

UNITED STATES PATENT AND TRADEMARK OFFICE

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BEFORE THE PATENT TRIAL AND APPEAL BOARD

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ERICSSON INC. AND  
TELEFONAKTIEBOLAGET LM ERICSSON,  
Petitioner,

v.

INTELLECTUAL VENTURES I LLC AND  
INTELLECTUAL VENTURES II LLC,  
Patent Owner.

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Case No. IPR2014-01412  
Case No. IPR2015-01077  
Patent 5,963,557

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Before BRIAN J. McNAMARA, JUSTIN BUSCH, and  
MIRIAM L. QUINN, *Administrative Patent Judges*.

McNAMARA, *Administrative Patent Judge*.

FINAL WRITTEN DECISION  
*35 U.S.C. § 318(a) and*  
*37 C.F.R. § 42.73*

## BACKGROUND

Ericsson Inc. and Telefonaktiebolaget LM Ericsson (collectively, “Petitioner”) filed a Petition (Paper 1, “Pet.”) for *inter partes* review of claims 1, 2, 4–7, 10, 12–16, 18–21, 24, 26–28, and 32 of U.S. Patent No. 5,963,557 (Ex. 1001, “the ’557 Patent”). On March 18, 2015 we entered a Decision to Institute a trial (Paper 8, “Dec. to Inst.”) on the following challenges to patentability of the claims:

Claims 7 and 21 of the ’557 Patent as anticipated under 35 U.S.C. § 102 by U.S. Patent No. 5,392,450 (“the ’450 Patent”);

Claims 1, 4, 5, 7, 12, 13, 15, 18, 19, 21, 26, and 27 of the ’557 Patent as obvious under 35 U.S.C. § 103(a) over the ’450 Patent;

Claims 1, 2, 4–7, 10, 12, 13, 15, 16, 18–21, 24, 26, 27, and 32 of the ’557 Patent as obvious under 35 U.S.C. § 103(a) over U.S. Patent No. 6,334,219 (“the ’219 Patent”);

Claim 32 of the ’557 Patent as anticipated under 35 U.S.C. § 102 by the ’219 Patent;

Claims 15, 18, and 20 of the ’557 Patent as obvious under 35 U.S.C. § 103(a) over the combination of the ’450 Patent and the admitted prior art;

Claims 5, 10, 12, and 13 of the ’557 Patent as obvious under 35 U.S.C. § 103(a) over the combination of the ’450 Patent and the ’219 Patent;

Claims 19, 24, 26, 27, and 32 of the ’557 Patent as obvious under 35 U.S.C. § 103(a) over the combination of the ’450 Patent, the ’219 Patent, and the admitted prior art;

Claims 7 and 14 of the ’557 Patent as obvious under 35 U.S.C. § 103(a) over the combination of the ’450 Patent and U.S. Patent No. 5,680,398 (“the ’398 Patent”); and

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Claims 21 and 28 of the '557 Patent as obvious under 35 U.S.C. § 103(a) over the combination of the '450 Patent, the '398 Patent, and the admitted prior art.

On July 10, 2015, we joined IPR2015-01077 to this proceeding and instituted trial on the following grounds:

Claims 11 and 25 of the '557 patent as obvious under 35 U.S.C. § 103(a) over the '450 patent;

Claims 11 and 25 of the '557 patent as obvious under 35 U.S.C. § 103(a) over the combination of the '450 patent and the '219 patent; and

Claims 11 and 25 of the '557 patent as obvious under 35 U.S.C. § 103(a) over the combination of the '450 patent and Bungum.

In the joined proceeding Intellectual Ventures I LLC and Intellectual Ventures II LLC (collectively, "Patent Owner") filed a Patent Owner Response (Paper 17, "PO Resp.") and Petitioner filed a Reply (Paper 22, "Reply"). Oral argument was consolidated with the oral argument in IPR2014-01471, which concerns a continuation-in-part of the '557 Patent, and heard on December 15, 2015. A transcript of the consolidated hearing (Paper 35, "Tr.") was entered in this proceeding.

We have jurisdiction under 35 U.S.C. § 311 and base our decision on the preponderance of the evidence. 37 C.F.R. § 42.1(d). Having reviewed the arguments of the parties and the supporting evidence, we conclude that claims 1, 2, 4-7, 10-16, 18-21, 24-28, and 32 have been shown to be unpatentable.

#### THE '557 PATENT

The '557 Patent relates to a method and system for enabling point-to-point and multicast communication in a network using three types of communication

channels—namely, upstream payload channels, upstream control channels, and downstream channels. Ex. 1001, Abstract. Figure 7 of the '557 Patent is reproduced below.

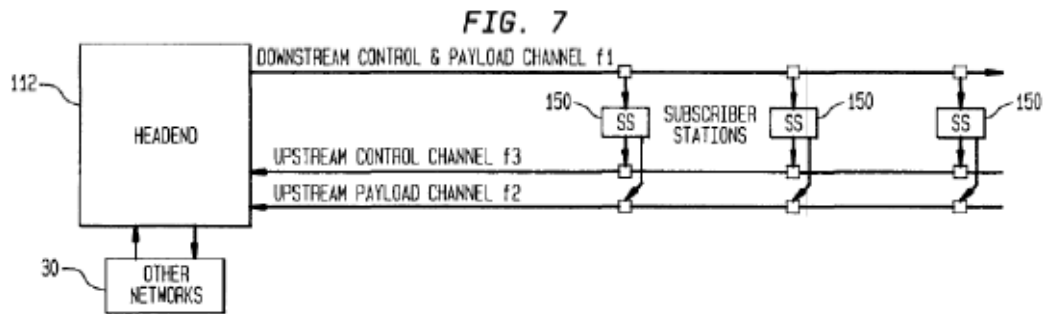


Figure 7 illustrates the three types of communication channels allocated by the network of the invention.

The '557 Patent discloses that a central controller at the head end of the network is connected to the subscriber stations via a shared medium. Ex. 1001, col. 8, ll. 2–5. An upstream payload channel carries payload data from the stations to the central controller, and an upstream control channel is used to transmit upstream control data. Downstream channels carry data from the central controller to the stations. *Id.* at col. 8, ll. 34–48. To allow “contention free transmission” on an upstream payload channel (*id.* at col. 11, ll. 33–34), stations send reservation requests on the upstream control channel to the central controller, which responds by assigning specific upstream transmission slots to each station and indicates the slot assignment by transmitting a control message (“reservation grant”) to the stations on the downstream channel (*id.* at col. 8, ll. 51–55; col. 13, ll. 39–48). Each station then transmits payload data only in the assigned slots of the upstream payload channel. *Id.* at col. 8, ll. 56–58.

## ILLUSTRATIVE CLAIMS

Of the challenged claims, claims 1, 6, 7, 10, 11, 12, 13, 15, 20, 21, 24, 26, 27, 28, and 32 are independent. Claims 1 and 15 are illustrative and are reproduced below:

1. A network comprising:
  - a centralized controller,
  - a station connected to said centralized controller over a shared medium,
    - a first distinct shared unidirectional transmission path being established between said centralized controller and said station for transmitting data from said centralized controller to said station, wherein the first path being a downstream channel, and
    - at least a second and third distinct shared unidirectional transmission paths being established between said centralized controller and said station for transmitting data from said station to said centralized controller, wherein the second and third paths each being an upstream channel,
      - wherein said station transmitting reservation requests data on said second path and receiving a payload data transmission grant from said centralized controller on said first path to transmit payload data on said third path from said station to said centralized controller on time-slots allocated by said centralized controller, and
      - wherein said centralized controller receiving said reservation request data on said second path from said station and transmitting on said first path a payload data transmission grant to said station for transmitting payload data on said third path on said time-slots allocated by said centralized controller and
      - wherein each of said transmission paths comprises a channel having a unique carrier frequency and bandwidth, and a modulation scheme.
  
15. A multiple access method via a shared medium of a network, said network comprising a centralized controller and a plurality of stations connected to said centralized controller over a shared medium, wherein

a first distinct shared unidirectional transmission path is established between said centralized controller and said stations for broadcasting data from said centralized controller to said stations, at least second and third distinct shared unidirectional transmission paths for transmitting data from said stations to said centralized controller, wherein the first path being a downstream channel and said second and third paths each being an upstream channel, said multiple access method comprising the steps of:

transmitting from a particular station reservation request data on said second path and receiving a payload data transmission grant message from said centralized controller on said first path to transmit payload data packets on said third path from said particular station to said centralized controller on payload time-slots allocated by said centralized controller,

transmitting from said particular station said reservation request data on said second path if said particular station fails to receive a grant message from said centralized controller within a predetermined time delay or if said particular station receives a collision status message from said centralized controller on said first path to retransmit said reservation request according to a collision resolution algorithm,

receiving by said centralized controller said reservation request data on said second path from said particular station, and transmitting on said first path said payload data transmission grant data to said particular station for transmission on said third path of payload data on said payload time-slots allocated by said centralized controller, and

optionally detecting by said centralized controller a collision due to simultaneous transmission of said reservation requests by two or more stations on the same reservation timeslot of said second path, and then transmitting said collision statuses of said reservation requests on said first path to said stations, which will retransmit their reservation requests according to said collision resolution algorithm,

wherein each of said transmission paths comprises a channel having a unique carrier frequency and bandwidth, and a modulation scheme.

## CLAIM CONSTRUCTION

We interpret claims of an unexpired patent using the broadest reasonable construction in light of the specification of the patent in which they appear. *See* 37 C.F.R. § 42.100(b); *In re Cuozzo Speed Techs., LLC*, 793 F.3d 1268, 1278 (Fed. Cir. 2015), *cert. granted sub nom. Cuozzo Speed Techs., LLC v. Lee*, 136 S. Ct. 890 (mem.) (2016). In applying a broadest reasonable construction, claim terms generally are given their ordinary and customary meaning, as would be understood by one of ordinary skill in the art in the context of the entire disclosure. *See In re Translogic Tech., Inc.*, 504 F.3d 1249, 1257 (Fed. Cir. 2007).

### Transmission Path

In our Decision to Institute, we construed the term “transmission path” to have its plain and ordinary meaning as “a communications path in a communications network.” Dec. to Inst. 8. Patent Owner contends that we should not construe this term at all because its plain and ordinary meaning is clear. PO Resp. 6–7. Patent Owner disputes the authority of the IEEE reference we used to establish the plain and ordinary meaning, arguing that Exhibit 1017 is not a standard, but a functional requirements document generated to assist a working group and is subject to change. *Id.* at 7–8. However, Patent Owner does not propose a “plain and ordinary meaning.” *Id.* Nor does Patent Owner argue that the scope of the term would be different if we rely on other evidence of the plain and ordinary meaning. *Id.*

Although our Decision to Institute notes that the construction of “transmission path” is not particularly material to the decision, Dec. to Inst. 7–8, it is helpful to establish a baseline definition of the meaning as understood by those of ordinary skill in the art. Patent Owner’s assertion that the definition we applied

was used by an IEEE working group supports our determination that our construction in the Decision to Institute applies the plain and ordinary meaning to those of ordinary skill in the art. Accordingly, we adopt the construction of “transmission path” as “a communication path in a communications network.”

#### Optionally

Consistent with its ordinary meaning, we construed the term “optionally” to mean “left to choice, not mandatory.” *Id.* at 8–9. Patent Owner contends that our construction is inconsistent with the use of “optionally” in the specification. *Id.* at 10. Patent Owner contends that in the context of the claim as a whole, optionally reflects that a construction of “optionally detecting” consistent with its use in the specification is that the capability of detecting a collision be present at the centralized controller and that a collision may, on occasion, be encountered. *Id.* at 12. We discuss the use of the term “optionally” in the context of the claims in our analysis of Representative Claim B and the ’450 patent.

#### Or

In our Decision to Institute, although we discuss the use of “or” in the claims as part of our construction of “optionally” (Dec. to Inst. 8–9), we did not construe specifically the term “or,” which is used in Representative Claim B. We address the use of the term “or” in the context of the claims in our analysis of Representative Claim B and the ’450 Patent.

#### Time-Slot

In this proceeding, neither party proposed a construction for the term “time-slot,” and we did not construe it in our Decision to Institute. However, in related case IPR2015-01471, which concerns a continuation-in-part of the ’557 Patent, it became clear that a construction of the term “slot” was in dispute, and it was



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discussed extensively at the consolidated oral hearing. In this proceeding, Patent Owner argues that the '450 Patent does not disclose transmitting payload data on time slots allocated by the network control terminal (NCT), because the NCT in the '450 Patent assigns only one slot, so that a small aperture terminal (SAT) transmits data beginning on a single slot. PO Resp. 15–19. In IPR2014-01471, we construed “slot” to mean “a duration of time.” *Ericsson Inc. and Telefonaktiebolaget LM Ericsson v. Intellectual Ventures II LLC*, Case 2014-01471, slip op. at 7 (PTAB, March 17, 2015) (Paper 33, Final Written Decision). We address the implications of this issue in our analysis of Representative Claim A and the '450 patent.

## ANALYSIS OF PRIOR ART CHALLENGES

### Introduction

To establish anticipation, each and every element in a claim, arranged as recited in the claim, must be found in a single prior art reference. *Net MoneyIN, Inc. v. VeriSign, Inc.*, 545 F.3d 1359, 1369 (Fed. Cir. 2008). “A reference anticipates a claim if it discloses the claimed invention ‘such that a skilled artisan could take its teachings in combination with his own knowledge of the particular art and be in possession of the invention.’” *In re Graves*, 69 F.3d 1147, 1152 (Fed. Cir. 1995) (emphasis omitted) (quoting *In re LeGrice*, 301 F.2d 929, 936 (CCPA 1962)).

A patent claim is unpatentable under 35 U.S.C. § 103(a) if the differences between the claimed subject matter and the prior art are such that the subject matter, as a whole, would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. *KSR Int’l Co. v. Teleflex Inc.*, 550 U.S. 398, 406 (2007). The question of obviousness is

resolved on the basis of underlying factual determinations including: (1) the scope and content of the prior art; (2) any differences between the claimed subject matter and the prior art; (3) the level of ordinary skill in the art; and (4) objective evidence of nonobviousness. *Graham v. John Deere Co.*, 383 U.S. 1, 17–18 (1966).

The level of ordinary skill in the art is reflected by the prior art of record. *See Okajima v. Bourdeau*, 261 F.3d 1350, 1355 (Fed. Cir. 2001); *In re GPAC Inc.*, 57 F.3d 1573, 1579 (Fed. Cir. 1995); *In re Oelrich*, 579 F.2d 86, 91 (CCPA 1978).

#### Representative Claims A and B

The Patent Owner Response addresses “Representative Claims A and B,” which are not actual issued claims, but exemplary claims proposed in the Petition that include elements common to other claims and are addressed in our Decision to Institute.<sup>1</sup> Dec. to Inst. 10–11, PO Resp. 14–41. The common limitations in Representative Claim A, which is drawn to a network, as recited in claims 1–14, are recited identically in challenged independent claims 1, 6, 7, 10, 12, and 13. *Id.* The common elements in Representative Claim B, which is drawn to a multiple access method via a shared medium, are recited identically in challenged independent claims 15, 20, 21, 24, 26, and 27. *Id.* For purposes of our analysis the relevant elements of Representative Claim A recite:

(a) three distinct shared unidirectional transmission paths between a station and a centralized controller, a first path for downstream transmission and a second and a third path for upstream transmission;

(b) the station transmitting reservation requests to the centralized controller on the second path and receiving from the centralized controller on the first path a payload transmission grant to

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<sup>1</sup> As noted in the Decision to Institute, Patent Owner did not object to Petitioner’s use of Representative Claims A and B. Dec. to Inst. 11.

transmit payload data on the third path to the centralized controller on time-slots allocated by the centralized controller; and

(c) operation of the centralized controller that mirrors the operation of the station described in (b).

*Id.* at 12 (citing Pet. 15–16). Representative Claim B includes all of the limitations of Representative Claim A and further recites:

(1) a plurality of stations;

(2) the station transmitting (i.e., retransmitting) the reservation request if a grant message is not received within a predetermined time delay, or if a collision status message is received from the centralized controller to retransmit the reservation request according to a collision resolution algorithm; and

(3) the centralized controller optionally detecting a collision of reservation requests and transmitting the collision statuses on the first path to the stations, which will retransmit the reservation requests according to the collision resolution algorithm.

*Id.* (citing Pet. 16–17).

#### Grounds Based on the '450 Patent

##### *Representative Claim A*

Most of the instituted grounds cite the '450 patent. Patent Owner contends that the '450 patent does not disclose each and every element of representative claims A and B and that nothing in the remaining references (the '398 patent, the admitted prior art (APA), the '219 patent, or Bungum) cures the deficiencies in the '450 patent.

The '450 Patent discloses a satellite communications system in which a satellite relays information between small-aperture terminals (SAT), which may be portable terminals (PT), and a hub network control terminal (NCT). Ex. 1005, Abstract. The NCT receives requests from the PTs, allocates channel resources, and broadcasts housekeeping messages. *Id.* Three separate data channels, each on a different frequency, are used to effect reservation and basic data transfer. Ex.

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1005, col. 4, ll. 51–53. As shown in Fig. 3, these are a forward channel 25-1 from the NCT (outbound [from the NCT]), a reservation channel 25-2 from PT (inbound [to the NCT]), and a return channel 25-3 from PT (inbound [to the NCT]). *Id.* at col. 4, ll. 53–57.

Petitioner explains that Figure 3 of the '450 patent shows a forward channel 25-1, a reservation channel 25-2, a return channel 25-3 (Pet. 13 (citing Ex. 1005, col. 4, ll. 53–56)), and that Figure 5 of the '450 Patent describes “the operation of these channels . . . through which the centralized controller processes reservation requests” (Id. (citing Ex. 1005, col. 7, l. 59–col. 8, l. 2)). Further, Petitioner’s claim chart quotes the disclosure in the '450 patent that an SAT wishing to transmit information sends a “request 32” during a frame (frame 1) on reservation channel 25-2, and that “[t]he NCT response 34 appears in some later frame (e.g. frame 3)” on forward channel 25-1, shown in Fig. 5 as 25-1b, which “acknowledges receipt of the request and assigns a future frame and slot . . . .” Pet. 16 (emphases added) (quoting Ex. 1005, col. 7, ll. 16–46) (internal quotation marks omitted). The claim chart also quotes the next paragraph in the '450 patent, which states “[d]ata intended for another SAT will be transmitted in channel 25-3 to the NCT.” Id. (citing Ex. 1005, col. 8, ll. 3–5). In addition, Figure 5 of the '450 patent cited in the claim chart and discussed in the Petition shows a transmission 36 labelled “DATA TO NCT” in a slot along the time axis following the NCT response 34. Thus, Petitioner has cited disclosure supporting its contention that the '450 Patent discloses “receiving a payload data transmission grant . . . to transmit payload data on said third path . . . on time-slots allocated by said centralized controller,” as recited in Representative Claim A.

Patent Owner's primary contention concerning Representative Claim A is that the '450 patent does not disclose the feature recited in Representative Claims A and B, and referenced in the Petition as claim element A.5, that recites: "*wherein said station transmitting reservation requests data on said second path and receiving a payload data transmission grant from said centralized controller on said first path to transmit payload data on said third path from said station to said centralized controller on time slots allocated by said centralized controller.*" PO Resp. 15–16, 18–19. Patent Owner contends that the claims of the '557 Patent explicitly require that the centralized controller allocate plural time-slots for transmission of payload data, as contrasted with the '450 patent, in which the NCT only specifies the start of the transmission time and in which the SAT transmits its entire message without regard to the length of time required for such transmission. *Id.* at 16, 19. Patent Owner highlights the unframed structure of the return channel in the '450 patent as evidence that the '450 patent does not disclose a central controller allocating time-slots to payload data transmission. *Id.* at 16–18.

Petitioner notes that the claims put no limitation on how the allocation of slots is to be made and that in the '450 patent, the transmission timing and length are not arbitrary, but known and controlled by the NCT. Reply 6–7. Petitioner argues that Figure 5 of the '450 patent discloses a station responding to receipt of a grant by transmitting to the NCT an upstream sync portion that is two 45 msec slots long, followed by payload data for a time period that is longer than the two slot sync and would be understood by a person of ordinary skill to comprise multiple slots. *Id.* at 6. Citing the testimony of Patent Owner's witness, Dr. Jonathan Wells, Petitioner also argues that, even if the '450 patent is read to assign only one slot corresponding to the duration of the payload, assigning multiple slots

was well known in the prior art, and using multi-slot allocations in a separate upstream channel would have been obvious. *Id.* at 7. Petitioner further disputes Patent Owner’s assertion that the claims require a multi-slot assignment for a single request because the specification uses the terms “slot” and “slots” interchangeably, the claims “would make no sense” when only one slot of data needs to be transmitted, and because Patent Owner’s witness, Dr. Wells, testified that “slots” encompasses “one or more slots” as used in the ’557 Patent. *Id.* at 8 (citing Transcript of Deposition of Dr. Jonathan Wells, Ex. 1023 (“Wells Tr.”), 54:17–56:9).

Claim element A.5 concerns actions taken by the station. As noted above, the elements of Representative Claim A, including element A.5, are common to independent claims 1 and 15. Patent Owner’s argument does not consider other language in claim 1 that provides context for limitation A.5 concerning the central controller that provides the grant to which the station responds. Apparatus claim 1 recites that, upon receiving a reservation request, the central controller responds by *“transmitting on said first path a payload data transmission grant to said station for transmitting payload data on said third path on said time-slots allocated by said centralized controller.”* Almost identical language appears in method claim 15. Claims 1 and 15 do not limit the form of the grant, nor do claims 1 and 15 limit the time-slots allocated by the central controller. For example, there is no requirement in the claims that the grant authorize a specific number of time-slots or that the time slots be of any particular duration. Claims 1 and 15 recite that, in response to receiving a request on the second path, the centralized controller transmits on the first path a “grant” authorizing payload data transmission on the third path at allocated time-slots. Claims 1 and 15 do not limit the allocated time

slots to any particular frame or time. Nor do claims 1 and 15 preclude allocating sufficient time slots for the terminal to transmit its entire message.

Given the language of the claims, we conclude that Petitioner has shown by a preponderance of the evidence that the '450 patent discloses the recited features in element A.5, which appears in the challenged claims illustrated by Representative Claim A (independent claims 1, 4, 5, 7, and 10–14, as well as corresponding dependent claims 2–4) and Representative Claim B (independent claims 15, 21, and 25–27, as well as corresponding dependent claims 16–19).

*Representative Claim B*

As discussed above, Representative Claim B has three elements. There is no dispute that the '450 patent discloses the first element, i.e., a plurality of stations. We turn our attention to elements B.2 and B.3

*Elements B.2 and B.3*

As discussed below, Elements B.2 and B.3 are analyzed together. Element B.2 recites in part “*transmitting from said particular station said reservation request data on said second path if said particular station fails to receive a grant message from said centralized controller within a predetermined time delay. . .*” *Id.* The Petition cited to column 7, line 59 through column 8, line 2, as disclosing this limitation. Pet. 16–17. The disclosure the Petition cites states that if two different PTs attempt to send requests in the contention return order wire (CROW) portion, the NCT will detect the collision and not send an acknowledgement, and that in the absence of an acknowledgement the PT will assume that it was not heard and send another CROW in a randomly selected time unit. Ex. 1005, col. 7, ll. 59–65. The disclosure cited by Petitioner also states that a PT receiving an

acknowledgement but no transmission assignment continues listening for another timeout interval. *Id.* at col. 7, ll. 66–68.

Patent Owner first contends that the '450 patent does not disclose the “predetermined time delay” element (identified as element B.2) that is common to all the claims corresponding to Representative Claim B. PO Resp. 20. Patent Owner argues that the disclosure cited by Petitioner is not sufficient because it fails to disclose the claimed feature that the grant message must be received within a time delay that is predetermined. PO Resp. 20–21. According to Patent Owner, in the '450 patent, the time delay is not predetermined because the timeout interval begins at the receipt of the acknowledgement, which can occur at any time. *Id.* at 21. Petitioner notes that there is no dispute that the '450 patent discloses waiting several frames before retransmitting a reservation request. Reply 9. Petitioner argues that in Figure 5, the '450 patent shows waiting three frames between the reservation request and the repeated reservation request, and cites the testimony of Petitioner’s witness, Dr. Wayne Stark, and Patent Owner’s witness, Dr. Wells, that the several-frame delay is a matter of system design and that the system would be programmed to know precisely how long to wait for a reservation request. *Id.*; Pet. Opp. to Mot. for Observations on Cross Examination 4–5. Dr. Stark notes that the '557 Patent does not provide any explicit definition of the term “predetermined time delay” (Ex. 1024, Reply Decl. of Dr. Wayne Stark (“Stark Reply Decl.”) ¶ 38) and contests the assumption by Dr. Wells that “predetermined” means a static or fixed time delay, as opposed to a time delay determined in advance. *Id.* ¶ 40. Dr. Stark notes Dr. Wells testified that receipt of the acknowledgment has the effect of resetting a timer. *Id.* ¶ 39. We agree with Dr. Stark’s observation that this testimony by Dr. Wells is a tacit admission that the delay in the '450 patent is



predetermined, as in the expiration of a timer. *Id.* Thus, we find that the '450 patent discloses the predetermined time delay recited in element B.2 of Representative Claim B.

Patent Owner also contends that the '450 patent does not disclose the collision status elements recited in element B.2 and element B.3 of Representative Claim B. PO Resp. 21–24. In addition to the subject matter discussed above, i.e., “*transmitting . . . said reservation request data . . . if said particular station fails to receive a grant message from said centralized controller within a predetermined time delay,*” element B.2 also recites “*or if said particular station receives a collision status message from said centralized controller on said first path to retransmit said reservation request according to a collision resolution algorithm.*” *Id.* at 21–22. Patent Owner argues that, in addition to transmitting reservation request data within a “predetermined time delay” as discussed above, element B.2 requires transmitting reservation request data if the particular station receives a collision status message. *Id.* at 21. According to Patent Owner, the Petition does not establish that the '450 patent discloses both capabilities and does not mention the acknowledgement message corresponding to a collision status message because one of ordinary skill would not consider an acknowledgement message to be a collision status message. *Id.* at 23. Petitioner responds that the claim is written in the alternative using the disjunctive term “or” and that the recited collision status message is not necessary for anticipation. Reply 9–10.

Patent Owner also argues that Petitioner has not established that the '450 patent discloses element B.3, i.e., “*optionally detecting by said centralized controller a collision due to simultaneous transmission of said reservation requests by two or more stations on the same reservation time-slot of said second path, and*

*then transmitting said collision statuses of said reservation requests on said first path to said stations, which will retransmit their reservation requests according to said collision algorithm.”* PO Resp. 23–24. The claim chart in the Petition notes that this feature is “optional” and refers the reader to the analysis of claim element B.2. Pet. 17. Patent Owner argues that “optionally detecting” would have been understood by those of ordinary skill to require that the capability of detecting a collision be present at the centralized controller. *Id.* at 24.

The claim language recites “*optionally detecting . . . a collision . . . and then transmitting said collision statuses.*” Patent Owner’s position appears to be that in order to be able to choose whether to exercise the option of detecting a collision and transmitting collision statuses, the central controller must have that capability. However, instead of a structure having the capability to perform both actions, the “optionally detecting” language appears in a claim drawn to a method, i.e., Representative Claim B, which as discussed above, is drawn to a multiple access method via a shared medium, and recites common elements identical to those recited in challenged independent claims 15, 20, 21, 24, 26, and 27. As discussed further below, the claim language does not require the centralized controller to have a structure that performs this step. Instead, the claim language recites that the step of detecting collisions and transmitting collision statuses is optional. Such optional elements do not narrow the claim because they can always be omitted. *In re Johnston*, 435 F.3d 1381, 1384 (Fed. Cir. 2006).

Our analysis of elements B.2 and B.3 are related inextricably to each other because element B.3 makes optional detecting collisions and transmitting collision statuses to the stations on the first path. The alternative following “or” in Element B.2 recites a collision status message, but does not limit how that message is

generated. Petitioner argues that Patent Owner seeks to write out the word “or” in the claim and replace it with “and.” Reply 3.

Courts have recognized that “or” is not restricted to mutually exclusive alternatives (A or B, [but not both]) and may be used to denote an inclusive list (A, or B [or both]), depending on context. *Gonzalez v. Infostream Group, Inc.*, Case No. 2:14-cv-906-JRG-RSP, 2015 WL 5604448, at \*17–19 (E.D. Tex. Sept. 21, 2015). In addition, discussing the implications of a statement in the prosecution history that “disparate databases” refers to the absence of common keys “or” record ID columns of similar value, the Federal Circuit noted that the statement could be interpreted to mean the absence of any one of these characteristics makes the databases disparate (“disjunctive interpretation”) or that only the absence of all these characteristics makes them disparate (“conjunctive interpretation”). *Vasudevan Software, Inc. v. MicroStrategy, Inc.*, 782 F.3d 671, 679–681 (Fed. Cir. 2015) (concluding that the applicant distinguished the reference based on the conjunctive interpretation and affirming the district court’s construction that “disparate databases” means databases that have (1) an absence of compatible keys; *and* (2) an absence of record ID columns of similar value; *and* (3) an absence of record ID columns of similar format in the schemas and format that would otherwise enable linking data).

Although the Federal Circuit consistently has interpreted the meaning of the word “or” to mean the items in the sequence are alternatives to each other, that is not the end of the inquiry where a question remains as to whether the claims should be interpreted to mean a method that must be capable of carrying out each of the alternatives. *Schumer v. Lab. Comput. Sys., Inc.*, 308 F. 3d 1304, 1311–14 (Fed. Cir. 2002) (distinguishing between a product claim and a process claim limited to a

particular machine, where the concept of capability has relevance, and a method claim not tied to a particular device, and finding infringement of the method if any one of three features of a coordinate system is translated). Representative Claim B concerns a multiple access method in which claim element B.2 does not limit the structure of the station to one that must have the capability of receiving a collision status message from the central controller to transmit a reservation request; nor does element B.2 limit the central controller to any specific structure that detects a collision and transmits a collision status message. Thus, Representative Claim B encompasses, and is disclosed by, a method in which the central controller detects a collision, transmits a collision status message to the station and then receives reservation request data, or a method in which the central controller receives reservation request data from the station after a predetermined delay, as described in the '450 patent.

Our conclusion is consistent with a reading of elements B.2 and B.3 together, rather than in isolation. What distinguishes this case is the alternative recitation in element B.2 “*or if the station receives a collision status message from said centralized controller on said first path*” together with the recitation in element B.3 of “*optionally detecting . . . a collision . . . and then transmitting collision statuses . . . on said first path to said stations . . .*” As discussed above, the claim recites that detecting a collision and transmitting a status on the first path is optional. Because detecting a collision and transmitting a status is optional, we must read the second part of limitation B.2, which recites transmitting reservation request data after a predetermined time delay “*or if the station receives a collision status message from the centralized controller,*” to be optional as well.

Thus, we find that Petitioner has shown by a preponderance of the evidence that the '450 patent discloses all the limitations in Representative Claim B, i.e. the '450 patent discloses the first part of the limitation recited in claim element B.2 and, given the language identifying alternatives and options in claim limitations B.2 and B.3, it is not necessary for the '450 patent to describe any further features to disclose Representative Claim B.

Having determined that Petitioner has demonstrated by a preponderance of the evidence that the common limitations of Representative Claims A and B are disclosed by the '450 patent, we turn to the challenges to specific claims based on the '450 patent alone or in combination with other references.

*Anticipation and Obviousness of Claims 7 and 21 by the '450 Patent*

Patent Owner contends that Petitioner has not established that the '450 patent teaches the limitation “wherein said centralized controller is a base-station.” PO Resp. 26–27. Petitioner argues that the claims of the '557 Patent are not limited to land based stations and that the '557 Patent discloses that the principles of using two upstream and one downstream channel can be practiced in wireless, cable, and satellite contention resolution systems. Reply 11–12 (citing Ex. 1001, col. 19, ll. 39–57). Patent Owner argues that the NCT in the '450 patent is a component of a satellite system that acts as a relay for communications between portable terminals, and that the claimed base station is a component of a land based cellular system in which the base station connects mobile users to a larger network. *Id.* at 28.

The Specification of the '557 Patent describes a cable system implementation and specifically states: (1) that “the implementation of the invention in a cable network was merely illustrative” (Ex. 1001, col. 19, ll. 39–40);

(2) that another example is an implementation in a wireless system in which the central controller is a base station and that the communication units are cordless or cellular telephones (*id.* at col. 19, ll. 41–42); and (3) that when employed in a satellite system the central controller is a satellite and the subscriber stations are earth stations (*id.* at col. 19, ll. 50–54). As previously discussed, the '450 patent discloses in Figure 1 NCT 12, which communicates with portable terminals 14 through satellite 11, using two upstream channels and one downstream channel. Ex. 1005, Abstract, Fig.1. Thus, the '450 patent discloses the NCT in the context of a satellite network. Claims 7 and 21 recite only that the centralized controller is a base station, that the network is a wireless network, that the transmission medium is air, and that the station is a mobile or stationary communication unit. Claims 7 and 21 do not limit a wireless network to a non-satellite network, or, in the case of a satellite network, limit the base station to any particular node. Thus, we conclude that Petitioner has shown by a preponderance of the evidence that the '450 patent anticipates the base station limitation of claims 7 and 21.

Petitioner further notes that the question is not whether cellular base stations and satellites have differences, but whether media access controller and contention resolution access principles used in satellite and cellular applications are translatable to each other. Reply 12. To the extent that the base station is considered to be limited to a cellular wireless network as argued by Patent Owner, we note (1) that the Specification of the '557 patent extends the concept of using two upstream channels and one downstream channel to a wireless network (Ex. 1001, col. 19, ll. 50–57) and (2) that the '450 patent discloses the two upstream, one downstream channel approach in the context of a satellite network, in which the transmission medium is air and the central controller is the satellite (Ex. 1005,

4:50–57). Thus, we conclude that Petitioner has shown by a preponderance of the evidence, that this limitation, which recites that the central controller is a mobile or stationary base station in a wireless network in which the transmission medium is air, is obvious under 35 U.S.C. § 103(a) over the '450 patent.

*Obviousness of Claims 1, 4, 5, 7, 12, 13, 15, 18, 19, 21, 26, and 27 over the '450 Patent*

Patent Owner argues that Petitioner “failed to set forth a prima facie case that claims 1, 4–7, 12, 13, 15, 18–21, and 26–27 are obvious over the '450 patent,” arguing that Petitioner does not explain the differences between the '450 patent and independent claims 1, 7, 12, 15, 20, 21, and 26. PO Resp. 42–43. We have already addressed claims 7 and 21. Thus, we discuss below the independent claims remaining in this ground of unpatentability over the '450 patent.

Patent Owner’s argument is not persuasive because Patent Owner does not offer specific arguments concerning the differences it argues are unexplained by Petitioner.<sup>2</sup> Patent Owner addresses claim pairs 7 and 21 (already discussed), 11 and 25, 12 and 26, and 13 and 27 under the heading “Petitioners failed to establish the '450 patent alone or in combination with any of the '398 patent, the alleged APA, the '219 patent, or the Bungum reference fail to disclose the “*wherein*” clauses of the independent claims.” PO Resp. 25–26. We address the claim pairs not discussed in the Patent Owner Response as well as claim pairs 12 and 26, and 13 and 27 in this section of the Final Written Decision. We address claims 11 and 25 in a separate section.

We address below the disclosures of the '450 patent with reference to each of the claim limitations (in pairs) as they are addressed in the Petition. For the

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reasons discussed below, we find that the Petition sufficiently addressed each of the claim limitations at issue.

Claims 1 and 15

As to the limitation in claims 1 and 15 “*wherein each of said transmission paths comprises a channel having a unique carrier frequency and bandwidth, and a modulation scheme,*” Petitioner cites to the disclosure in the ’450 patent that a forward (downstream) channel and a return (upstream) channel can support a range of transmission rates. We agree with Petitioner’s argument and evidence. We declined to adopt Patent Owner’s argument that the forward and return channels have the same data rate and therefore a person of ordinary skill would have understood the channels to have the same bandwidth. *See* Dec. to Inst. 17–18. As discussed above, Patent Owner offers no further argument or evidence on this issue.

Claims 4 and 18

As to the limitation “*wherein said network comprises three shared unidirectional paths*” in claims 4 and 18, Petitioner cites to Figure 3 and column 4, line 48 through column 5, line 11 and argues that this limitation is disclosed in the ’450 patent. *See* Dec. to Inst. 19. We agree with Petitioner’s argument and evidence.

Claims 5 and 19

As to the limitation “*wherein said first path on which payload and control data packets are transmitted is one of plural downstream channels*” in claims 5 and 19, Petitioner cites to column 5, lines 29–35 and column 6, line 64 through column 7, line 1 and argues that this limitation is disclosed in the ’450 patent. *See* Dec. to Inst. 18–19. We agree with Petitioner’s argument and evidence.



As noted above, Patent Owner argues generally that Petitioner has not explained the differences between the above discussed claims and the '450 patent, but does not provide specific arguments. After considering the disclosures referred to above, and in light of our interpretation of Representative claims A and B as discussed above, we conclude that Petitioner has demonstrated by a preponderance of the evidence that claims 1, 4, 5, 15, 18, and 19 are unpatentable over the '450 patent.

Claims 12 and 26

As to the limitation “*wherein first and second modulation schemes are used for said second path and third path, respectively, wherein said second path being an upstream control channel (UCC) and said third path being an upstream payload channel (UPC), and wherein said first modulation scheme enhances robustness and efficiency of said reservation request packet transmission of said UCC without degrading the robustness, efficiency and utilization of said UPC*” in claims 12 and 26, we were persuaded, at institution, by Petitioner’s citation to the testimony of Dr. Stark that a person of ordinary skill would understand that a purpose of the modulation disclosed in the '450 patent would be to enhance robustness, and that different ones of the disclosed modulation techniques, such as minimum phase shift keying and BPSK modulation could be used in separate upstream channels to enhance robustness and efficiency. *See* Dec. to Inst. 22–23. Patent Owner contends that Petitioner fails to address the second component of this limitation, i.e., “without degrading the robustness.” PO Resp. 39–40. Petitioner replies that this element was plainly addressed in the Petition because the use of different modulation schemes used on each channel does not suggest any degradation of robustness and efficiency. Reply 18. We further note Dr. Stark’s

testimony that a person of ordinary skill would understand “that because the channels are distinct, e.g. in frequency, use of a first modulation scheme, selected to enhance robustness/ efficiency for the upstream control channel could be implemented without degrading the robustness, efficiency, or utilization of the upstream payload channel.” Ex. 1003, Declaration of Dr. Wayne Stark (“Stark Decl.”) ¶ 141 (emphasis added). We credit this testimony and find it persuasive. We also find persuasive the testimony (offered by Petitioner) of Patent Owner’s witness, Dr. Wells, that modulation techniques on one channel do not impact the robustness and efficiency on the other channel. Reply 17 (citing Wells Tr. 114:7–16). Thus, contrary to Patent Owner’s argument, Petitioner has addressed the second component of the limitation and has demonstrated by a preponderance of the evidence that claims 12 and 26 are unpatentable as obvious under 35 U.S.C. § 103(a) over the ’450 patent.

#### Claims 13 and 27

As to the limitation “*wherein said second path on which reservation request packets are transmitted is one of a plurality of upstream control channels*” in claims 13 and 27, we noted at institution the disclosure at column 4, lines 48–52 of the ’450 patent that the channel access protocol uses frequency division multiple access (FDMA) techniques and Dr. Stark’s testimony that a person of ordinary skill would have understood that, using FDMA, the channels would operate independently. *See* Dec. to Inst. 23–24. Patent Owner contests the assertion in the Petition that, because the ’450 patent discloses time slots disclosed in the upstream control channel, a person of ordinary skill would understand that time slots could be used for multiple time division multiple access (TDMA) channels. PO Resp.

41. According to Patent Owner, Petitioner's assertion erroneously equates time slots with channels and the existence of multiple time slots, without more, does not establish the existence of multiple channels. *Id.* Petitioner replies by noting that claims 13 and 27 require only a plurality of upstream channels and the claims are not limited to TDMA or FDMA channels. Reply 18. Petitioner also cites the testimony of Patent Owner's witness, Dr. Wells, that the claims are not limited to FDMA channels and that TDMA channels were known. *Id.* (citing Wells Tr. 122:9–123:18). We are persuaded by Petitioner's argument that the claim language only requires upstream control channels, without restriction to any particular type of channel, FDMA, TDMA, or otherwise. Given the claim language, Petitioner has demonstrated by a preponderance of the evidence that claims 13 and 27 are obvious over the '450 patent.

*Obviousness of Claims 15, 18, and 20 over the '450 Patent and the Admitted Prior Art; Obviousness of claims 21 and 28 over the '450 Patent, the '398 Patent, and the Admitted Prior Art; Obviousness of Claims 19, 24, 26, 27, and 32 as Obvious over the Combination of the '450 Patent, the '219 Patent, and the Admitted Prior Art*

We instituted trial of claims 15, 18, and 20 of the '557 Patent as obvious over the combination of the '450 Patent and the admitted prior art; claims 21 and 28 as obvious over the combination of the '450 patent, the '398 patent, and the admitted prior art; and claims 19, 24, 26, 27, and 32 as obvious over the combination of the '450 patent, the '219 patent, and the admitted prior art. *See* Dec. to Inst. 48. Although the Decision to Institute does not number the grounds, Patent Owner identifies these grounds as grounds 6–8, respectively (PO Resp. 13–

14) and argues them together. PO Resp. 24–25.<sup>3</sup> Patent Owner contends that Petitioner has not established that the admitted prior art discloses the “predetermined time delay” recited in these claims. *Id.* at 25. However, as we discussed in our analysis of Representative Claim B, Petitioner has demonstrated by a preponderance of the evidence that the ’450 patent discloses this claimed limitation. Patent Owner has presented no persuasive arguments that refute the evidence presented in the Petition, evidence which we found sufficient to institute trial with respect to claims 15, 18, 19, 21, 24, and 28.

We have reviewed the evidence and arguments presented. For example, for claims 15, 18, and 20, we find that the APA discloses that when a head end detects collision, the head end transmits a message via the downstream channel indicating in which slots the collision occurred. *See* Pet. 43 (citing Ex. 1001, col. 5, ll. 11–13). We also credit the testimony of Dr. Stark that one of ordinary skill in the art would have applied the known techniques of the admitted prior art to the known method of detecting collision in the ’450 patent to achieve a predictable result. *See* Pet. 54 (citing Ex. 1003 ¶ 224). Further to claim 21, we find that the disclosure in the ’398 patent of a wireless radio environment can be combined with the disclosures of the ’450 patent concerning a satellite network. *See* Pet. 56 (citing Ex. 1022, col. 8, ll. 6–23; Ex. 1003 ¶ 237). As to claim 28 we find that the ’398 patent discloses multiple uplink traffic channels on which access requests can be transmitted. *See* Pet. 50–51 (citing Ex. 1022, col. 5, ll. 58–61; col. 5, l. 67–col. 6, l. 1). And we find that the alleged combination of the ’450 and ’398 patent

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<sup>3</sup> Patent Owner also presents additional arguments concerning claim 20 (*id.* at 43–44), claim 26 (*id.* at 39–40), claim 27 (*id.* at 41–42), and claim 32 (*id.* at 45). These additional arguments are addressed separately in this Final Written Decision.

involves using a known technique (upstream air traffic channels to transmit a reservation request in a network having both upstream traffic and control channels) in a known manner (in a network having an upstream reservation channel on which reservation requests are transmitted and an upstream transmission channel) to yield predictable results (increasing the maximum number of random accesses per unit time so that the capacity of the uplink common random access channel is no longer the limiting factor of the common control channel capacity). *See* Pet. 58–59 (citing Ex. 1022, col. 7, ll. 57–63; Ex. 1003 ¶ 241). Finally, as to claims 19, 24, 26, 27, and 32, we adopt as our own findings the facts presented by Petitioner concerning the disclosure and rationale for the combination of the '450 patent, the '219 patent, and the admitted prior art as summarized in our Decision to Institute at pages 41–44.

We determine that Petitioner has demonstrated by a preponderance of the evidence that claims 15, 18, 19, 21, 24, and 28 are unpatentable on the above grounds. As noted, Patent Owner's arguments concerning claims 20, 26, 27, and 32 are discussed further herein.

#### Claim 20

Patent Owner argues that claim 20 was erroneously included with the challenge to claims 15 and 18 as obvious over the combination of the '450 patent and the admitted prior art because we expressly found that the '450 patent does not disclose the limitation "*wherein transmissions over said second and third paths are carried out simultaneously during overlapping time periods in said station.*" PO Resp. 43–44 (citing Dec. to Inst. 20). Our Decision to Institute looks to Petitioner's citation of the Admitted Prior Art for this disclosure. Dec. to Inst. 41.

The Petition cites the disclosure in the '557 Patent that when a head end monitoring each mini-slot detects a collision, the head end transmits a message via the downstream channel DC indicating during which slot the collision was detected. Pet. 43 (citing Ex. 1001, col. 5, ll. 11–13). Petitioner notes that in the Admitted Prior Art, the head end immediately notifies the device of a collision, rather than having the device wait for a time-out period. Pet. 54. As a result, transmissions over the second and third paths are carried out simultaneously during overlapping time periods in the station, as recited in claim 20. Petitioner argues that the combination with the '450 patent is motivated by the limited number of alternatives (the only two possibilities are to: (1) transmit a collision message, or (2) wait for a time-out). *Id.* at 54–55. We credited Dr. Stark's testimony (Stark Decl. ¶ 224) and found Petitioner's argument persuasive. Dec. to Inst. 41. Patent Owner has presented no persuasive arguments refuting the evidence presented by Petitioner. Thus, Petitioner has demonstrated by a preponderance of the evidence that the contested limitation of claim 20 is disclosed by the combination of the '450 patent and the Admitted Prior Art.

### Claim 26

Claim 26 recites substantially the same limitation as that recited in claim 12. As discussed above, we have concluded that both claims 12 and 26 are unpatentable over the '450 patent alone. Further, at Institution, we were persuaded by Petitioner's evidence and arguments presented in the Petition, which we adopt as our findings here, that the '219 patent discloses using different modulation schemes for different carriers, and that the use of different modulation schemes on different upstream channels in the '450 patent multiple upstream channels would

yield a predictable result of allowing for different data rates on the different channels. *See* Dec. to Inst. 42–43 (relying on Pet. 29, 57 (citing Ex. 1008, col. 6, ll. 28–41; Ex. 1003 ¶ 239)). In the context of the combination with the Admitted Prior Art (and also with the '219 patent discussed further herein), Patent Owner advances the same argument, i.e., that the '450 patent does not disclose the first modulation does not degrade the robustness, efficiency, and utilization of the upstream payload channel. PO Resp. 40–41, 52. Having already declined to adopt Patent Owner's argument and relying on our findings above, we conclude that Petitioner has demonstrated by a preponderance of the evidence that claims 12 and 26 are also unpatentable over the combination of the '450 patent with the Admitted Prior Art and the combination of the '450 Patent, the Admitted Prior Art, and the '219 Patent, discussed further herein.

#### Claim 27

Claim 27 recites substantially the same limitation as that recited in claim 13. As discussed above, we have determined that Petitioner has demonstrated by a preponderance of the evidence that claims 13 and 27 are unpatentable over the '450 patent. Further, at Institution, we were persuaded that the '219 patent discloses a second path is one of a plurality of upstream control channels because it discloses that a plurality of control channels are interspersed among the telephony channels in the second frequency bandwidth. *See* Dec. to Inst. 35, 43–45 (citing Ex. 1008, col. 5, ll. 48–51, col. 55, l. 65–col. 56, l. 63). We adopt this as our finding, and further find that the combination of the '450 patent upstream reservation channel and the '219 patent multiple upstream control channel would yield the predictable result of reducing the amount of contention on the reservation channel by allowing for use of additional control channels for reservations, in

accordance with the evidence and arguments presented by Petitioner. *See* Pet. 58 (citing Ex. 1003 ¶ 240). Patent Owner again argues that the '450 patent does not disclose the claimed limitations. PO Resp. 40–41. Having already declined to adopt Patent Owner's argument, relying on our findings above, we conclude that Petitioner has demonstrated by a preponderance of the evidence that claims 13 and 27 are also unpatentable over the combination of the '450 patent with the Admitted Prior Art and the combination of the '450 Patent, the Admitted Prior Art, and the '219 Patent, discussed further herein.

#### Claim 32

We address the substance of the combination of the '450 patent and the '219 patent with respect to claim 32 in a separate section of this Decision.

#### *Claims 11 and 25 as Obvious Over the '450 Patent*

We addressed claims 11 and 25 in our Decision to Institute in joined case IPR2015-01077 (“Joined IPR”), instituting on the following 3 grounds: (i) obviousness over the '450 patent, (ii) obviousness over the combination of the '450 patent and the '219 patent, and (iii) obviousness over the combination of the '450 patent and Bungum. Paper 15 in this proceeding. We first address the grounds based on the '450 patent and the combination of the '450 patent and Bungum. We defer our analysis of the combination of the '450 patent with the '219 patent to later in this Final Written Decision.

Claims 11 and 25 are independent claims that recite the limitations in Representative Claims A and B respectively, as already considered above with respect to the '450 patent, with the added limitation “*wherein the first path is a broadcasting downstream channel carrying MPEG2 transport packets*” (“the MPEG2 limitation”). In its Petition in IPR2015-01077 (“Joined Pet.”), Petitioner



acknowledges that the '450 patent does not disclose transmitting MPEG2 packets, but contends the MPEG2 limitation is obvious in view of the knowledge of those of ordinary skill, which includes knowledge of the MPEG2 standard that mentions a broadcast satellite service as one area for using MPEG2 technology. Joined Pet. 29–32. Citing the IEEE 802.14 standard mentioned several times in the '557 Patent, Petitioner cites the testimony of its witness Dr. Stark that it would have been a matter of design choice to combine a satellite network with a downstream broadcasting channel, as in the '450 patent, with MPEG2 transport packets. Joined Pet. 11.

Patent Owner first contends that the '450 patent does not disclose a satellite network with a broadcasting downstream channel carrying any type of payload data. PO Resp. 30. Patent Owner argues that the '450 patent, instead expressly discloses a channel with a data portion following a forward order wire (FOW) portion, as shown in Figure 3. *Id.* Citing Petitioner's reference to the NCT as broadcasting the outbound FOW to enable all PTs to request network services over the contention channel (Joined Pet. 29 (citing Ex. 1005, col. 10, ll. 62–64)), Patent Owner argues that the '450 patent discloses only the FOW portion as the broadcast portion of the frame. PO Resp. 30.

Patent Owner further contends that Petitioner's arguments concerning the transmission of MPEG2 in the Joined IPR are inconsistent with the position Petitioner took in underlying proceeding IPR2014-01412 ("the Underlying Proceeding"). PO Resp. 30–31. Patent Owner notes that in the Underlying Proceeding, Petitioner argued that the '450 patent discloses transmitting control information in the FOW and data in the data portion, but in the Joined Proceeding Petitioner argues that control information can be equated with data to show the

broadcasting MPEG2 limitation. *Id.* Patent Owner also argues that Petitioner presents no evidence that one of ordinary skill would modify the '450 patent to transmit MPEG2 video on the FOW, which is the only portion of the frame disclosed as a broadcast transmission. *Id.* at 31.

Petitioner replies that Patent Owner's argument rewrites the limitation by requiring that MPEG2 packets be broadcast, rather than focusing on the claim language, which recites that the first path is "a broadcasting downstream channel carrying MPEG2 packets." Reply. 13–14. Petitioner contends that Patent Owner's expert Dr. Wells acknowledges that the '450 discloses broadcasting data to the PTs on the FOW. *Id.* at 13 (citing Wells Tr. 155:6–10). Petitioner also notes that the '450 patent discloses a hub network in which the NCT receives requests from PTs, allocates channel resources, and broadcasts housekeeping messages. Joined Pet. 29 (citing Ex. 1005, Abstract); *see* Ex. 1005, col 2, ll. 55–57. According to Petitioner, although the '450 patent does not call out MPEG2 transport packets as a type of data to be transmitted, Dr. Stark's declaration highlights many applicable well-known prior art standards for multiple access communication that teach transmission of MPEG2 transport packets, so that a person of ordinary skill would have understood it would be obvious to use well-known MPEG2 transport packets in the network disclosed in the '450 patent. *Id.* at 30. Petitioner cites the IEEE 802.14 standard as a prior art managed access control (MAC) standard for MPEG2 transport packets, and notes that, although Patent Owner criticizes IEEE 802.14 as a draft, it still demonstrates the state of the art at the time. Reply 14. Petitioner also cites a document it calls "the MPEG2 standard itself," which states that MPEG2 packet transmission is to be achieved via the Broadcasting Satellite

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Service (BSS). *Id.* (citing Ex. 1023 in IPR2015-01077, at 6, which states that the applications of the standard include Broadcast Satellite Service to the home).<sup>4</sup>

Patent Owner disputes Petitioner's reliance on Dr. Stark's testimony, arguing that Petitioner has failed to provide rational underpinning for its proposed modification of the '450 patent. PO Resp. 30–36. Patent Owner contends that Dr. Stark misrepresents the disclosure in the admitted prior art by spelling the term “videotext” as “video text,” and highlighting the term video. *Id.* at 33 (citing Ex. 1027 (“the '469 patent”) col. 7, ll. 56–60),<sup>5</sup> thereby suggesting that videotext, which is a special type of information, and video are the same thing. *Id.* at 32–33. We note, however, that the '469 patent cited by Patent Owner states that “[t]he term ‘data’ is used throughout the specification and claims to refer to any type of information digital or analog.” Ex. 1027, col. 7, ll. 56–58. In addition, “data” includes “signaling information,” (*id.* at col. 7, ll. 60), as would be transmitted in the FOW in the '450 patent.

Patent Owner's arguments are not persuasive because they incorporate into claims 11 and 25 features that are not claimed. Claims 11 and 25 recite a characteristic of the first path, i.e., it is a broadcasting channel. The '450 patent discloses explicitly that the first path broadcasts the FOW, and is, thus, a broadcasting channel, and the broadcasting channel broadcasts at least housekeeping messages. The same limitation in claims 11 and 25 of the '557 Patent also recites that the broadcasting downstream channel carries MPEG2

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<sup>4</sup> Ex. 1023 in IPR2015-01077 is titled Information Technology – Generic Coding of Moving Pictures and Associated Audio Information: Video, ITU-T Recommendation H.262, International Telecommunication Union ITU-T (Telecommunication Standardization Sector of ITU) (July 1995).

<sup>5</sup> Patent Owner cites Ex. 1027 from joined proceeding IPR2015-01077.

transport packets. Although Patent Owner argues extensively particular characteristics of MPEG2 transport packets would not motivate a combination with the '450 patent, (PO Resp. 35–36), these characteristics are not recited in claims 11 and 25. Petitioner also notes the testimony of Patent Owner's witness, Dr. Wells, that the claims of the '557 Patent do not require streaming real time video, but only require transmitting MPEG2 data, as well as Dr. Wells' acknowledgement that MPEG2 transport packets could be transported at the speeds in the '450 patent. Reply 15. We further note Patent Owner's earlier arguments that the '450 patent discloses the satellite acting as a relay. PO Resp. 28.

As discussed above, there is evidence that MPEG2 could have been used to transmit video via satellite. As previously discussed, Petitioner has cited credible evidence that satellites transport MPEG2 packets. Reply 14. The claims are drawn to a three channel arrangement in which one channel is used to transmit data from the central controller to the station and two channels are used to transmit data from the station to the central controller. As discussed above, that arrangement is disclosed in the '450 patent. The further limitation in claims 11 and 25 that the first path is a broadcast channel carrying MPEG2 data is a restriction to a field where Petitioner has demonstrated it was known to use such a format. Thus, Petitioner has produced persuasive evidence that combining the use of known MPEG2 transport packets with a managed access satellite communication system, such as that disclosed in the '450 patent, would have been obvious to one of ordinary skill. Therefore, we conclude that Patent Owner has demonstrated by a preponderance of the evidence that claims 11 and 25 are unpatentable as obvious under 35 U.S.C. § 103(a) over the '450 patent.

*Claims 11 and 25 as Obvious Over the '450 Patent and Bungum*

As previously discussed, the '450 patent concerns a satellite communication network. Petitioner cites Bungum for the proposition that in 1997 it was known for satellites to broadcast MPEG2 transport packets downstream. Joined Pet. 48–49 (citing IPR2015-01077 Ex. 1011 (“Bungum”), Abstract). Petitioner argues that a person of ordinary skill would have been motivated to combine Bungum with the '450 patent because sending MPEG2 packets over the network disclosed in the '450 patent would have been applying known prior art elements to yield predictable results. Joined Pet. 50–51.

Patent Owner contends that Petitioner’s combination of Bungum and the '450 patent does not consider material differences between the two references. PO Resp. 38–39. Patent Owner argues that a person of ordinary skill would not have been motivated to combine the teachings of Bungum with those of the '450 patent because Bungum is directed to unidirectional broadcasting in which there is no multiple access, no upstream transmission, no shared medium, and no reservation requests. *Id.* at 38. We agree with Petitioner that Patent Owner’s argument fails because in the '450 patent the downstream broadcasting channel is also unidirectional. Reply 17.

Patent Owner also argues that Petitioner does not address whether the combination is plausible because of differences in the MPEG2 format and delay rates, i.e., Bungum discloses broadband networks with low delay and high data rates, while the '450 patent discloses a satellite network with high delay. *Id.* at 39. We are not persuaded by this argument for the same reasons we were not persuaded by similar arguments Patent Owner presented in the context of obviousness of claims 11 and 25 over the '450 patent alone, as discussed above.

Petitioner has cited credible evidence that MPEG2 could have been used to transmit video via satellite and that satellites transport MPEG2 packets. Reply 14.

In view of the above, we conclude that Petitioner has shown by a preponderance of the evidence that claims 11 and 25 are unpatentable over the combination of the '450 patent and Bungum.

Grounds Based on the '219 Patent

The '219 Patent discloses channel allocation for a hybrid fiber-coax network used in providing communications in telephone, data, television, and video services. Ex. 1008, col. 1, ll. 25–31. The '219 Patent states that its principles could be applied to other networks such as wireless networks. *Id.* at col. 18, ll. 59–67. The '219 Patent discloses a head end providing downstream transmission of control and telephony information, which may be on orthogonal carriers in a first bandwidth, and upstream transmission from service units in a second bandwidth using at least one control channel for transmission of upstream control data and a plurality of telephony information channels for transmission of upstream telephony information. *Id.* at col. 5, ll. 36–45. Telephony information in the '219 Patent includes telephone services and digital data transfer services. *Id.* at col. 1, ll. 29–31.

*Elements Common to Representative Claims A and B (claims 1, 2, 4–7, 10, 12, 13, 15, 16, 18–21, 24, 26, and 27)*

Our Decision to Institute includes a thorough analysis of the elements of Representative Claims A and B as compared to the disclosures in the '219 Patent. Dec. to Inst. 25–29. We turn our attention to the elements of Representative Claims A and B that Patent Owner contends are not disclosed in the '219 patent.

Patent Owner contends that Petitioner has not established the '219 patent discloses a “shared medium,” as recited in the preamble common to Representative

Claims A and B (PO Resp. 46). However, Petitioner points to testimony by Patent Owner's witness, Dr. Wells, that agrees with the testimony of Petitioner's witness, Dr. Stark, that the '219 patent discloses a shared medium in Figure 1 (Reply 21). Petitioner argues that "*a first distinct shared unidirectional transmission path being established between said centralized controller and said station for transmitting data from said centralized controller to said station, wherein the first path being a downstream channel*" is disclosed in the '219 patent as a head end terminal that provides for downstream transmission of control data and downstream telephone information in a first frequency bandwidth and a plurality of control channels interspersed among the information channels in the first frequency bandwidth. Pet. 23. Patent Owner contends that Petitioner fails to explain how this subject matter in the '219 patent maps to the claimed "*distinct shared unidirectional path[s]*." PO Resp. 46–47. Petitioner responds that Patent Owner ignores the subject matter at pages 22–23 of the Petition, which cites to paragraphs 151 and 152 of the Stark Declaration, where transmission of downstream control data in a first frequency bandwidth and receipt of upstream telephony and upstream control is discussed. Reply. 21–22. We addressed this issue in our Decision to Institute, where we determined that the subject matter in Petitioner's claim chart supports its contention. Dec. to Inst. 25–26. As we discussed, Figure 1 of the '219 Patent shows a head end connected to service units over the hybrid-fiber-coaxial lines and multiple separate upstream control and data channels are disclosed expressly in the '219 patent because the disclosure shows each upstream and downstream band is OFDM multiplexed to include 240 separate payload channels and 24 separate IOC control data channels. *Id.* (citing Ex. 1008, col. 56, ll. 25–45). *See* Pet. 20–21. Patent Owner has presented no new evidence or

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argument that would change our determination that the '219 patent discloses the claimed shared medium and first shared unidirectional transmission path between a central controller and a station as a downstream path.

Patent Owner also argues that Petitioner has failed to establish that the '219 patent discloses common element A.5, i.e., “*wherein said station transmitting reservation requests data on said second path and receiving a payload data transmission grant from said centralized controller on said first path.*” PO Resp. 47–48. Patent Owner argues that Petitioner’s citation of the disclosure in the '219 patent that the control circuit allocates a payload channel to a service unit in response to a request for bandwidth does not establish that the reservation request is transmitted on the claimed “second path” or that data transmission is received on the claimed “first path.” *Id.* at 48. The Petition explains that a request for an allocation would have been received at the host data terminal (HDT) from an integrated service unit (ISU) on the upstream ISU operations channel (IOC) and Dr. Stark’s explains the disclosure of a transmission on an upstream payload channel in response to a head end message grant on a downstream channel following a request from a service unit on a distinct, second upstream IOC channel. Reply 22–23. We also addressed this issue in our Decision to Institute and determined that Petitioner provided sufficient evidence and argument to support its assertions. Dec. to Inst. 27–28. Patent Owner has presented no new evidence or argument that would change our determination.

*Elements of Representative Claim B (claims 15, 16, 18–21, 24, 26, and 27)*

We addressed the elements of Representative Claim B as compared to the disclosures in the '219 patent in our Decision to Institute. Dec. to Inst. 29. Patent Owner contends that Petitioner has failed to establish that the '219 patent has the



capability of transmitting reservation request data if a particular station fails to receive a grant message and if a particular station receives a collision status message. PO Resp. 48. Patent Owner contends that Petitioner does not address the first part of the limitation that recites “*transmitting from said particular station said reservation request data on said second path if said particular station fails to receive a grant message from said centralized controller within a predetermined time delay.*” *Id.* The Patent Owner Response offers no detailed explanation of Patent Owner’s position. *Id.*

Petitioner replies that Patent Owner’s position is premised on its incorrect interpretation of the term “or.” We extensively discussed the meaning of “or” in Representative Claim B previously in this Final Written Decision. We determined that, Representative Claim Bis disclosed by a structure in which the central controller detects a collision, transmits a collision status message to the station and then receives reservation request data, or a structure in which the central controller receives reservation request data from the station after a predetermined delay. The ’219 patent discloses a protocol for handling collisions that may include the HDT detecting an error an transmission and broadcasting to all the ISUs a retransmission command, i.e., transmits a collision status message to the station, such that the ISUs retransmit the upstream signal, which the HDT then receives. Ex. 1008, col. 63, ll. 11–20. The ’219 patent also discloses that the HDT broadcasts the retransmission request after waiting a particular time, i.e., a predetermined delay, for example, a time based on an exponential back-off . Ex. 1108, col. 63, ll. 22–30. Thus, we conclude that this limitation is disclosed in the ’219 patent.

Having concluded that the '219 patent discloses the disputed limitations in Representative Claims A and B, we turn to Patent Owner's remaining arguments concerning claims 5 and 19, 6 and 20, 12 and 26, and 32.<sup>6</sup>

Claims 5 and 19

Claims 5 and 19 recite "*wherein said first path on which payload and control data packets are transmitted is one of plural downstream channels.*" Petitioner notes that the '219 patent discloses a plurality of control channels interspersed among telephony information channels in the first frequency bandwidth and contends that the plural downstream channels are shown in Figure 13 of the '219 patent. Pet. 28 (citing Ex. 1008, col. 5, ll. 36–41, 46–48; col. 55, ll. 56–62). Patent Owner contends that the IOC channel is not a path on which payload and control data packets are transmitted, but instead carries only control data. PO Resp. 49–50. Patent Owner contends that the '219 patent distinguished IOC channels, i.e. ISU operation channels, from payload channels and does not disclose or suggest any channel on which payload and control data packets are transmitted. *Id.* Patent Owner cites the disclosure in the '219 patent that IOC channels and synchronization channels may use a different modulation scheme for transport of control data between the MCC modem and the ISU than is used for transport of telephony data. *Id.* (citing Ex. 1008, col. 37, ll. 54–62).

Petitioner replies that the disclosed downstream bandwidth in the '219 patent is a path including multiple payload and control channels. Reply 23. Petitioner cites the Reply Declaration of Dr. Stark. Stark Reply Decl. ¶ 87. According to Dr. Stark, the '219 patent discloses that the downstream telephone transmitter receives inputs from active coax master units (CXMUs), each within a

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<sup>6</sup> Challenges to claim 32 are addressed in separate sections.

6 MHz frequency band and combines them into a single RF signal, that each 6 MHz band is separated by a guard band, and downstream telephony information is transmitted in the 725–800 MHz frequency band. *Id.* Thus, according to Dr. Stark, Figure 13 of the '219 patent shows multiple downstream channels transmitting payload and control information and that, even if one considered the 6 MHz band as a single channel containing both control data and payload data, there would be multiple downstream channels. *Id.*

The '219 patent states that “Fig. 13 shows a spectral allocation in a first telephone embodiment in the system of Fig. 1.” Ex. 1008, col. 15, ll. 21–22. The '219 patent further states that in “Fig. 13, the spectrum allocation for one 6 MHz band for upstream and downstream transport of telephone information and control data utilizing OFDM [orthogonal frequency division multiplexing] techniques is shown.” Ex. 1008, col. 41, ll. 21–24. In the '219 patent “the telephony payload channels and the IOC channels of the 6 MHz band are interspersed in the telephony payload channels with an IOC located every 10 payload channels. With such a distributed technique, wherein sub-bands of payload channels greater than 10 include an IOC channel, the amount of bandwidth an ISU ‘sees’ can be limited such that an IOC channel is available for the HDT to communicate with the ISU.” *Id.* at col. 41, ll. 51–60. In view of this disclosure that IOC channels are interspersed with payload channels, and the disclosure cited by Patent Owner that IOC and telephone channels are modulated differently, we agree with Patent Owner that the '219 patent does not disclose that the first path on which the payload and control data packets are transmitted is the same one of plural downstream channels. However, claims 5 and 19 do not recite that the payload and control information is transmitted on the same channel. Claims 5 and 19 recite that

the first path on which the payload and control packets are transmitted is one of a plurality of channels. As discussed above, the '219 patent discloses a first path on which payload and IOC channels are interspersed. Thus, we conclude that Petitioner has demonstrated that the feature recited in claims 5 and 19 is disclosed in the '219 patent and has demonstrated by a preponderance of the evidence that claims 5 and 19 are unpatentable based on the '219 patent alone or in combination with the '450 patent.

#### Claims 6 and 20

Claims 6 and 20 recite that the second and third paths' transmissions are carried out simultaneously during overlapping time periods in a station. Citing Dr. Stark's testimony that the second (reservation or control) and third (payload) paths transmit using multiple frequencies, Petitioner contends that one of ordinary skill would know that the '219 patent discloses separate upstream channels for control and payload data and that one of ordinary skill would understand that transmission over those paths could occur simultaneously during overlapping time periods. Pet. 28 (citing Stark Decl. ¶ 161). Arguing that the term "said station" refers to single station that simultaneously transmits on two paths, based on the term's antecedent, Patent Owner argues that Petitioner has not identified an express disclosure of this feature. PO Resp. 51. However, Patent Owner offers no explanation or evidence why a person of ordinary skill would not have known that in the '219 patent a single station could transmit on different frequencies at the same time.<sup>7</sup> Thus, we

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<sup>7</sup> The Patent Owner Response refers the reader to § IV(A)(1)(c), which does not exist. There is no § V(A)(1)(c). Section VI, identified in the Table of Contents as beginning on page 45, is mis-numbered on page 45 as § IV. However, there is no

conclude that Petitioner has demonstrated by a preponderance of the evidence that claims 6 and 20 are unpatentable as obvious over the '219 patent.

Claims 12 and 26

Claims 12 and 26 recite that the first modulation technique enhances robustness and efficiency of the reservation request transmission without degrading the robustness, efficiency and utilization of the upstream payload channel. Patent Owner argues that Petitioner does not address the second portion of the limitation, i.e., without degrading the upstream payload channel. PO Resp. 52. We addressed a similar argument advanced by Patent Owner in our discussion of the challenges based on the '450 patent. Petitioner also cites the testimony of Patent Owner's witness Dr. Jonathan Wells that "without degrading" is implicit in the use of separate channels. Reply 24 (citing Wells Tr. 114:7–16). Therefore, we conclude that Petitioner has demonstrated that the '219 patent discloses this limitation and, by a preponderance of the evidence, that claim 12 is unpatentable as obvious over the '219 patent and that claim 26 is unpatentable over the combination of the '219 patent, the '450 patent, and the admitted prior art, as addressed above in our discussion of the challenges based on the '450 patent.

*Claim 32 as Anticipated by the '219 Patent*

We instituted trial on the grounds that claim 32 is anticipated by the '219 patent. Claim 32 recites as a further limitation a second circuit for detecting whether a collision has occurred in a particular time slot on the second path due to simultaneous transmissions in the time slot from two or more stations, and for causing, in response to detecting the collision, the transmitter to transmit a

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sub-section (A)(1)(c) in this portion of the Patent Owner Response. Thus, the subject matter that Patent Owner references is unclear.

notification on the first path to at least the stations where the collisions have occurred. Patent Owner proffers an argument similar to that which it advanced in the Patent Owner Preliminary Response, i.e., that the claim charts in the Petition do not show a circuit located at a centralized controller. PO Resp. 53. Patent Owner contends that Petitioner does not explain how the elements cited individually in the claim charts disclose the arrangement of elements recited in claim 32. *Id.*

Petitioner replies that Patent Owner ignores its citations to Dr. Stark's testimony explaining how the '219 patent discloses a host digital terminal (HDT) in a central controller, i.e., the head end, and that Dr. Stark's explanation remains uncontested. Reply 25 (citing Stark Decl. ¶¶ 165–166, 168, 174; Stark Reply Decl. ¶ 90).

Referencing Figure 1 of the '219 patent, paragraph 168 of the Stark declaration states that the head end, including the HDT, interfaces with multiple stations located downstream of the head end. Stark Decl. ¶ 168. Dr. Stark further notes that Patent Owner's witness, Dr. Wells, does not refute Dr. Stark's assertion that the head end includes an HDT that operates as a circuit located at the central controller. Stark Reply Decl. ¶ 90.

As we noted in our Decision to Institute, Petitioner's claim charts identify a HDT and coax master units (CXMUs), which are located at the head end. Dec. to Inst. 36. The Petition explains that Figure 1 of the '219 patent discloses hybrid-fiber-coaxial (HFC) networks that include a head end and HDTs that implement all common equipment functions for customer interface equipment, such as integrated service units (ISUs). The claim charts also identify disclosure in the '219 patent that the downstream telephony transmitter in Figure 4 takes outputs from the active CXMUs of the HDT, which carry telephony and control data, and combines the outputs into a downstream telephony transmission signal. Dec. to Inst. 37. Thus,

we conclude that Petitioner has demonstrated that the '219 patent discloses the claimed circuit located at a centralized controller, and that Petitioner has shown by a preponderance of the evidence that claim 32 of the '557 Patent is anticipated by the '219 patent.

*Claim 32 as Obvious Over the Combination of the '450 Patent, the '219 Patent, and the Admitted Prior Art.*

Petitioner also contends that a person of ordinary skill could have implemented the structure of the '219 patent in the NCT of the '450 patent and obtained predictable results (e.g., the transmitter would have transmitted on the forward channel, the dual receivers would have each received on respective upstream channels, and the circuit would detect collisions and cause the transmission of a notification). Pet. 59–60 (citing Stark Decl. ¶ 243). Dr. Stark further testifies that a person of ordinary skill would have been motivated to combine the '450 Patent with the structure of the '219 Patent and the transmission of a downstream message indicating a collision in a time slot as disclosed in the APA to arrive at the subject matter of Claim 32. Stark Decl. ¶ 243. Patent Owner has not provided persuasive evidence to overcome Dr. Stark's testimony. Thus, we conclude that Petitioner has demonstrated by a preponderance of the evidence that claim 32 is unpatentable under 35 U.S.C. § 103 as obvious over the combination of the '450 patent, the '219 patent, and the APA.

#### CONCLUSION

Upon consideration of the challenges on which trial was instituted, we conclude as follows:

Claims 7 and 21 of the '557 Patent are unpatentable as anticipated under 35 U.S.C. § 102 by the '450 Patent;

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Claims 1, 4, 5, 7, 11–13, 15, 18, 19, 21, and 25–27 of the '557 Patent are unpatentable as obvious under 35 U.S.C. § 103(a) over the '450 Patent;

Claims 1, 2, 4–7, 10, 12, 13, 15, 16, 18–21, 24, 26, 27, and 32 of the '557 Patent are unpatentable as obvious under 35 U.S.C. § 103(a) over the '219 Patent;

Claim 32 of the '557 Patent is unpatentable as anticipated under 35 U.S.C. § 102 by the '219 Patent;

Claims 15, 18, and 20 of the '557 Patent are unpatentable as obvious under 35 U.S.C. § 103(a) over the combination of the '450 Patent and the admitted prior art;

Claims 5, 10–13, and 25 of the '557 Patent are unpatentable as obvious under 35 U.S.C. § 103(a) over the combination of the '450 Patent and the '219 Patent;

Claims 19, 24, 26, 27, and 32 of the '557 Patent are unpatentable as obvious under 35 U.S.C. § 103(a) over the combination of the '450 Patent, the '219 Patent, and the admitted prior art;

Claims 7 and 14 of the '557 Patent are unpatentable as obvious under 35 U.S.C. § 103(a) over the combination of the '450 Patent and the '398 Patent;

Claims 21 and 28 of the '557 Patent are unpatentable as obvious under 35 U.S.C. § 103(a) over the combination of the '450 Patent, the '398 Patent, and the admitted prior art; and

Claims 11 and 25 of the '557 patent are unpatentable as obvious under 35 U.S.C. § 103(a) over the combination of the '450 patent and Bungum.



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ORDER

In consideration of the above, it is

ORDERED that claims 1, 2, 4–7, 10–16, 18–21, 24–28, and 32 of the '557 Patent are unpatentable; and

FURTHER ORDERED, that because this is a final written decision, parties to the proceeding seeking judicial review of the decision must comply with the notice and service requirements of 37 C.F.R. § 90.2.

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