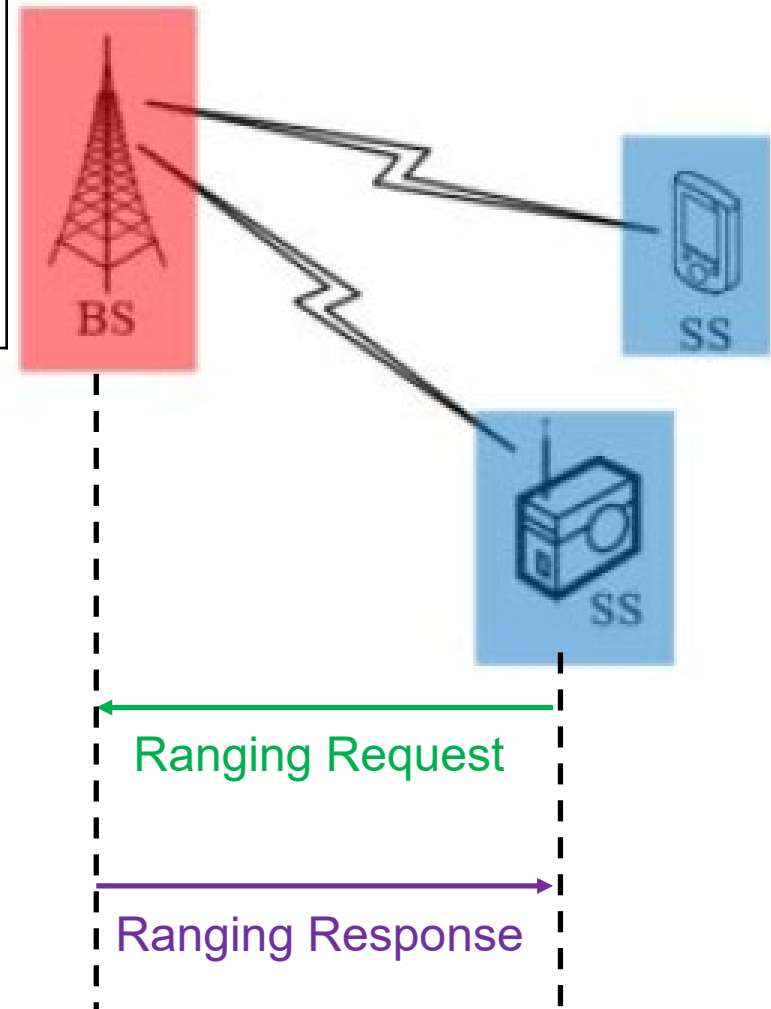
WiMAX Discloses Limitation [9B]

[9B]

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

WiMAX discloses the **subscriber station (SS)** receiving the **Ranging Response** from the **base station (BS)**.

(Petition, 34-35; Ex. 1002 (Bertonis Dec.), ¶¶179-180)



(Petition, 6-8, 34-35; Ex. 1002 (Bertonis Dec.), ¶¶179-180)

WiMAX Discloses Limitation [9B]

[9B]

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

WiMAX's **Ranging Response** is generated according to **Ranging Request** parameters and **Ranging Response** parameters as determined by the **BS**.

(Petition, 35; Ex. 1002 (Bertonis Dec.), ¶¶194-196)

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	variable	TLV specific
}		

(Ex. 1013 (WiMAX), 49; Petition, 8, 34-35; Ex. 1002 (Bertonis Dec.), ¶180)

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	variable	TLV specific
}		

(Ex. 1013 (WiMAX), 50; Petition, 16; Ex. 1002 (Bertonis Dec.), ¶152)

Waxman Backup Slides

Waxman Teaches Limitation [9A]

[9A]

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

- Waxman discloses a **station** transmitting the **probe request** to **AP**.
- Waxman's **probe request** specifies a plurality of parameters for the **probe response** including a Requested Transmission Scheme (RTS) parameter, a number of antennas to be used, and other attributes.

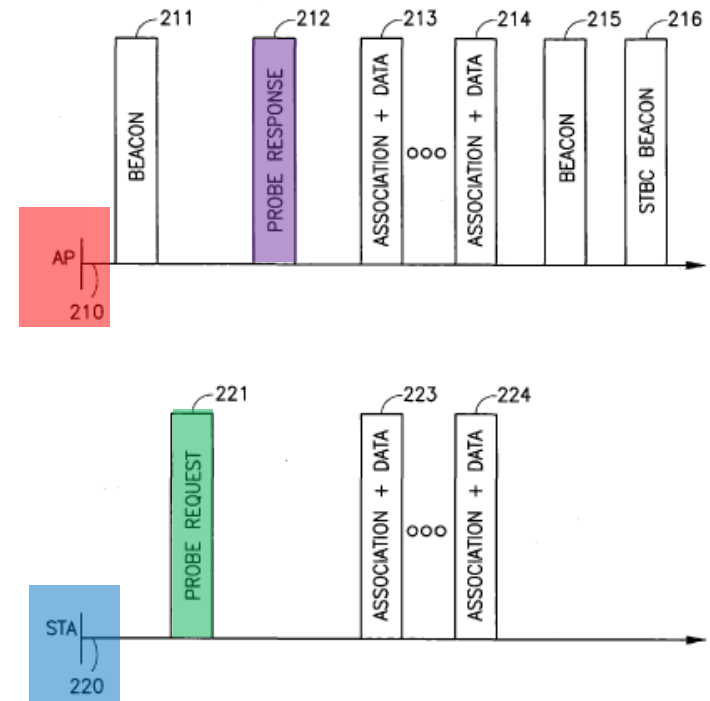


FIG. 2

(Petition, 53-54; Ex. 1002 (Bertonis Dec.), ¶¶396-404)

(Ex. 1007 (Waxman), FIG. 2; Petition 52, Ex. 1002 (Bertonis Dec.), ¶339)

Waxman Teaches Limitation [9A]

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

- Waxman's **probe request** specifies a plurality of parameters including a Requested Transmission Scheme (RTS) parameter, a number of antennas to be used, and other attributes for the AP to use to form the **probe response**.
- By specifying the transmission scheme, the RTS parameter specifies a **modulation profile** because STBC and BF perform different modulations.

(Petition, 53-54; Ex. 1002 (Bertonis Dec.), ¶¶403-407)

[0030]	Stations 101, 102 and/or 103 may perform an active scanning, e.g., may transmit a probe request. The probe request may include a Requested Transmission Scheme (RTS) field, which may include a value of a RTS parameter or other indication. The value of the RTS param-
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(Ex. 1007 (Waxman), [0030]; Petition, 49; Ex. 1002 (Bertonis Dec.), ¶403)

[0035]	In some embodiments, the probe request may be used for active scanning by a station, for example, to indicate (e.g., using a value of a parameter in a field of the probe request) a requested transmission scheme, a requested number of transmission antennas to be used, and/or other attributes of a requested transmission scheme.
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(Ex. 1007 (Waxman), [0035]; Petition, 49; Ex. 1002 (Bertonis Dec.), ¶403)

Waxman Teaches Limitation [9B]

[9B]

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

Waxman teaches the **station** receiving the **probe response** from the **AP**, wherein the **probe response** is generated in accordance with parameters in the **probe request** (e.g., number of transmission antennas, communication scheme, and/or other attributes of a requested transmission) and parameters determined by the **AP** (e.g., setting values of complex weights and/or selecting a specific BF algorithm and values for that algorithm when using BF communication).

(Petition, 54; Ex. 1002 (Bertonis Dec.), ¶¶409-420)

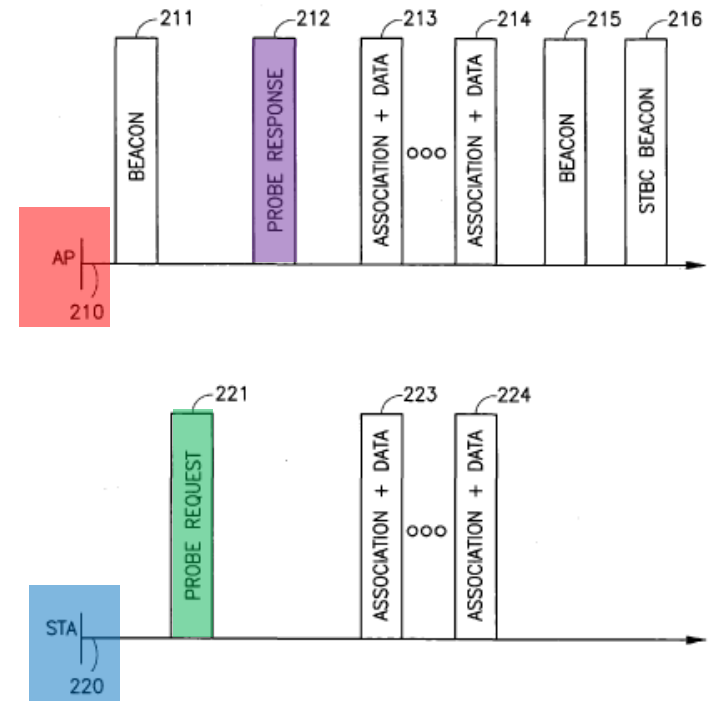


FIG. 2

(Ex. 1007 (Waxman), FIG. 2; Petition, 52; Ex. 1002 (Bertonis Dec.), ¶339)

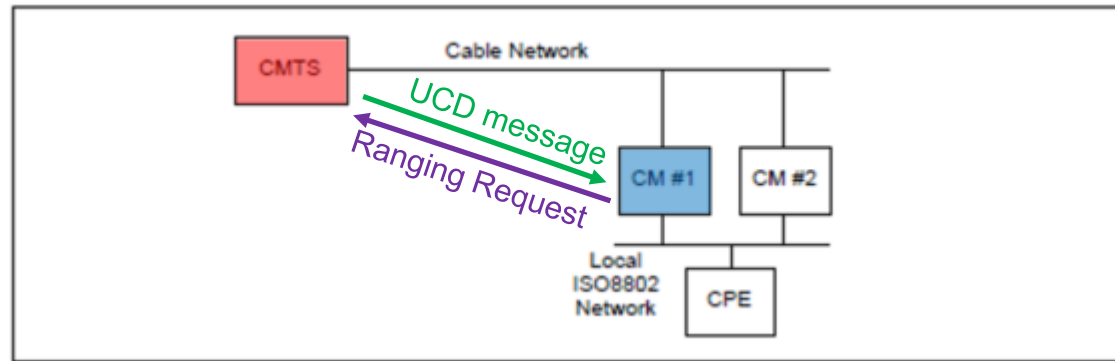
DOCSIS 2.0 Ranging Backup Slides

DOCSIS 2.0 Ranging Discloses Limitation [1A]

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

- DOCSIS 2.0 discloses the **CM#1** receiving the **UCD message** (“probe request”) from the **CMTS**.

(Petition, 72-75; Ex. 1002 (Bertonis Dec.), ¶¶565-571)



(Petition, 72; Ex. 1002 (Bertonis Dec.), ¶563)

- **UCD message** specifies many parameters including Downstream Channel ID and source address.

(Petition, 72-76; Ex. 1002 (Bertonis Dec.), ¶¶565-575)

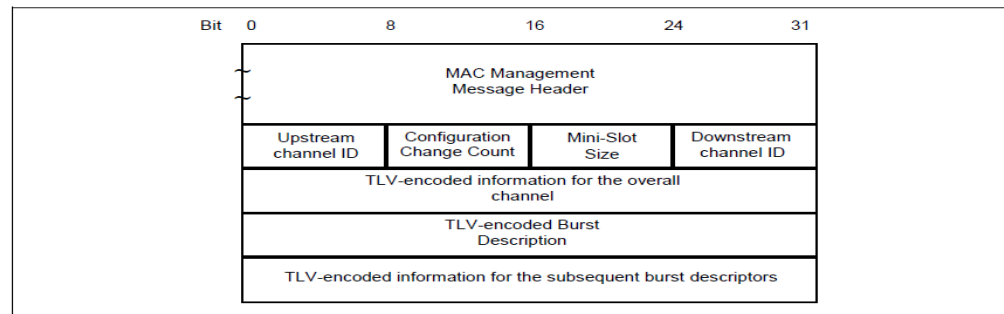


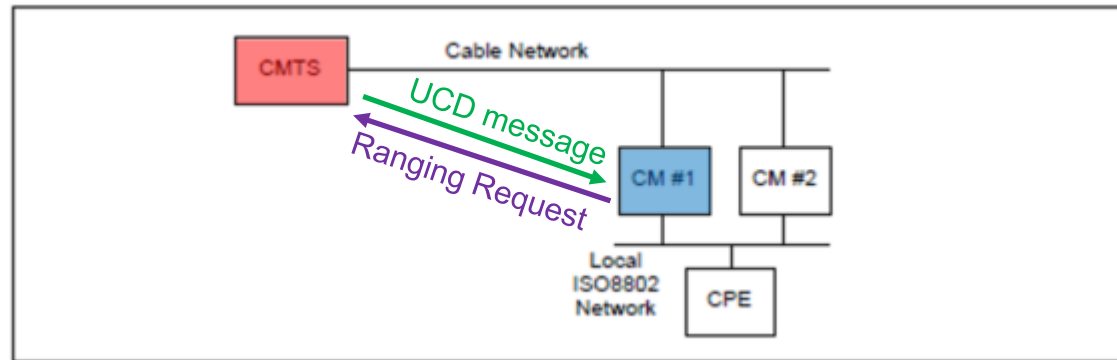
Figure 8-16 Upstream Channel Descriptor

(Ex. 1010 (DOCSIS 2.0), 136; Petition, 73; Ex. 1002 (Bertonis Dec.), ¶565)

DOCSIS 2.0 Ranging Discloses Limitation [1B]

[1B] b) determining a second plurality of parameters associated with generation and transmission of the **probe**;

- The **UCD message's** ranging required parameter causes **CM#1** to generate and transmit the **Ranging Request**.



(Petition, 72; Ex. 1002 (Bertonis Dec.), ¶563)

- The **Ranging Request** includes multiple parameters.

(Petition, 79-80; Ex. 1002 (Bertonis Dec.), ¶¶582-584)

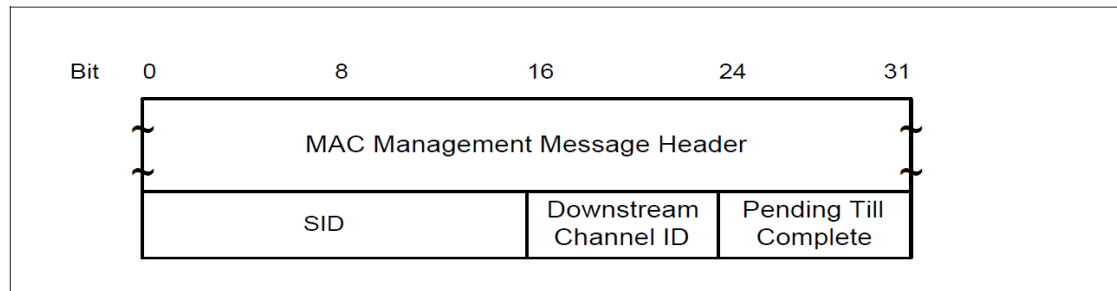


Figure 8-21 Packet PDU Following the Timing Header

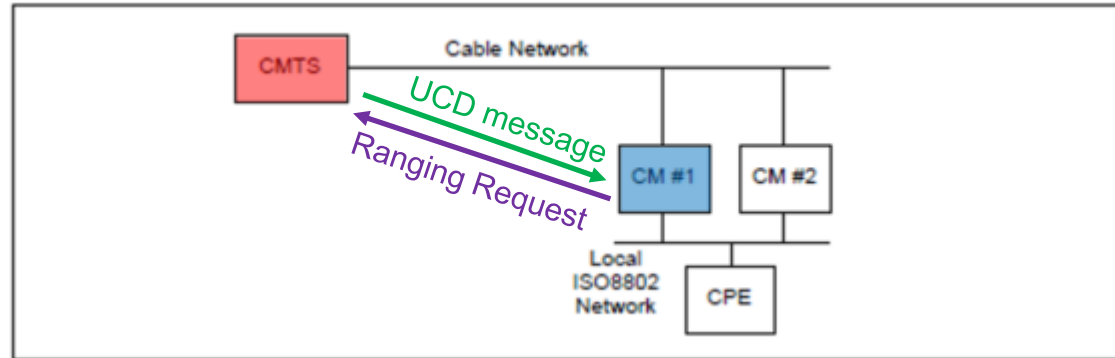
(Ex. 1010 (DOCSIS 2.0), 146; Petition, 80)

DOCSIS 2.0 Ranging Discloses Limitation [1C]

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

- The **UCD message** parameters and **Ranging Request's** parameters are used to generate the **Ranging Request**.
- The **UCD message's** modulation rate and frequency parameters are used to dictate the **Ranging Request's** form.

(Petition, 81; Ex. 1002 (Bertonis Dec.), ¶¶588-590)



(Petition, 72; Ex. 1002 (Bertonis Dec.), ¶563)

Table 8-18 Channel TLV Parameters

Name	Type (1 byte)	Length (1 byte)	Value (Variable length)
Modulation Rate	1	1	Multiples of base rate of 160 kHz. (Value is 1, 2, 4, 8, 16, or 32.) A value of 32 means that this is a DOCSIS 2.0 Only Upstream. If S-CDMA mode is enabled then this parameter MUST have a value of 8, 16 or 32.
Frequency	2	4	Upstream center frequency (Hz)

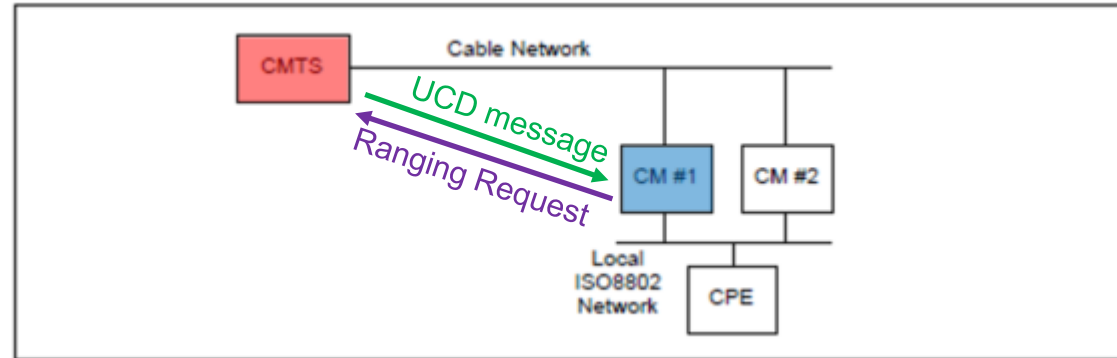
(Ex. 1010 (DOCSIS 2.0), 137; Petition, 73)

DOCSIS 2.0 Ranging Discloses Limitation [1D]

[1D] d) transmitting the **probe** from the **first node** to the **second node**.

- **CM#1** transmits the **Ranging Request** to the **CMTS**.

(Petition, 82; Ex. 1002 (Bertonis Dec.), ¶¶594-595)



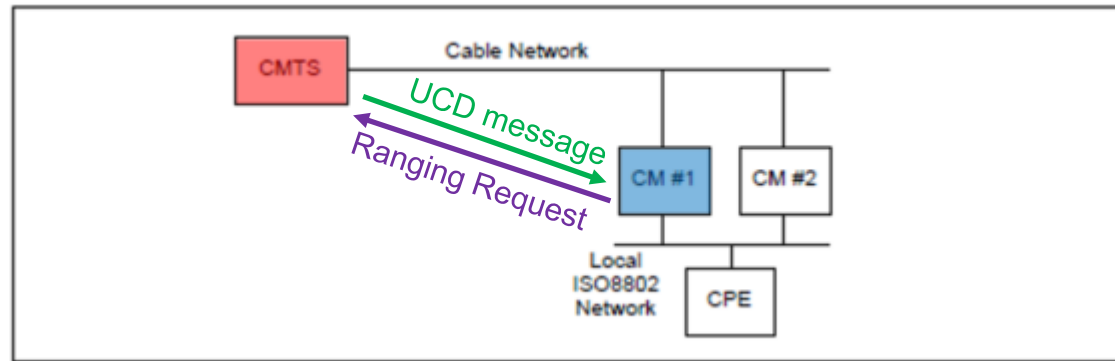
(Petition, 72; Ex. 1002 (Bertonis Dec.), ¶563)

DOCSIS 2.0 Ranging Discloses Limitation [9A]

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

- The **CMTS** transmits the **UCD message** to **CM#1** and specifies parameters for the **Ranging Request**, the UCD parameters comprising a form for the **Ranging Request** including a modulation rate and type for the **Ranging Request**.

(Petition, 83-84; Ex. 1002 (Bertonis Dec.), ¶¶614-623)



(Petition, 72; Ex. 1002 (Bertonis Dec.), ¶563)

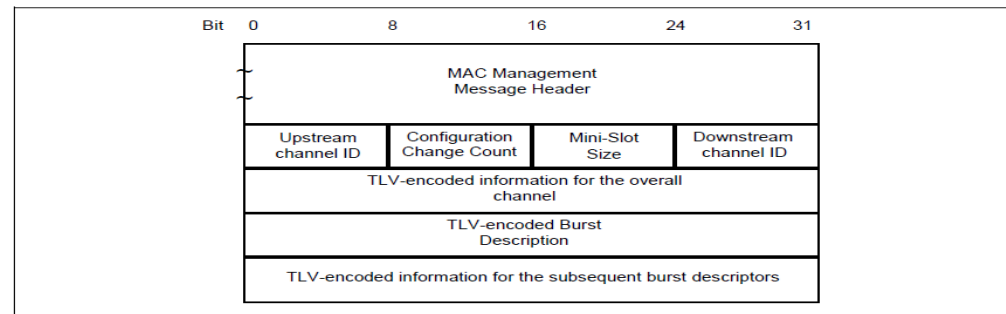


Figure 8-16 Upstream Channel Descriptor

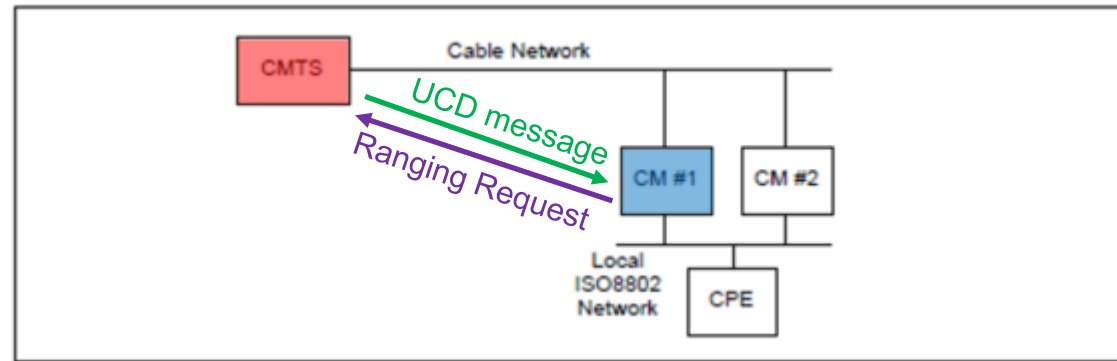
(Ex. 1010 (DOCSIS 2.0), 136; Petition, 73; Ex. 1002 (Bertonis Dec.), ¶565)

DOCSIS 2.0 Ranging Discloses Limitation [9B]

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

- The **CMTS** receives the **Ranging Request** from **CM#1**, wherein the **Ranging Request** is generated in accordance with the **UCD message's** parameters and **Ranging Request's** parameters as determined by **CM#1**.

(Petition, 84; Ex. 1002 (Bertonis Dec.), ¶¶631-634)



(Petition, 72; Ex. 1002 (Bertonis Dec.), ¶563)

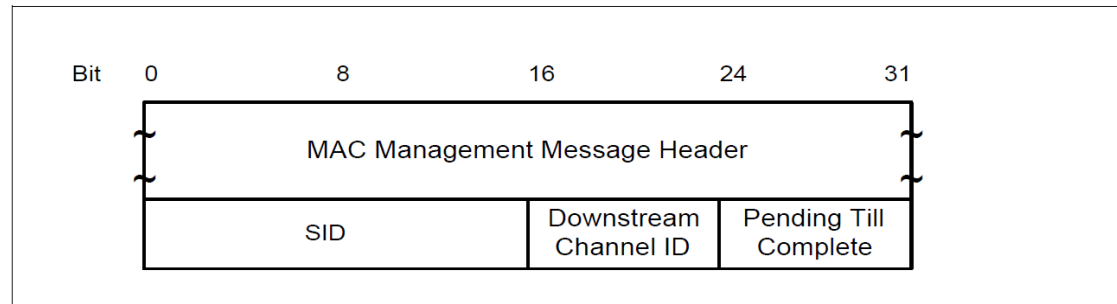


Figure 8-21 Packet PDU Following the Timing Header

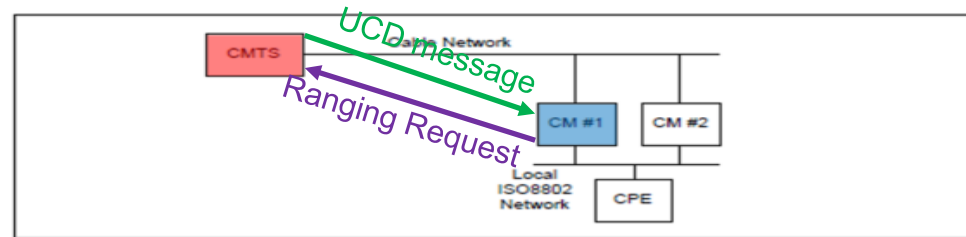
(Ex. 1010 (DOCSIS 2.0), 146; Petition, 80; Ex. 1002 (Bertonis Dec.), ¶631)

DOCSIS 2.0 Ranging-Zuckerman Teaches Claim 10

10	The method of claim 9, wherein the probe request is configured such that the probe emulates an OFDMA transmission.
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- Zuckerman teaches that DOCSIS is used for transferring data over coax and that various modulations are used to carry data over coax.
- Zuckerman then discusses the well-known advantages (e.g., high spectral efficiency, reducing interference) of OFDMA and presents a system using OFDMA for cable and wireless connections.
- Based on Zuckerman's discussed advantages of OFDMA, a POSITA would have been motivated to implement DOCSIS 2.0's cable network to use OFDMA.

(Petition, 89; Ex. 1002 (Bertonis Dec.), ¶¶ 665-667)



(Petition, 72; Ex. 1002 (Bertonis Dec.), ¶563)

A POSITA would have been motivated to use OFDMA in DOCSIS 2.0's network because doing so would have improved network performance (e.g., bit error rate) and because it addresses known problems with the DOCSIS 2.0 system (e.g., noise, network congestion).

(Petition, 89-90; Ex. 1002 (Bertonis Dec.), ¶ 667)

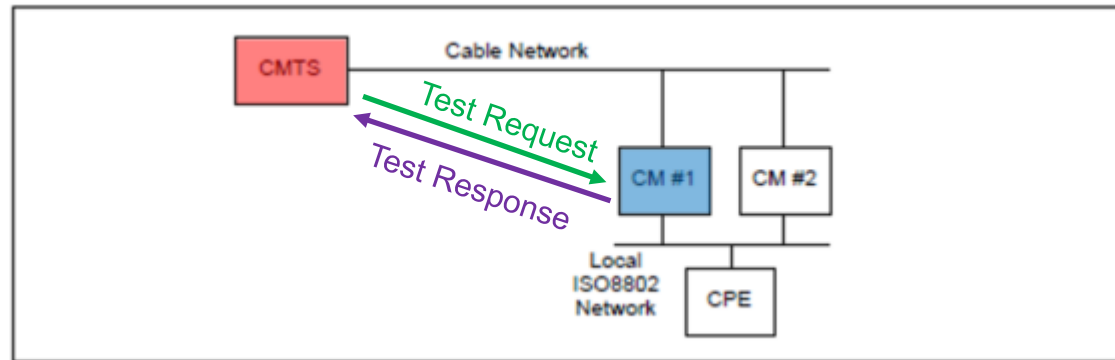
DOCSIS 2.0 Testing Backup Slides

DOCSIS 2.0 Testing Teaches Limitation [1A]

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

- In DOCSIS-2.0's test mode, **CM#1** receives a **Test Request** from the **CMTS**.
- The **Test Request** specifies many parameters including Mode and source address.
- Additionally, per ISO8802-2, the **Test Response** includes the **Test Request's** information field (i.e., Mode and channel parameters).

(Petition, 76-79; Ex. 1002 (Bertonis Dec.), ¶¶576-581)



(Petition, 72, 76-77; Ex. 1002 (Bertonis Dec.), ¶¶ 563, 576-577)

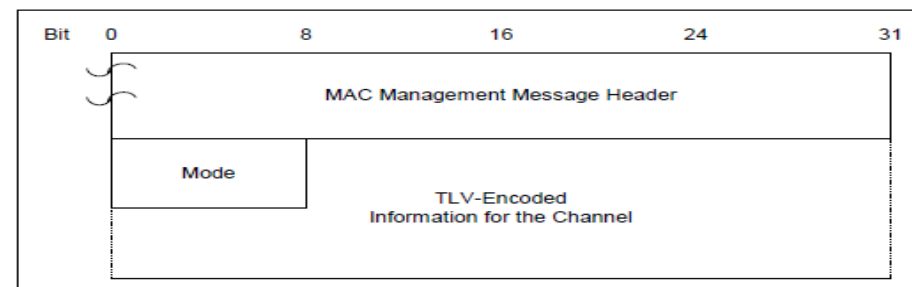


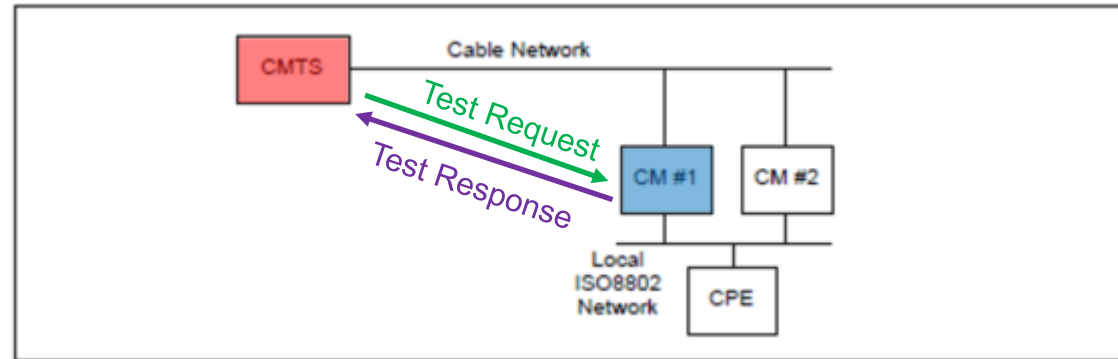
Figure 8-45 Test Request

(Ex. 1010 (DOCSIS 2.0), 185; Petition, 77; Ex. 1002 (Bertonis Dec.), ¶576)

DOCSIS 2.0 Testing Teaches Limitation [1B]

[1B] b) determining a second plurality of parameters associated with generation and transmission of the **probe**;

- Upon receiving a **Test Request** with a non-zero Mode, **CM#1** generates and transmits the **Test Response** based on the **Test Request's** parameters.
- Per ISO8802-2, the **Test Response's** PDU includes multiple parameters like DSAP and SSAP addresses.



(Petition, 72, 76-77; Ex. 1002 (Bertonis Dec.), ¶¶563, 576-577)

DSAP address	SSAP address	Control	Information
8 bits	8 bits	8 or 16 bits	M*8 bits

DSAP address	- Destination service access point address field
SSAP address	- Source service access point address field
Control	- Control field [16 bits for formats that include sequence numbering, and 8 bits for formats that do not (see 5.2)]
Information	- Information field
-	- Multiplication
M	- An Integer value equal to or greater than 0. (Upper bound of M is a function of the medium access control methodology used.)

Figure 4—LLC PDU format

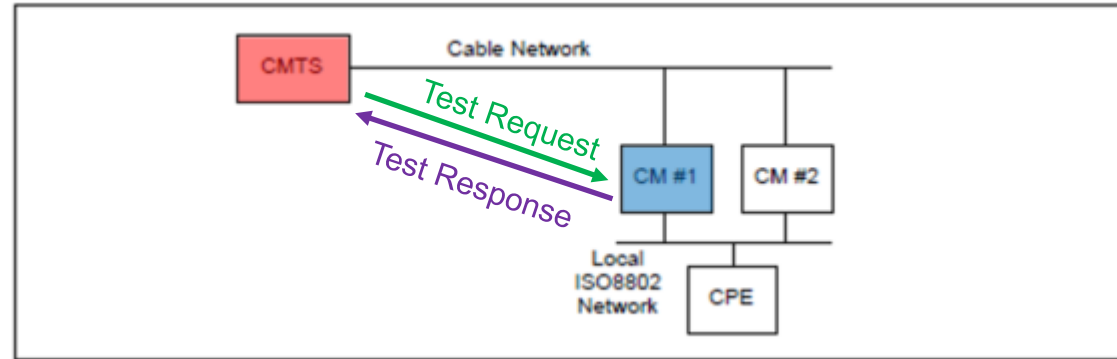
(Ex. 1011 (ISO8802-2), 39; Petition, 80)

DOCSIS 2.0 Testing Teaches Limitation [1C]

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

- The **Test Request's** parameters are used to generate the **Test Response**.
- The **Test Request's** modulation rate, carrier frequency, and power level parameters are used to dictate the **Test Response's** form.

(Petition, 81; Ex. 1002 (Bertonis Dec.), ¶¶591-593)



(Petition, 72, 76-77; Ex. 1002 (Bertonis Dec.), ¶¶563, 576-577)

Table 8-22 Channel TLV Parameters

Name	Type (1 byte)	Length (1 byte)	Value (variable length)
Modulation Rate	1	1	Multiples of base rate of 160 kHzc. (Value is 1, 2, 4, 8, 16, or 32.). This TLV MUST be present if the test mode is 1.

Table 8-22 Channel TLV Parameters (Continued)

Frequency	2	4	Upstream carrier frequency (Hz). This TLV MUST be present if the test mode is 1 or 2.
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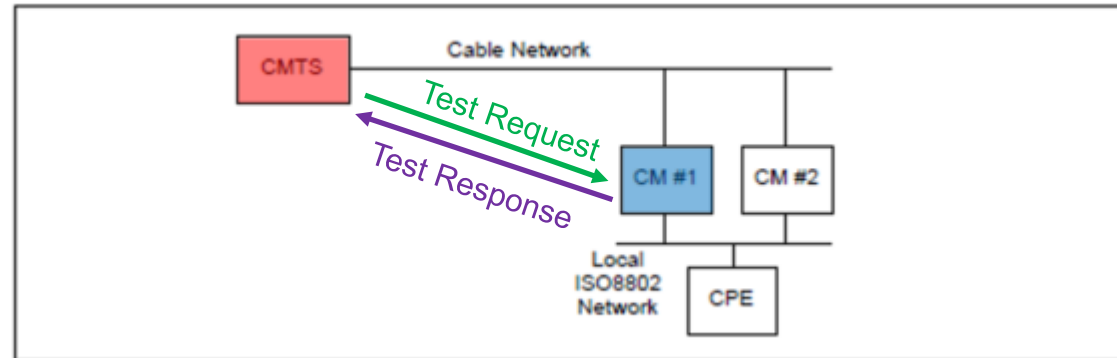
(Ex. 1010 (DOCSIS 2.0), 185-186; Petition, 77-78)

DOCSIS 2.0 Testing Teaches Limitation [1D]

[1D] d) transmitting the **probe** from the **first node** to the **second node**.

- **CM#1** transmits the **Test Response** to the **CMTS**.

(Petition, 82; Ex. 1002 (Bertonis Dec.), ¶¶596-597)



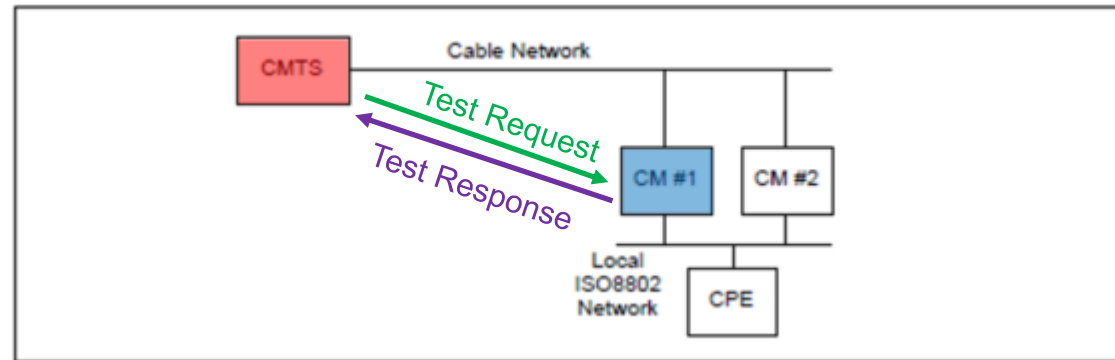
(Petition, 72, 76-77; Ex. 1002 (Bertonis Dec.), ¶¶563, 576-577)

DOCSIS 2.0 Testing Teaches Limitation [9A]

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

- The **CMTS** transmits the **Test Request** to **CM#1** and specifies parameters for the **Test Response**, the **Test Request's** parameters comprising a form for the **Test Response** including a modulation rate and type for the **Test Response**.

(Petition, 84; Ex. 1002 (Bertonis Dec.), ¶¶624-630)



(Petition, 72, 76-77; Ex. 1002 (Bertonis Dec.), ¶¶563, 576-577)

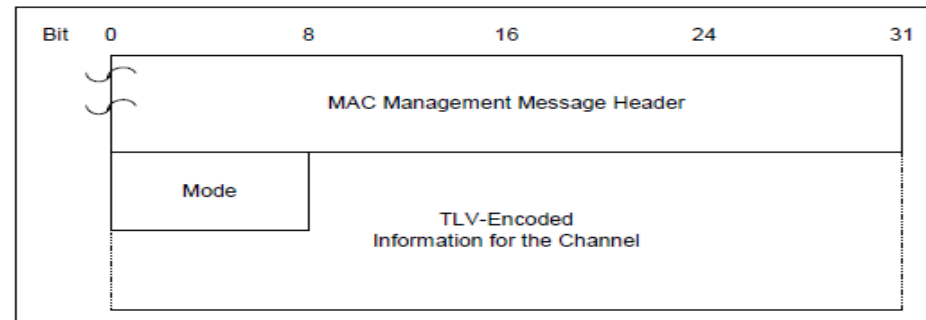


Figure 8-45 Test Request

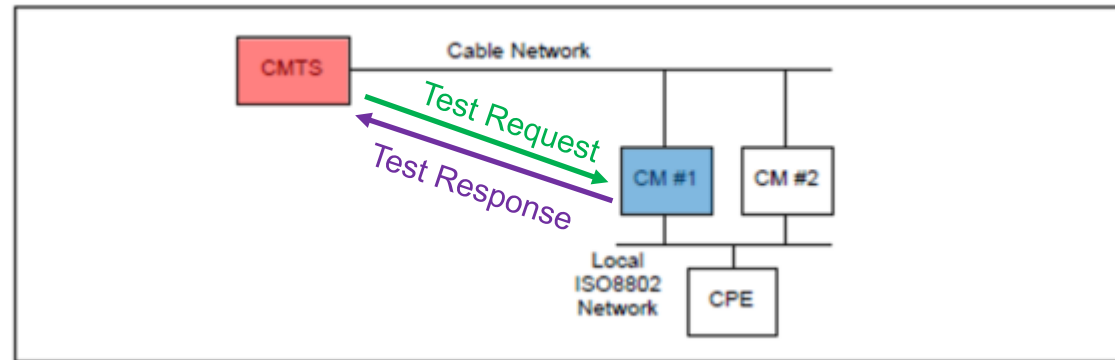
(Ex. 1010 (DOCSIS 2.0), 185; Petition, 84; Ex. 1002 (Bertonis Dec.), ¶624)

DOCSIS 2.0 Testing Teaches Limitation [9B]

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

- The **CMTS** receives the **Test Response** from **CM#1**, wherein the **Test Response** is generated in accordance with the **Test Request's** parameters and **Test Response's** parameters as determined by **CM#1**.

(Petition, 84-85; Ex. 1002 (Bertonis Dec.), ¶¶635-639)



(Petition, 72, 76-77; Ex. 1002 (Bertonis Dec.), ¶¶563, 576-577)

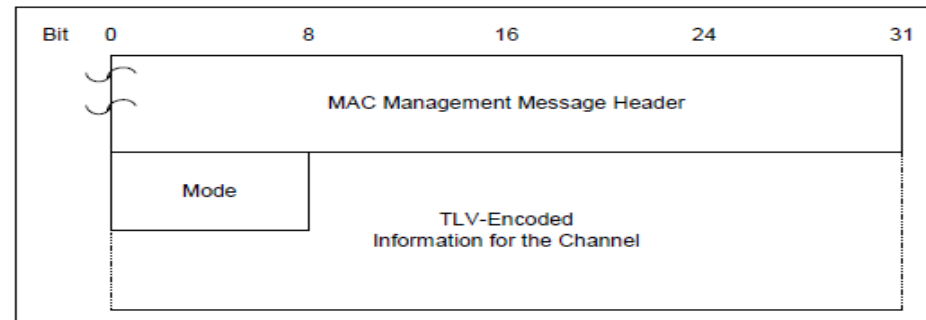


Figure 8-45 Test Request

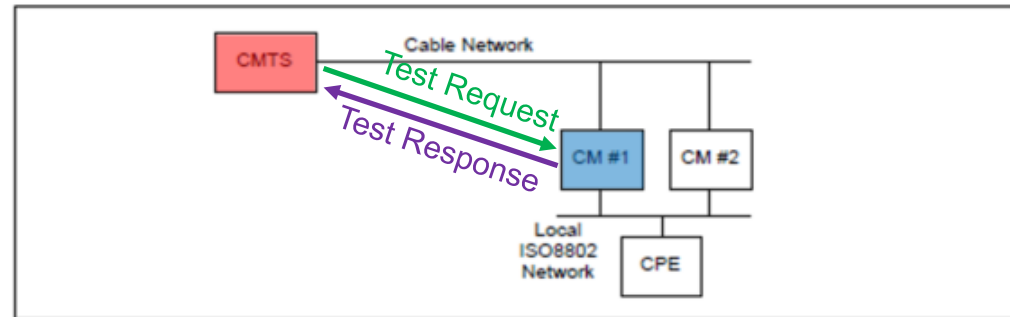
(Ex. 1010 (DOCSIS 2.0), 185; Petition, 84; Ex. 1002 (Bertonis Dec.), ¶624)

DOCSIS 2.0 Testing-Zuckerman Teaches Claim 10

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----	---

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- Zuckerman then discusses the well-known advantages (e.g., high spectral efficiency, reducing interference) of OFDMA and presents a system using OFDMA for cable and wireless connections.
- Based on Zuckerman's discussed advantages of OFDMA, a POSITA would have been motivated to implement DOCSIS 2.0's cable network to use OFDMA.

(Petition, 89; Ex. 1002 (Bertonis Dec.), ¶¶665-667)



(Petition, 72, 76-77; Ex. 1002 (Bertonis Dec.), ¶¶563, 576-577)

A POSITA would have been motivated to use OFDMA in DOCSIS 2.0's network because doing so would have improved network performance (e.g., bit error rate) and because it addresses known problems with the DOCSIS 2.0 system (e.g., noise, network congestion).

(Petition, 89-90; Ex. 1002 (Bertonis Dec.), ¶667)