

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

GOOGLE LLC,
Petitioner,

v.

PERSONALIZED MEDIA COMMUNICATIONS, LLC,
Patent Owner.

IPR2020-00721
Patent 7,865,920 B1

Before GEORGIANNA W. BRADEN, JON M. JURGOVAN, and
STEVEN M. AMUNDSON, *Administrative Patent Judges*.

AMUNDSON, *Administrative Patent Judge*.

JUDGMENT
Final Written Decision
Determining Some Challenged Claims Unpatentable
35 U.S.C. § 318(a)

I. INTRODUCTION

Google LLC (“Petitioner”) filed a Petition requesting an *inter partes* review of claims 7–10 in U.S. Patent No. 7,865,920 B1 (Ex. 1001, “the ’920 patent”) under 35 U.S.C. §§ 311–319.¹ Paper 6 (“Pet.”). Personalized Media Communications, LLC (“Patent Owner”) filed a Preliminary Response. Paper 9 (“Prelim. Resp.”).

In our Institution Decision (Paper 11, “Inst. Dec.”), we instituted review based on all challenged claims and all grounds presented in the Petition. We have jurisdiction under 35 U.S.C. § 6. We issue this Final Written Decision under 35 U.S.C. § 318(a) and 37 C.F.R. § 42.73. For the reasons explained below, Petitioner has shown by a preponderance of the evidence that claims 7, 8, and 10 are unpatentable but has not shown by a preponderance of the evidence that claim 9 is unpatentable. *See* 35 U.S.C. § 316(e) (2018).

II. BACKGROUND

A. *Procedural History*

After we instituted review, Patent Owner filed a Response (Paper 13, “Resp.”), Petitioner filed a Reply (Paper 18, “Reply”), and Patent Owner filed a Sur-reply (Paper 20, “Sur-reply”). On June 30, 2021, we held an oral hearing, and the record includes the hearing transcript. *See* Paper 31 (“Tr.”).

On July 1, 2021, we issued an order authorizing the parties to file opening and responsive briefs addressing the meaning of the term “operatively connected” in claims 8 and 9. Paper 26, 3. Then, Petitioner filed an opening brief (Paper 27), Patent Owner filed an opening brief

¹ Petitioner filed a Petition (Paper 1) and a corrected Petition (Paper 6). We reference the corrected Petition filed on April 15, 2020.

(Paper 28), Petitioner filed a responsive brief (Paper 29), and Patent Owner filed a responsive brief (Paper 30).

B. Real Parties in Interest

Petitioner identifies itself as the real party in interest. Pet. 51. Patent Owner identifies itself as the real party in interest. Paper 4, 1. The parties do not raise any issue about real parties in interest.

C. Related Matters

Petitioner and Patent Owner identify the following civil actions where Patent Owner has asserted the '920 patent against Petitioner and others:

- *Personalized Media Communications, LLC v. Akamai Technologies, Inc.*, No. 2:19-cv-00089 (E.D. Tex. filed March 21, 2019);
- *Personalized Media Communications, LLC v. Google LLC*, No. 2:19-cv-00090 (E.D. Tex. filed March 21, 2019) (“the *Google* case”); and
- *Personalized Media Communications, LLC v. Netflix, Inc.*, No. 2:19-cv-00091 (E.D. Tex. filed March 21, 2019) (“the *Netflix* case”).

Pet. 52; Paper 4, 1. Although the *Netflix* case was filed in the Eastern District of Texas, the case was transferred to the Southern District of New York. Ex. 2003, 16–17.

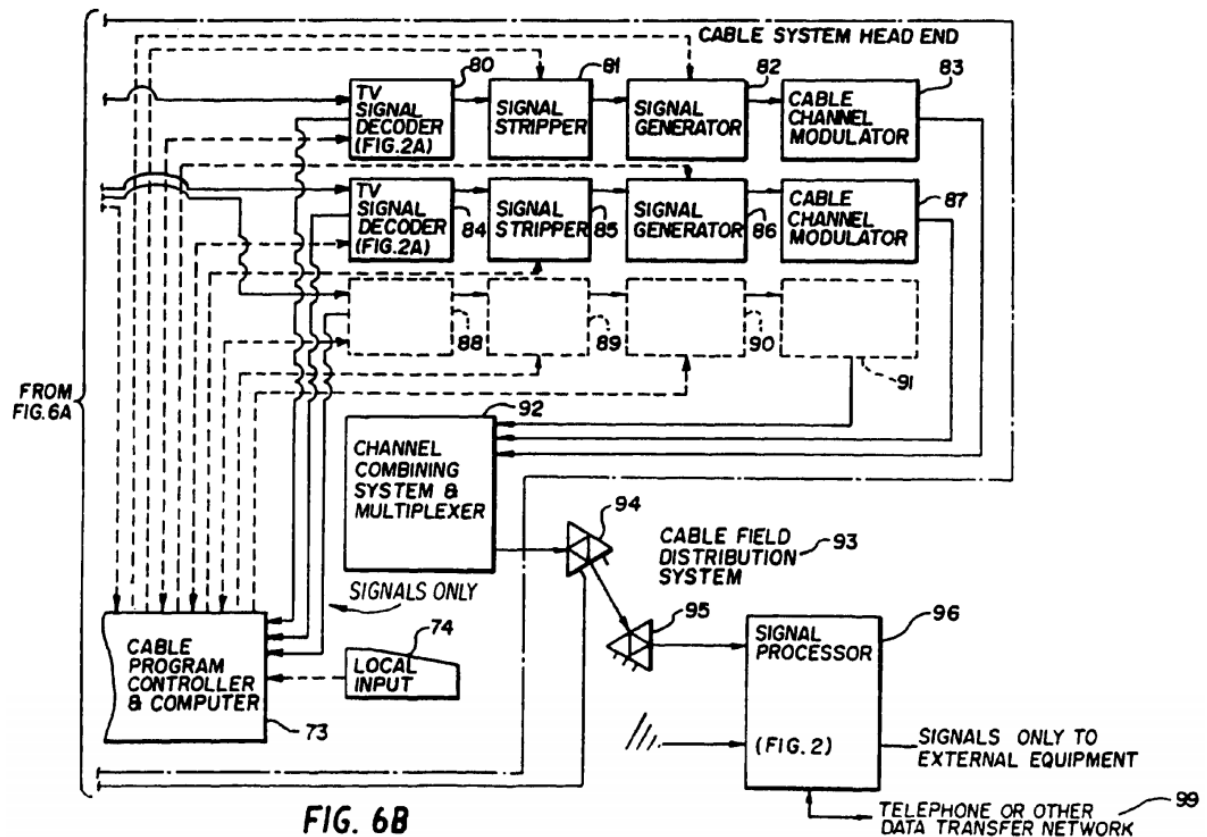
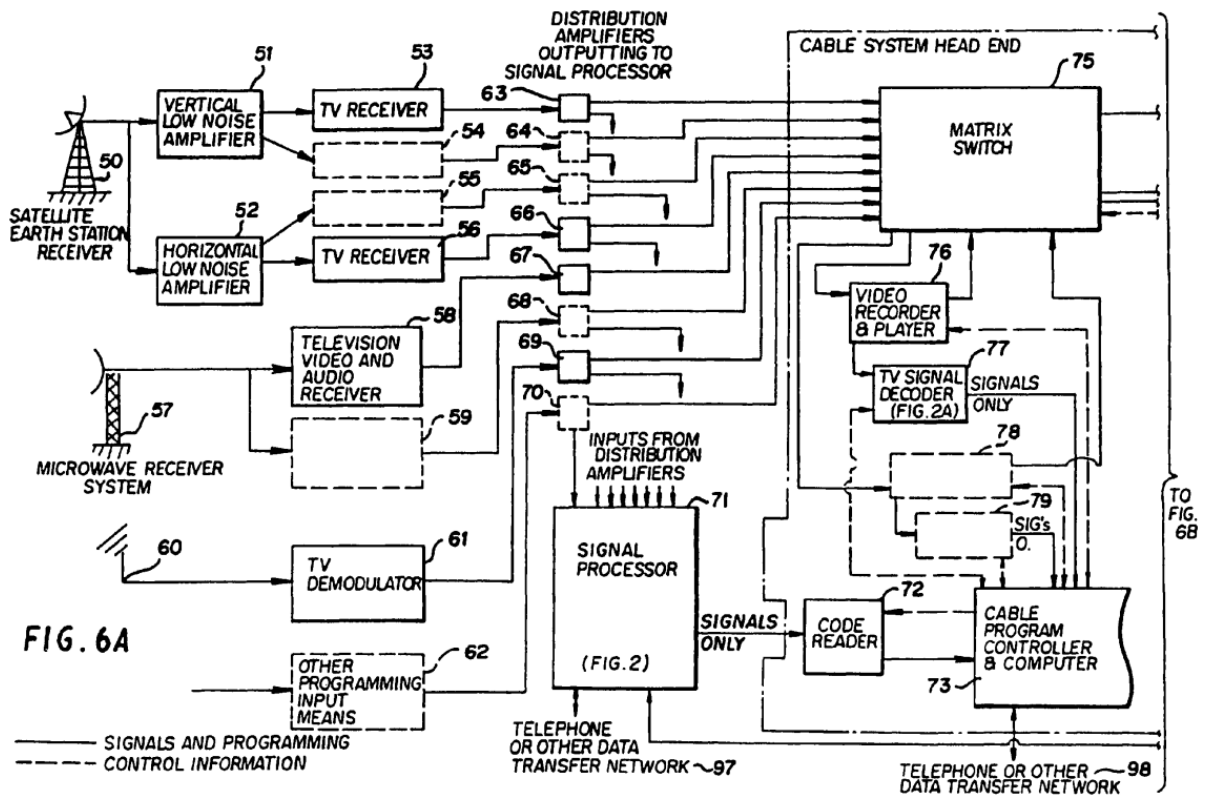
In addition, Patent Owner identifies numerous matters before the Office, including *inter partes* reviews, *ex parte* reexaminations, and reissue applications, as matters that could affect or be affected by this proceeding because they involve “patents that belong to the same patent family” as the '920 patent. Paper 4, 1–3.

D. The '920 Patent (Exhibit 1001)

The '920 patent, titled “Signal Processing Apparatus and Methods,” issued on January 4, 2011, from an application filed on May 19, 1995. Ex. 1001, codes (22), (45), (54). The patent identifies that application as the last in a series of continuation applications based on a continuation-in-part application filed on September 11, 1987, with the earliest ancestor application filed on November 3, 1981. *Id.* at 1:7–20, code (63).

The '920 patent describes a “unified system of programming communication” where the “system encompasses the prior art (television, radio, broadcast hardcopy, computer communications, etc.) and new user specific mass media.” Ex. 1001, code (57). The patent states that “[w]ithin the unified system, parallel processing computer systems, each having an input (e.g., 77) controlling a plurality of computers (e.g., 205), generate and output user information at receiver stations.” *Id.*

Figures 6A and 6B in the '920 patent depict an embodiment of a signal processing apparatus according to the invention. Ex. 1001, 10:11–13, 167:61–168:27, 174:19–41. Figures 6A and 6B are reproduced below:



Figures 6A and 6B are block diagrams illustrating an “intermediate transmission station,” i.e., a cable television head end. *Id.* at 10:11–13, 167:61–64, Figs. 6A–6B.

The ’920 patent states that “stations that originate broadcast transmissions are called ‘original transmission stations,’ stations that receive and retransmit broadcast transmissions are called ‘intermediate transmission stations’, and stations where subscribers view programming are called ‘ultimate receiver stations.’” Ex. 1001, 21:47–52; *see id.* at 11:33–41. The patent explains that an intermediate transmission station delivers received transmissions “by any means,” including over the air (“broadcast”) and over hard wire (“cablecast”). *Id.* at 7:9–15; *see id.* at 221:42–49, 252:64–67, 253:42–44, 255:3–5, 259:45–48, 260:28–31, 278:38–40. The patent also explains that a “programming unit,” e.g., a commercial, may “be retransmitted immediately or recorded for delayed transmission.” *Id.* at 8:19–24, 26:14–15.

The ’920 patent states that computer 73 (in Figures 6A–6B) may perform a variety of actions including the following:

- (1) “has capacity for maintaining records on the station’s programming schedule,” including “the complete programming schedule of the station”;
- (2) “has capacity for determining what programming is prerecorded on the magnetic tapes (or other recording media) loaded on” storage devices;
- (3) “has capacity for automatically organizing the locations of units of prerecorded programming on recording media such as magnetic video tapes”; and
- (4) “has capacity for automatically playing organized scheduled program units according to its recorded station schedule.”

Ex. 1001, 169:4–12, 170:53–57, 171:32–35, 172:56–58, 180:53–55. The patent also states that computer 73 “is preprogrammed with information on the operating speeds and capacities of all station apparatus and the connections of said apparatus with matrix switch, 75.” *Id.* at 168:66–169:3. In addition, the patent discloses storing data based on storage availability, e.g., based on a storage device’s “recording capacity,” “level of fullness,” or “available space.” *Id.* at 17:46–52, 47:54–64, 141:9–13, 141:34–41, 143:34–42, 153:62–154:11, 156:62–157:12, 171:45–63, 179:55–64.

The ’920 patent explains that each signal decoder for detecting and processing embedded signal information “is controlled by a controller, 39, 44, or 47, that has buffer, microprocessor, ROM, and RAM capacities.” Ex. 1001, 19:32–34, 19:46–47. “[B]uffer capacity of controller, 39, 44, or 47, includes capacity for receiving, organizing, and storing simultaneous inputs from multiple sources while inputting information, received and stored earlier, to said microprocessor capacity of controller, 39, 44, or 47.” *Id.* at 19:48–52. “RAM capacity of controller, 39, 44, or 47, constitutes workspace that the microprocessor of said controller, 39, 44, or 47, can use for intermediate stages of information processing and may also contain microprocessor control instructions.” *Id.* at 19:63–67.

The ’920 patent also explains that a unified system according to the invention has “capacity for communicating to many different apparatus messages that vary greatly in complexity, length, and priority for speed of processing.” Ex. 1001, 29:44–47; *see id.* at 29:47–58. According to the patent, “[s]peed and flexibility are essential considerations not only in the composition of individual messages but also in the composition of message

streams.” *Id.* at 30:10–12. Thus, the system seeks “to maximize the speed of information transmission.” *Id.* at 84:6–12.

E. The Challenged Claims

Petitioner challenges independent claim 7 and claims 8–10 that depend directly from claim 7. Claim 7 exemplifies the challenged claims and reads as follows (with formatting added for clarity):

7. A method of communicating programming to subscribers in a network, said network including one or more programming origination stations, a plurality of intermediate transmission stations, and a plurality of subscriber stations, each intermediate transmission station receiving audio or video programming from said origination stations, each intermediate transmission stations [sic] including one or more selective communications devices and a plurality of storage locations, said method comprising the steps of:

passing a plurality of units of audio or video programming to a transmitter at said one or more programming origination stations;

passing to said transmitter at said one or more programming origination stations, data identifying said units of audio or video programming or subject matter included in said units of audio or video programming,

said data effective to instruct: at least one of said plurality of intermediate transmission stations to indicate when to retransmit said plurality of units of audio or video programming to at least one of said plurality of subscriber stations,

wherein data of one or more predetermined transmission station capacities is processed at said at least one of said plurality of intermediate transmission stations to identify one of said plurality of storage locations at which to store at least one said plurality of units of audio or video programming,

wherein said identified storage locations are different for each of said plurality of units of audio or video programming, and

wherein said stored at least one of said plurality of units of programming is transferred from said identified one of said plurality of storage locations to another of said plurality of storage locations based on said data identifying said units of audio or video programming or subject matter included in said units of audio or video programming and said data of one or more predetermined transmission station capacities; and

transmitting said plurality of units of audio or video programming and said data that identify said units of audio or video programming or a subject matter included in said units of audio or video programming to said plurality of intermediate transmission stations.

Ex. 1001, 288:25–67.

F. The Asserted References

For its challenges, Petitioner relies on the following references:

Name	Reference	Exhibit
Lovett	US 4,450,477, issued May 22, 1984	1005
Cox	US 4,388,645, issued June 14, 1983	1006
Olson	US 4,536,837, issued August 20, 1985	1007
Knight	US 4,477,847, issued October 16, 1984	1008

Petitioner contends that the challenged claims are “not entitled to a priority date before September 11, 1987.” Pet. 15. Petitioner also contends that each reference “constitutes prior art under at least pre-AIA §§ 102(a),

(b), and (e).” *Id.* at 2, 6, 10–11; *see* 35 U.S.C. § 102 (2006).² Patent Owner does not dispute that each reference qualifies as prior art. *See* Resp. 4–22.

G. The Asserted Challenges to Patentability

Petitioner asserts the following challenges to patentability:

Claims Challenged	35 U.S.C. §	References
7–10	103(a)	Lovett, Cox
7–10	103(a)	Lovett, Cox, Olson
7–10	103(a)	Lovett, Cox, Knight

Pet. 1–2, 19–49.

H. Testimonial Evidence

To support its challenges, Petitioner relies on the declaration of Charles J. Neuhauser, Ph.D. (Ex. 1003, “Neuhauser Decl.”). Dr. Neuhauser states, “I have been retained by Google, LLC, as an independent expert in this proceeding before the United States Patent and Trademark Office.” Ex. 1003 ¶ 2.

To support its positions, Patent Owner relies on the declaration of Alfred C. Weaver, Ph.D. (Ex. 2001, “Weaver Decl.”). Dr. Weaver states, “I have been retained by Patent Owner Personalized Media Communications, LLC (‘PMC’) as a technical expert witness with respect to the proceedings currently before the Patent Trial and Appeal Board.” Ex. 2001 ¶ 2.

² The Leahy-Smith America Invents Act (“AIA”), Pub. L. No. 112-29, 125 Stat. 284 (2011), amended 35 U.S.C. §§ 102 and 103 effective March 16, 2013. Because the ’920 patent’s filing date predates the AIA’s amendments to § 102 and § 103, this decision refers to the pre-AIA versions of § 102 and § 103.

I. Burden

In an *inter partes* review, a petitioner bears the burden of persuasion to prove “unpatentability by a preponderance of the evidence.” *Dynamic Drinkware, LLC v. Nat’l Graphics, Inc.*, 800 F.3d 1375, 1378 (Fed. Cir. 2015) (quoting 35 U.S.C. § 316(e)); *see* 37 C.F.R. § 42.1(d) (2021).

III. PATENTABILITY ANALYSIS

A. Legal Principles: Obviousness

A patent may not be obtained “if the differences between the subject matter sought to be patented 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.” 35 U.S.C. § 103(a) (2006). An obviousness analysis involves underlying factual inquiries including (1) the scope and content of the prior art; (2) differences between the claimed invention and the prior art; (3) the level of ordinary skill in the art; and (4) where in evidence, objective indicia of nonobviousness, such as commercial success, long-felt but unsolved needs, and failure of others.³ *Graham v. John Deere Co.*, 383 U.S. 1, 17–18, 35–36 (1966); *Apple Inc. v. Samsung Elecs. Co.*, 839 F.3d 1034, 1047–48 (Fed. Cir. 2016) (en banc). When evaluating a combination of references, an obviousness analysis should address “whether there was an apparent reason to combine the known elements in the fashion claimed by the patent at issue.” *KSR Int’l Co. v. Teleflex Inc.*, 550 U.S. 398, 418 (2007).

We analyze the obviousness issues according to these principles.

³ The record does not include arguments or evidence regarding objective indicia of nonobviousness.

B. Level of Ordinary Skill in the Art

Factors pertinent to determining the level of ordinary skill in the art include (1) the educational level of the inventor; (2) the type of problems encountered in the art; (3) prior-art solutions to those problems; (4) the rapidity with which innovations are made; (5) the sophistication of the technology; and (6) the educational level of workers active in the field. *Envtl. Designs, Ltd. v. Union Oil Co.*, 713 F.2d 693, 696–97 (Fed. Cir. 1983). Not all factors may exist in every case, and one or more of these or other factors may predominate in a particular case. *Id.* These factors are not exhaustive, but merely a guide to determining the level of ordinary skill in the art. *Daiichi Sankyo Co. v. Apotex, Inc.*, 501 F.3d 1254, 1256 (Fed. Cir. 2007). Moreover, the prior art itself may reflect an appropriate skill level. *Okajima v. Bourdeau*, 261 F.3d 1350, 1355 (Fed. Cir. 2001).

Based on Dr. Neuhauser’s testimony, Petitioner asserts that a person of ordinary skill in the art would have been “someone knowledgeable in telecommunications services and signal processing apparatuses and methods.” Pet. 12 (citing Ex. 1003 ¶ 38). Petitioner also asserts that an ordinarily skilled artisan would have had a “Bachelor’s degree in electrical engineering or computer engineering (or equivalent), and at least three years of work experience in the field of TV broadcasting systems, computer systems or TV electronics, and/or multimedia or real-time video systems.” *Id.* (citing Ex. 1003 ¶ 38).

Based on Dr. Weaver’s testimony, Patent Owner asserts that a person of ordinary skill in the art would have had “at least a bachelor’s degree (or equivalent) in digital electronics, electrical engineering, computer

engineering or a related technical degree, and two to five years of post-degree experience in a similar field.” Resp. 4 (citing Ex. 2001 ¶ 34).

Patent Owner’s description of an ordinarily skilled artisan requires slightly less experience (“two to five years”) than Petitioner’s description (“at least three years”). See Pet. 12; Resp. 4. We adopt Patent Owner’s description of an ordinarily skilled artisan because it comports with the technology and claims of the ’920 patent as well as the asserted prior art. Moreover, if the prior art renders the claimed subject matter obvious to a person with less experience and less knowledge, then the prior art renders the claimed subject matter obvious to a person with more experience and more knowledge. See *Tokai Corp. v. Easton Enters., Inc.*, 632 F.3d 1358, 1369 (Fed. Cir. 2011).

We note that our analysis would not change if we adopted Petitioner’s description of an ordinarily skilled artisan. Consistent with this, Dr. Weaver testifies that “the analysis would be the same” under either Petitioner’s description of an ordinarily skilled artisan or Patent Owner’s description. Ex. 2001 ¶ 37; see *id.* ¶¶ 34, 36.

C. Claim Construction

1. GENERALLY

Because Petitioner filed the Petition after November 13, 2018, we construe claim terms “using the same claim construction standard” that district courts use to construe claim terms in civil actions under 35 U.S.C. § 282(b). See 37 C.F.R. § 42.100(b). Under that standard, “[c]laim terms are given their ordinary and customary meaning, which is the meaning the term would have to a person of ordinary skill in the art at the time of the invention.” *Power Integrations, Inc. v. Fairchild Semiconductor Int’l, Inc.*,

904 F.3d 965, 971 (Fed. Cir. 2018) (citing *Phillips v. AWH Corp.*, 415 F.3d 1303, 1312–13 (Fed. Cir. 2005) (en banc)). The meaning of claim terms may be determined by “look[ing] principally to the intrinsic evidence of record, examining the claim language itself, the written description, and the prosecution history, if in evidence.” *DePuy Spine, Inc. v. Medtronic Sofamor Danek, Inc.*, 469 F.3d 1005, 1014 (Fed. Cir. 2006) (citing *Phillips*, 415 F.3d at 1312–17).

Here, Petitioner contends that “[b]ecause the claims are unpatentable under all constructions, the Board need not construe the terms.” Pet. 17. Patent Owner does not ask us to construe any terms. *See* Resp. 11–22.

2. “INTERMEDIATE TRANSMISSION STATION”

As explained below, the parties dispute whether the prior art teaches certain aspects concerning the “capacities” of components at an “intermediate transmission station.” *See* Resp. 11–18; Reply 1–12; Sur-reply 1–11; *infra* § III.D.3(g). To help resolve that dispute, we address the meaning of “intermediate transmission station.” *See* Ex. 1001, 21:48–50; Ex. 1013, 28–31, 88; Ex. 2003, 5–15.

In the *Google* case, the Texas district court construed “intermediate transmission station” to mean “station that can receive and retransmit broadcast transmissions.” Ex. 1013, 28–31, 88; *see supra* § II.C. In the *Netflix* case, the New York district court construed “intermediate transmission station” the same way. Ex. 2003, 5–15; *see supra* § II.C.

In the *Google* case, the Texas district court determined that “[t]he term ‘intermediate transmission station’ is defined in” the ’920 patent. Ex. 1013, 29; *see* Ex. 2003, 3, 6. We agree that the ’920 patent defines the term “intermediate transmission station.” *See* Ex. 1001, 21:48–50. In

particular, the patent states: “stations that receive and retransmit broadcast transmissions are called ‘intermediate transmission stations.’” Ex. 1001, 21:48–50; *see* Ex. 1013, 29; Ex. 2003, 3, 6.

Consistent with the ’920 patent’s definition and both district courts, we construe “intermediate transmission station” to mean “station that can receive and retransmit broadcast transmissions.” *See* Ex. 1001, 21:48–50; Ex. 1013, 28–31, 88; Ex. 2003, 5–15.

3. “OPERATIVELY CONNECTED”

The parties dispute the meaning of the term “operatively connected” in claims 8 and 9. *See, e.g.*, Tr. 5:18–22, 13:15–18; Paper 27, 1–5; Paper 28, 1–3. Claim 8 depends directly from claim 7 and further requires that (1) “said one or more selective communications devices at said at least one of said plurality of intermediate transmission stations comprise a switch with a plurality of outputs” and (2) “said predetermined transmission station capacities specify a plurality of storage devices and/or transmitters operatively connected to said plurality of outputs.” Ex. 1001, 289:1–7. Claim 9 depends directly from claim 7 and further requires that (1) “said one or more selective communications devices at said at least one of said plurality of intermediate transmission stations comprise a switch with a plurality of inputs and outputs” and (2) “said predetermined transmission station capacities specify a plurality of storage devices and/or receivers operatively connected to said plurality of inputs and outputs.” *Id.* at 289:8–14.

Petitioner contends that “operatively connected” to switch inputs means “these components are connected in a way that permits the switch to selectively receive programming from these components via the inputs.”

Paper 27, 1. Petitioner contends that “operatively connected” to switch outputs means “these components are connected in a way that permits the switch to selectively send programming to these components via the outputs.” *Id.* Petitioner also contends that “operatively connected” is broader than “directly connected.” *Id.* at 3. Further, Petitioner asserts that the ’920 patent’s specification supports its proposed constructions. *See id.* at 1–5.

Patent Owner argues that “Petitioner’s proposed constructions are incorrect because they construe the term ‘switch’—not the term ‘operatively connected.’” Paper 30, 1. Patent Owner also argues that “the word ‘operatively’ does not modify or describe the ‘switch’” in claims 8 and 9 and that “the claimed operative connection is external of the switch” between “the inputs/outputs of the switch and the devices.” *Id.* (emphasis by Patent Owner).

In addition, Patent Owner contends that “operatively connected [to]” means “connected to enable data communication operations with.” Paper 28, 1, 3. Patent Owner also contends that the claim language and the ’920 patent’s specification support its proposed construction. *Id.* at 2–3.

In particular, Patent Owner argues that the language common to claims 8 and 9 specifies that the claimed “switch” functions in a “selective communications device.” Paper 28, 2. Referencing claim 8’s language, Patent Owner asserts that the “‘outputs’ of the switch (in the selective communication device) must be able to communicate data with the ‘storage devices and/or transmitters.’” *Id.* Referencing claim 9’s language, Patent Owner asserts that “[t]he ‘plurality of storage devices and/or receivers’ must be able to communicate data with the inputs of the switch, and the outputs of

the switch must be able to communicate data with the ‘plurality of storage devices and/or receivers.’” *Id.*

Further, Patent Owner asserts that the ’920 patent’s specification “informs the meaning of ‘operative’ as being tied to specific operations, which, in the context of claims 8 and 9, is data communication.” Paper 28, 3 (citing Ex. 1001, 9:1–5).

Based on the claim language and the ’920 patent’s specification, we agree with Patent Owner that “operatively connected [to]” means “connected to enable data communication operations with.” *See* Ex. 1001, 9:1–5, 167:61–168:36, 169:26–43, 169:61–170:36, 171:32–172:55, 173:57–62, 183:24–39, 289:1–14, Figs. 6A–6B; Paper 28, 1–3. We also agree with Patent Owner that Petitioner’s proposed constructions focus on switch operation, i.e., “permits the switch to selectively,” instead of external connections to the switch. *See* Paper 27, 1; Paper 30, 1.

As Patent Owner asserts, the language common to claims 8 and 9 specifies that the “switch” functions in a “selective communications device.” Ex. 1001, 289:1–14; *see* Paper 28, 2. And base claim 7 defines the communications as “audio or video programming,” i.e., data. Ex. 1001, 288:25–67.

The ’920 patent’s specification supports the conclusion that “operatively connected [to]” means “connected to enable data communication operations with.” Specifically, Figures 6A–6B illustrate an “intermediate transmission station” including the following components:

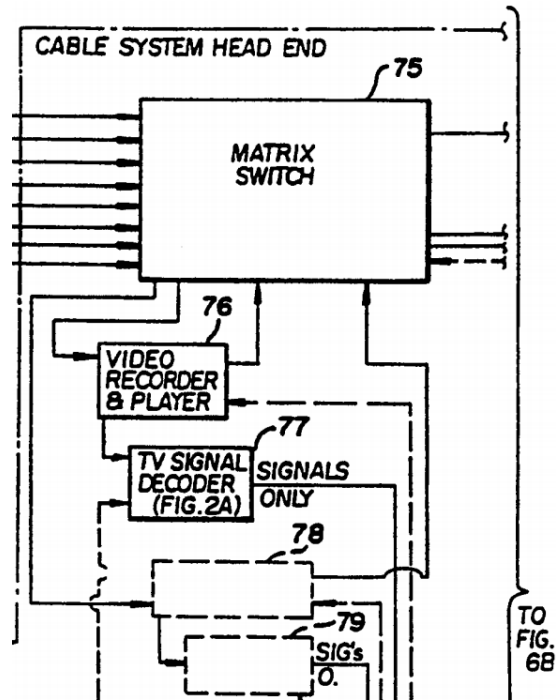
- (1) a “selective communications device,” e.g., matrix switch 75 with a “plurality of inputs and outputs”;
- (2) a “plurality of storage devices,” e.g., recorder/player 76 and recorder/player 78;

- (3) a “plurality of receivers,” e.g., television receivers 53 and 58; and
- (4) a “plurality of transmitters,” e.g., cable channel modulators 83 and 87.

Ex. 1001, 10:11–13, 167:61–168:20, 169:61–64, Figs. 6A–6B; Ex. 1014, 15:2–9. Each recorder/player 76 and 78 receives video, stores video, and plays video, and thus serves as a video storage device. *Id.* at 168:7–20, 170:28–36, 170:57–62, 172:4–11, 172:29–39, 178:1–11; *see* Tr. 6:25–7:3; Paper 27, 4–5.

Television receivers 53 and 58 receive audio or video programming, e.g., via satellite or microwave transmissions. Ex. 1001, 167:61–168:4, Fig. 6A. Each television receiver 53 and 58 supplies programming to an input of matrix switch 75 indirectly through a distribution amplifier. *Id.* at 168:7–15, 168:28–36, Fig. 6A. Each cable channel modulator 83 and 87 receives programming from an output of matrix switch 75 indirectly through a signal decoder, a signal stripper, and a signal generator. *Id.* at 168:7–15, 169:26–43, 183:24–39, Figs. 6A–6B.

The excerpt from the '920 patent's Figure 6A reproduced below depicts connections between matrix switch 75 and storage devices, i.e., recorder/player 76 and recorder/player 78:



The above excerpt from Figure 6A is a block diagram depicting part of an “intermediate transmission station.” Ex. 1001, 10:11–13, 167:61–64, Fig. 6A. As the above excerpt shows, each recorder/player 76 and 78 has an input directly connected to an output of matrix switch 75. *Id.* at 168:7–15, 172:4–11, 172:29–36, Fig. 6A. As the above excerpt also shows, each recorder/player 76 and 78 has an output directly connected to an input of matrix switch 75. *Id.* at 168:7–15, 172:4–11, 172:29–36, Fig. 6A.

The “intermediate transmission station” illustrated in Figures 6A–6B handles programming in various ways depending on the programming type. For “incoming programming” scheduled “for immediate retransmission,” computer 73 may, for example, cause matrix switch 75 to transfer the received programming from television receiver 53 to the switch output for cable channel modulator 87. Ex. 1001, 169:65–170:16. Furthermore, for “incoming programming” scheduled “for time deferred transmission,” computer 73 may, for example, cause matrix switch 75 to transfer the

received programming from television receiver 58 to the switch output for recorder/player 76. *Id.* at 170:17–36. Then, at the appropriate transmission time, computer 73 may, for example, cause matrix switch 75 to transfer the stored programming from recorder/player 76 to the switch output for cable channel modulator 83. *Id.* at 173:57–62. Moreover, computer 73 may cause matrix switch 75 to configure its switches to transfer stored programming between recorder/player 76 and recorder/player 78. *Id.* at 171:32–172:55.

The “intermediate transmission station” illustrated in Figures 6A–6B exemplifies an arrangement according to each of claim 8’s “and/or” alternatives:

- a “plurality of storage devices **and** transmitters” that are “operatively connected” to a “plurality of [switch] outputs” (the “and” alternative);
- a “plurality of storage devices **or** transmitters” that are “operatively connected” to a “plurality of [switch] outputs” (the “or” alternative).

First, for claim 8’s “and” alternative, a “plurality of storage devices **and** transmitters” are “operatively connected” to a “plurality of [switch] outputs” because (1) each recorder/player 76 and 78 has an input directly connected to an output of matrix switch 75 and (2) each cable channel modulator 83 and 87 receives programming from an output of matrix switch 75 indirectly through a signal decoder, a signal stripper, and a signal generator. Ex. 1001, 168:7–15, 169:26–43, 172:4–11, 172:29–36, 183:24–39, Figs. 6A–6B. Those indirect connections enable data communication operations between matrix switch 75 and cable channel modulators 83 and 87. To summarize for claim 8’s “and” alternative,

storage devices are “operatively connected” to switch outputs, and transmitters are “operatively connected” to switch outputs.

Second, for claim 8’s “or” alternative, a “plurality of storage devices **or** transmitters” are “operatively connected” to a “plurality of [switch] outputs” for the same reasons as claim 8’s “and” alternative: storage devices are “operatively connected” to switch outputs, and transmitters are “operatively connected” to switch outputs. Ex. 1001, 168:7–15, 169:26–43, 172:4–11, 172:29–36, 183:24–39, Figs. 6A–6B. Thus, both “or” options read on the “intermediate transmission station” illustrated in Figures 6A–6B.

The “intermediate transmission station” illustrated in Figures 6A–6B also exemplifies an arrangement according to each of claim 9’s “and/or” alternatives:

- a “plurality of storage devices **and** receivers” that are “operatively connected” to a “plurality of [switch] inputs and outputs” (the “and” alternative);
- a “plurality of storage devices **or** receivers” that are “operatively connected” to a “plurality of [switch] inputs and outputs” (the “or” alternative).

First, for claim 9’s “and” alternative, a “plurality of storage devices **and** receivers” are “operatively connected” to a “plurality of [switch] inputs and outputs” because (1) each recorder/player 76 and 78 has an input directly connected to an output of matrix switch 75 and (2) each television receiver 53 and 58 supplies programming to an input of matrix switch 75 indirectly through a distribution amplifier. Ex. 1001, 168:7–15, 168:28–36, 172:4–11, 172:29–36, Fig. 6A. Those indirect connections enable data communication operations between television receivers 53 and 58 and matrix switch 75. To summarize for claim 9’s “and” alternative, storage

devices are “operatively connected” to switch outputs, and receivers are “operatively connected” to switch inputs.

Second, for claim 9’s “or” alternative, a “plurality of storage devices **or** receivers” are “operatively connected” to a “plurality of [switch] inputs and outputs” because each recorder/player 76 and 78 has (1) an output directly connected to an input of matrix switch 75 and (2) an input directly connected to an output of matrix switch 75. Ex. 1001, 168:7–15, 172:4–11, 172:29–36, Fig. 6A. To summarize for claim 9’s “or” alternative, storage devices are “operatively connected” to switch inputs, and storage devices are “operatively connected” to switch outputs. Thus, one “or” option reads on the “intermediate transmission station” illustrated in Figures 6A–6B.

For the reasons discussed above, construing “operatively connected [to]” to mean “connected to enable data communication operations with” comports with the principle that a tribunal should not normally “interpret claim terms in a way that excludes disclosed examples in the specification.” *See Verizon Servs. Corp. v. Vonage Holdings Corp.*, 503 F.3d 1295, 1305 (Fed. Cir. 2007).

4. OTHER TERMS

We determine that no other claim terms require explicit constructions to decide the patentability issues. “[O]nly those terms need be construed that are in controversy, and only to the extent necessary to resolve the controversy.” *Vivid Techs., Inc. v. Am. Sci. & Eng’g, Inc.*, 200 F.3d 795, 803 (Fed. Cir. 1999); *see Nidec Motor Corp. v. Zhongshan Broad Ocean Motor Co.*, 868 F.3d 1013, 1017 (Fed. Cir. 2017).

D. Alleged Obviousness over Lovett and Cox

Petitioner contends that claims 7–10 are unpatentable under § 103(a) as obvious over Lovett and Cox. *See* Pet. 1, 19–45. Below, we provide overviews of Lovett and Cox, and then we consider the obviousness issues raised by the parties. As explained below, Patent Owner primarily disputes that Lovett and Cox teach two limitations in claim 7, i.e., the “storing” and “transferring” limitations. *See* Resp. 11–18; Sur-reply 1–11. As also explained below, we agree with Petitioner that claims 7, 8, and 10 are unpatentable under § 103(a) as obvious over Lovett and Cox but disagree that claim 9 is unpatentable based on these references.

1. OVERVIEW OF LOVETT (EXHIBIT 1005)

Lovett is a U.S. patent titled “Television Information System,” filed on March 31, 1982, and issued on May 22, 1984. Ex. 1005, codes (22), (45), (54). Lovett discloses a television information system that “transmits selected video picture information to one of a number of subscribers who have television sets connected to the system.” *Id.* at code (57).

With Lovett’s system, a “subscriber makes a selection by transmitting a request to the head end.” Ex. 1005, code (57). Then, a computer at the head end “interprets the request, searches the available data banks for the information, and records it.” *Id.* Next, “the information along with an identifying number is returned to the system and sent to a control station.” *Id.* The control station “route[s] the information to a particular modulator associated with the subscriber who made the request.” *Id.* The particular modulator “modulate[s] a unique carrier frequency which has been dedicated to that subscriber” and “sends the modulated carrier frequency (containing the selected information) to a feeder line” for that subscriber. *Id.*

Lovett explains that “[p]rivacy is assured by dedicating to each subscriber a different carrier frequency and associated television channel, and by filtering out all other channels which might be transmitted on the feeder line.” Ex. 1005, code (57); *see id.* at 6:40–42.

Lovett’s Figure 6 is reproduced below:

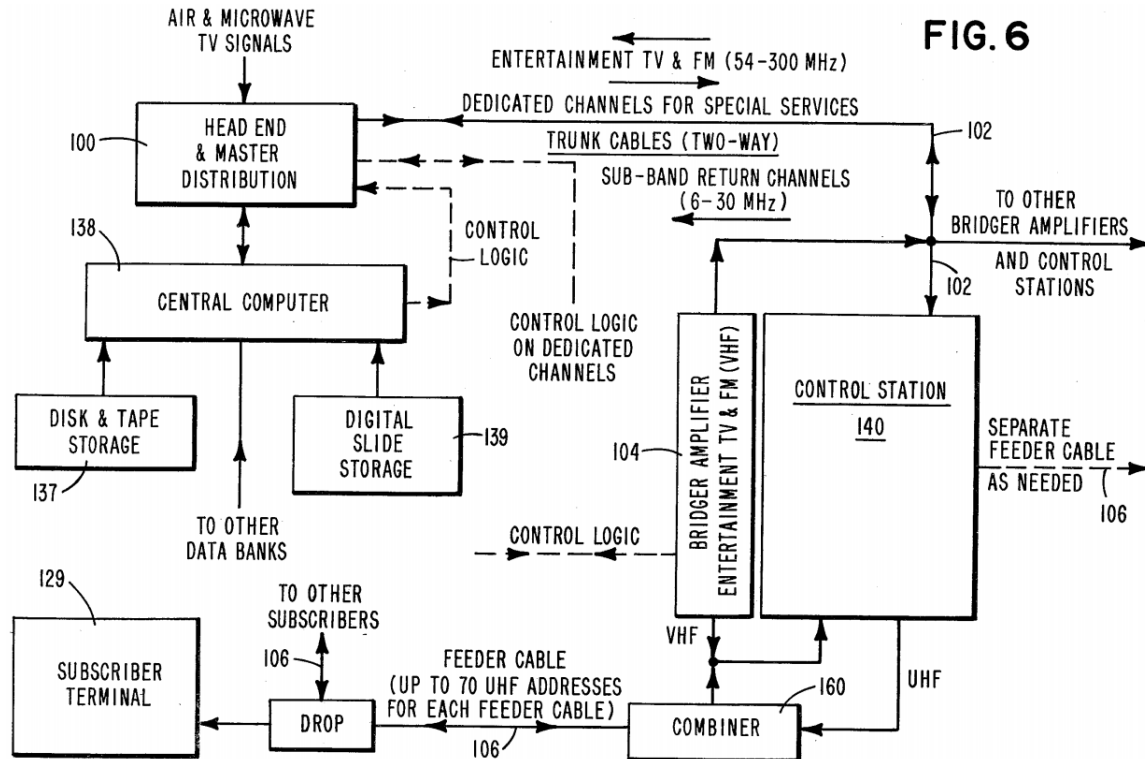


Figure 6 depicts a block diagram for a cable television system. Ex. 1005, 9:22–23, 11:34–37, Fig. 6.

As Figure 6 shows, head end 100 receives television signals representing television programming, e.g., using antennas to receive over-the-air signals. Ex. 1005, 1:32–36, Fig. 6; *see id.* at 1:7–17. Head end 100 communicates with control station 140 through trunk line 102. *Id.* at 10:1–3, 11:46–49, 12:7–11, 13:3–6, Fig. 6. Control station 140 communicates with subscriber terminal 129 and other subscriber terminals through feeder lines 106. *Id.* at 10:12–14, 11:40–42, Fig. 6.

Lovett's Figure 7 is reproduced below:

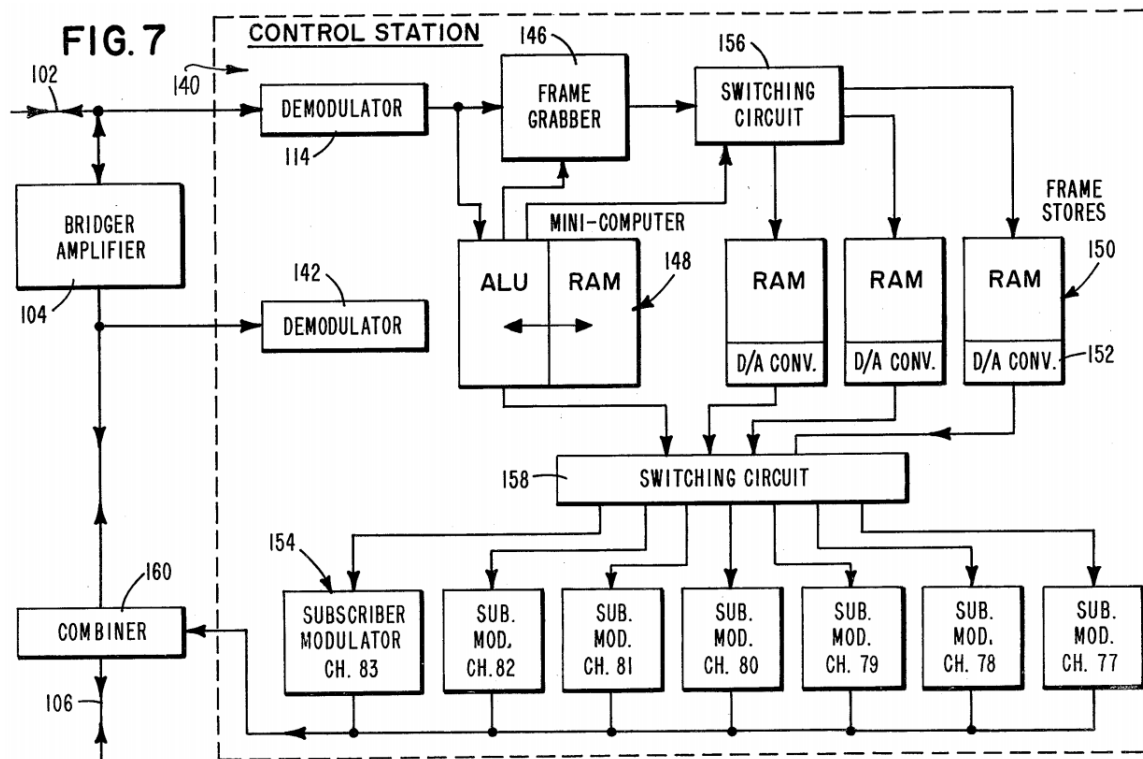


Figure 7 depicts a block diagram for a control station in a cable television system. Ex. 1005, 9:24–25, 12:38–40, Fig. 7.

As Figure 7 shows, control station 140 includes frame grabber 146 with an analog-to-digital converter at its input, mini-computer 148, frame stores 150 with respective digital-to-analog converters 152, subscriber modulators 154, switching circuit 156, and switching circuit 158. Ex. 1005, 12:40–50, 13:25–32, Fig. 7; *see id.* at 13:46–55. In addition, control station 140 is associated with “bridger amplifier 104 to direct selected data to the proper subscriber.” *Id.* at 12:38–40.

Switching circuit 156 receives input signals from mini-computer 148 and frame grabber 146. Ex. 1005, 12:45–50, 13:13–18, Fig. 7. Switching circuit 156 supplies output signals to frame stores 150. *Id.* at 13:13–18, Fig. 7. Switching circuit 158 receives input signals from mini-computer 148

and frame stores 150. *Id.* at 12:45–50, 13:18–23, Fig. 7. Switching circuit 158 supplies output signals to subscriber modulators 154. *Id.* at 13:18–23, Fig. 7; *see id.* at 12:66–13:2.

Each subscriber modulator 154 “modulate[s] a unique UHF carrier frequency associated with the television set of the subscriber who requested the data.” Ex. 1005, 13:34–37. At the subscriber terminal of the subscriber who requested the data, a UHF bandpass filter blocks “all frequencies except the UHF channel assigned or dedicated to the particular subscriber.” *Id.* at 13:63–68, Fig. 5.

2. OVERVIEW OF COX (EXHIBIT 1006)

Cox is a U.S. patent titled “Teletext Communication System with Timed Multipage Local Memory,” filed on April 13, 1981, and issued on June 14, 1983. Ex. 1006, codes (22), (45), (54). Cox discloses a teletext communication system including a transmitter, e.g., “an orbiting satellite,” that transmits television signals with “multiple pages of a teletext encoded data service at selected times of the day.” *Id.* at 2:1–5, code (57); *see id.* at 1:6–17, 3:4–15, 3:21–34. A cable television head end receives the television signals with the encoded data, processes the received signals, and distributes content to subscriber television receivers. *Id.* at 3:23–27, 3:43–65, Fig. 1.

Cox's Figure 1 is reproduced below:

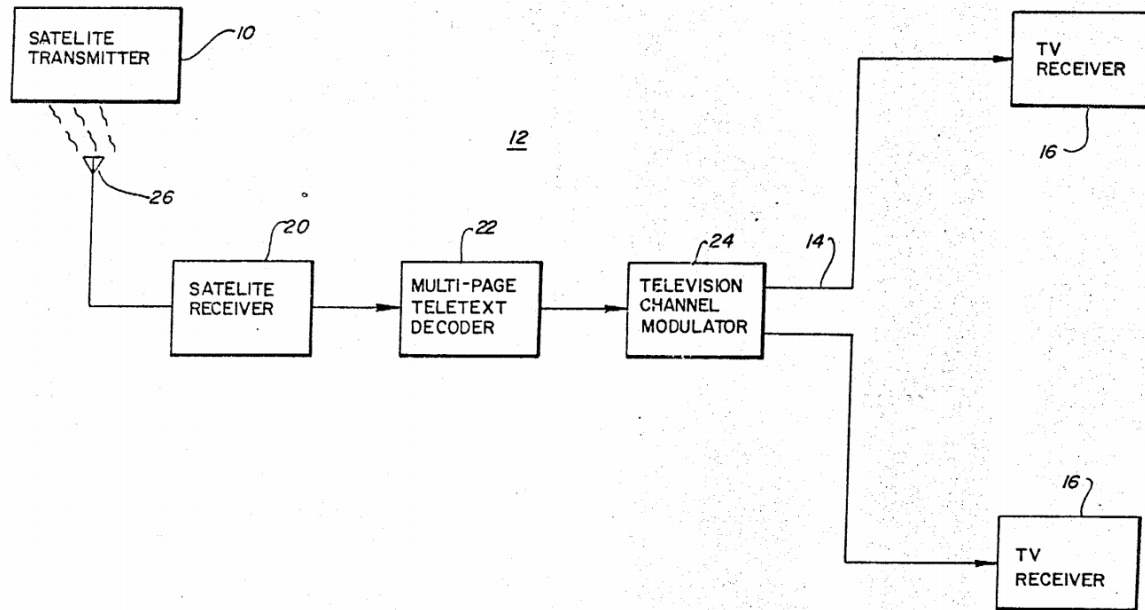


FIG. 1

Figure 1 depicts a block diagram of a teletext communication system.

Ex. 1006, 2:52–54, 3:21–23, Fig. 1.

As Figure 1 shows, the teletext communication system includes satellite 10, cable television head end 12, and television receivers 16 receiving television signals through cable 14. Ex. 1006, 3:23–27, code (57), Fig. 1. Head end 12 includes dish antenna 26, satellite receiver 20, teletext decoder 22, and television channel modulator 24. *Id.* at 3:43–59, 6:12–21, Fig. 1.

Satellite 10 transmits television signals with teletext data to head end 12. Ex. 1006, 1:61–2:10, 3:21–34, 3:66–68, Figs. 1–2; *see id.* at 1:13–34. The teletext data may produce multiple pages in a programming guide. *Id.* at 2:1–5, 3:23–51, 4:32–46, 6:36–43. A “group of one hundred pages represent[s] a magazine.” *Id.* at 1:28–29.

The teletext data for each teletext page includes a header. Ex. 1006, 1:49–52, 3:68–4:7, 4:53–48, Fig. 2. The header includes a magazine code and a page number for the teletext page. *Id.* at 4:3–7, 4:53–48, Fig. 2.

The teletext data for each teletext page also includes control data. Ex. 1006, 3:27–59, 4:18–32, 4:47–51, code (57), Figs. 2–3. The control data includes “time-on and time-off codes” indicating a time interval when head end 12 should broadcast each teletext page to television receivers 16. *Id.* at 4:18–32, 4:47–51, code (57), Fig. 2. The control data also includes a time-of-day code indicating the current time of day. *Id.* at 4:47–51, code (57), Fig. 3. Head end 12 compares the time-of-day code to the time-on and time-off codes and broadcasts television signals representing the teletext pages during their respective time intervals. *Id.* at 4:58–5:1, 8:11–40, Fig. 7.

Cox’s Figures 2 and 3 are reproduced below:

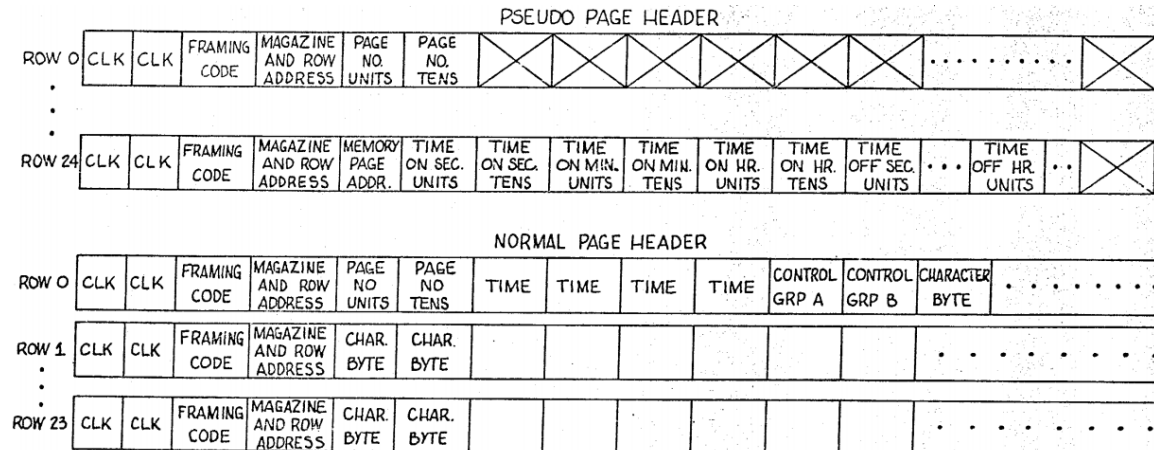


FIG. 2



FIG. 3

Figures 2 and 3 are charts illustrating a teletext data formatting scheme. Ex. 1006, 2:55–57, 3:66–38, 4:47–49, Figs. 2–3.

Figure 2 shows a magazine code and a page number for the teletext page in row 0, i.e., the header row. Ex. 1006, 1:49–52, 3:68–4:7, Fig. 2. Figure 2 shows time-on and time-off codes in row 24, i.e., in the twelve bytes following the “memory page address” byte. *Id.* at 4:18–25, Fig. 2. Figure 3 shows a time-of-day code in row 25, i.e., in the six bytes following the “row 25 address” byte. *Id.* at 4:47–51, Fig. 3.

When satellite 10 transmits television signals with teletext data to head end 12, the teletext data is embedded in the vertical blanking intervals of the television signals. Ex. 1006, 1:13–37, 1:61–2:10, 3:12–15, 3:27–34.

3. INDEPENDENT CLAIM 7

(a) Preamble

Claim 7’s preamble reads as follows:

A method of communicating programming to subscribers in a network, said network including one or more programming origination stations, a plurality of intermediate transmission stations, and a plurality of subscriber stations, each intermediate transmission station receiving audio or video programming from said origination stations, each intermediate transmission stations [sic] including one or more selective communications devices and a plurality of storage locations.

Ex. 1001, 288:25–33.

(i) Method of Communicating Programming

Petitioner contends that Lovett teaches “[a] method of communicating programming to subscribers in a network” according to claim 7’s preamble because Lovett discloses “a cable television system with transmission lines connected to television sets (or terminals) of the system’s subscribers.”

Pet. 21–22 (citing Ex. 1005, 1:6–39, 10:59–68).

Patent Owner makes no arguments specific to this aspect of claim 7's preamble. *See, e.g.*, Resp. 11–18; Sur-reply 1–11. Nonetheless, the burden remains on Petitioner to demonstrate unpatentability. *See Dynamic Drinkware*, 800 F.3d at 1378.

We agree with Petitioner that Lovett teaches “[a] method of communicating programming to subscribers in a network” according to claim 7's preamble. *See* Pet. 22; Ex. 1003 ¶¶ 46, 69–70, 81; Ex. 2001 ¶¶ 40–42. Specifically, Lovett discloses a cable television system that receives television signals representing television programming and distributes the received television signals over transmission lines connected to subscriber terminals. Ex. 1005, 1:6–39, 10:59–68, 11:34–12:17, Figs. 6–7; *see id.* at 9:61–67; Ex. 1003 ¶¶ 46, 70; Ex. 2001 ¶¶ 40–42.

(ii) One or More Programming Origination Stations

Petitioner contends that Lovett teaches “one or more programming origination stations” according to claim 7's preamble because Lovett discloses a cable television head end that “receives programing originated at another location via microwave or satellite signals.” Pet. 22–23 (citing Ex. 1005, 1:32–36, Fig. 6). According to Petitioner, the “sources of the microwave or satellite signals are the origination stations in Lovett's cable television network.” *Id.* at 23 (citing Ex. 1003 ¶ 48).

Patent Owner makes no arguments specific to this aspect of claim 7's preamble. *See, e.g.*, Resp. 11–18; Sur-reply 1–11. Nonetheless, the burden remains on Petitioner to demonstrate unpatentability. *See Dynamic Drinkware*, 800 F.3d at 1378.

We agree with Petitioner that Lovett teaches “one or more programming origination stations” according to claim 7's preamble. *See*

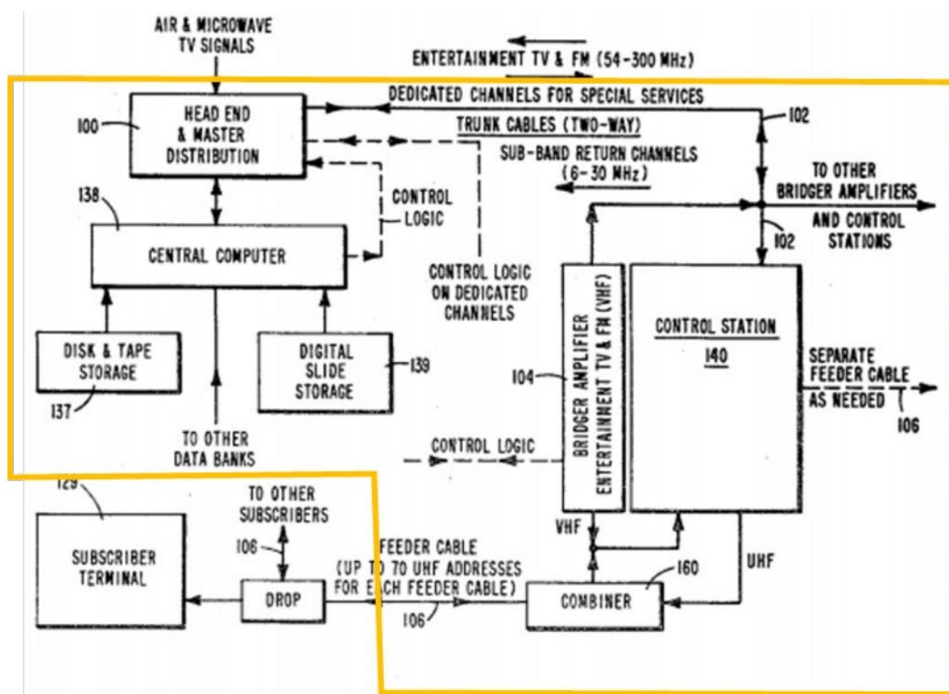
Pet. 22–23; Ex. 1003 ¶¶ 46, 69, 71, 73, 81. Specifically, Lovett discloses that head end 100 receives television signals representing television programming, e.g., using antennas to receive over-the-air signals. Ex. 1005, 1:32–36, Fig. 6; *see id.* at 1:7–17; Ex. 1003 ¶¶ 46, 73. The source or sources of the received television signals correspond to “one or more programming origination stations.” *See* Ex. 1003 ¶¶ 46, 73.

(iii) Plurality of Intermediate Transmission Stations

Petitioner contends that Lovett teaches a “plurality of intermediate transmission stations” according to claim 7’s preamble where “each intermediate transmission station receiv[es] audio or video programming from said origination stations” and “each intermediate transmission station[] includ[es] one or more selective communications devices and a plurality of storage locations.” Pet. 24–29 (citing Ex. 1003 ¶¶ 76–79; Ex. 1005, 2:38–48, 9:61–67, 10:7–8, 11:50–12:11, 12:38–50, 13:41–45, Figs. 2, 6–9); *see* Reply 2–5. Specifically, Petitioner identifies Lovett’s head end 100, bridger amplifier 104, and control station 140 located together “in the same physical station” as an “intermediate transmission station.” Pet. 24–27; Reply 2–5.

Petitioner asserts that an ordinarily skilled artisan would have “understood that each locality would have its own” head end “resulting in multiple head ends.” Pet. 24 (citing Ex. 1003 ¶ 76). Petitioner also asserts that an ordinarily skilled artisan would have “found it advantageous to include at least one bridger amplifier and control station in the same physical station as the head end to service feeder lines and drops in the immediate vicinity of the head end.” *Id.* at 25 (citing Ex. 1003 ¶ 78).

To support Petitioner's assertions, Dr. Neuhauser testifies that an ordinarily skilled artisan would have "found it advantageous to include at least one bridger amplifier and control station in the same physical station as the head end to service feeder lines and drops in the immediate vicinity of the head end." Ex. 1003 ¶ 78; *see* Pet. 25. Dr. Neuhauser explains that doing so "would provide the cost savings of serving customers in the immediate vicinity of the head end" without "the need for a separate facility." Ex. 1003 ¶ 78; *see* Pet. 25–26. To show "at least one bridger amplifier and control station in the same physical station as the head end," Dr. Neuhauser provides an annotated version of Lovett's Figure 6 as reproduced below (Ex. 1003 ¶ 78):



This annotated version of Figure 6 depicts a block diagram for a cable television system with a yellow box around components including head end 100, bridger amplifier 104, and control station 140. *See* Ex. 1003 ¶ 78; Ex. 1005, 9:22–23, 11:34–37, Fig. 6; Pet. 24–27; Reply 3–4.

For the claimed “one or more selective communications devices” at Lovett’s “intermediate transmission station,” Petitioner identifies three devices: (1) computer 138 at “the head end station”; (2) switching circuit 156 in control station 140; and (3) switching circuit 158 in control station 140. Pet. 27–28 (citing Ex. 1003 ¶¶ 79–80; Ex. 1005, 11:50–12:11, 12:45–50, Figs. 6–7). Petitioner asserts that head-end computer 138 “is a selective communications device because it selects data and communicates” data to head end 100 and because it takes data “from one of the data sources” to provide “to the master distribution unit.” *Id.* at 27–28. Petitioner asserts that switching circuit 156 “selects which of the frame stores (a plurality of storage locations) in the control station to communicate the output of the frame grabber 146 to.” *Id.* at 28. Petitioner asserts that switching circuit 158 “selects which modulator to communicate the output of the individual frame stores to.” *Id.*

For the claimed “plurality of storage locations” at Lovett’s “intermediate transmission station,” Petitioner identifies storage locations at “the head end station” and in control station 140. Pet. 27–28 (citing Ex. 1003 ¶¶ 79–80; Ex. 1005, 11:50–12:11, 12:45–50, Figs. 6–7). As storage locations at “the head end station,” Petitioner identifies “internal and attached storage” for head-end computer 138, e.g., disk and tape storage 137 and digital slide storage 139. *Id.* at 28. As storage locations in control station 140, Petitioner identifies frame stores 150. *Id.*

Patent Owner makes no arguments specific to this aspect of claim 7’s preamble. *See, e.g.,* Resp. 11–18; Sur-reply 1–11. Nonetheless, the burden remains on Petitioner to demonstrate unpatentability. *See Dynamic Drinkware*, 800 F.3d at 1378.

We agree with Petitioner that Lovett teaches a “plurality of intermediate transmission stations” according to claim 7’s preamble where “each intermediate transmission station receiv[es] audio or video programming from said origination stations” and “each intermediate transmission station[] includ[es] one or more selective communications devices and a plurality of storage locations.” *See* Pet. 23–29; Ex. 1003 ¶¶ 47–48, 69, 74–81. In particular, Lovett’s head end 100, bridger amplifier 104, and control station 140 correspond to an “intermediate transmission station,” i.e., a “station that can receive and retransmit broadcast transmissions.” Ex. 1005, 1:32–38, 10:1–3, 10:12–18, 11:40–49, 12:7–11, 13:3–45, Figs. 6–7; *see* Ex. 1003 ¶¶ 74–78; *supra* § III.C.2.

A transmission station with head end 100, bridger amplifier 104, and control station 140 includes the claimed “one or more selective communications devices,” e.g., head-end computer 138 and switching circuits 156 and 158 in control station 140. Ex. 1005, 11:50–12:11, 12:45–50, 13:13–23, Figs. 6–7; *see* Ex. 1003 ¶¶ 47–48, 79–80. A transmission station with head end 100, bridger amplifier 104, and control station 140 also includes the claimed “plurality of storage locations,” e.g., disk and tape storage 137 for head-end computer 138 and frame stores 150 in control station 140. Ex. 1005, 11:50–60, 12:45–54, 13:13–23, Figs. 6–7; *see* Ex. 1003 ¶¶ 47–48, 79–80.

(iv) Plurality of Subscriber Stations

Petitioner contends that Lovett teaches a “plurality of subscriber stations” according to claim 7’s preamble because Lovett discloses cable connections to a plurality of subscriber terminals. Pet. 22 (citing Ex. 1005, 1:6–39, 10:59–68).

Patent Owner makes no arguments specific to this aspect of claim 7's preamble. *See, e.g.*, Resp. 11–18; Sur-reply 1–11. Nonetheless, the burden remains on Petitioner to demonstrate unpatentability. *See Dynamic Drinkware*, 800 F.3d at 1378.

We agree with Petitioner that Lovett teaches a “plurality of subscriber stations” according to claim 7's preamble. *See* Pet. 22; Ex. 1003 ¶¶ 46, 69–70, 81. Specifically, Lovett discloses that control station 140 communicates with subscriber terminal 129 and other subscriber terminals through feeder lines 106. Ex. 1005, 10:12–14, 11:40–42, Fig. 6; *see* Ex. 1003 ¶¶ 46, 70; Ex. 2001 ¶¶ 41–42.

(v) Summary

Generally, a preamble does not limit a claim. *Allen Eng'g Corp. v. Bartell Indus., Inc.*, 299 F.3d 1336, 1346 (Fed. Cir. 2002). We need not decide whether claim 7's preamble limits the claim because we agree with Petitioner that Lovett teaches the preamble's subject matter. *See* Pet. 21–30; Ex. 1003 ¶¶ 46–48, 69–81; Ex. 2001 ¶¶ 40–42.

(b) Passing Units of Audio or Video Programming

Claim 7 recites “passing a plurality of units of audio or video programming to a transmitter at said one or more programming origination stations.” Ex. 1001, 288:34–36.

Petitioner contends that the combined disclosures in Lovett and Cox teach this limitation. *See* Pet. 30–32. Specifically, Petitioner asserts that Cox discloses that transmissions from a satellite to a cable television head end may include teletext data. *Id.* at 32 (citing Ex. 1006, 2:1–10, 3:21–26). Petitioner also asserts that the teletext data may produce “television programming in the form of a multiple page programing guide output in a

predetermined cyclical manner.” *Id.* (citing Ex. 1006, 3:27–62). Petitioner further asserts that “each page of the programing guide with its corresponding header data is a unit of the video programming.” *Id.*

Patent Owner makes no arguments specific to claim 7’s “passing programming” limitation. *See, e.g.*, Resp. 11–18; Sur-reply 1–11. Nonetheless, the burden remains on Petitioner to demonstrate unpatentability. *See Dynamic Drinkware*, 800 F.3d at 1378.

We agree with Petitioner that the combined disclosures in Lovett and Cox teach claim 7’s “passing programming” limitation. *See* Pet. 30–32; Ex. 1003 ¶¶ 52–55, 65, 82–84; Ex. 2001 ¶¶ 43–44. Specifically, Cox discloses satellite 10 transmitting television signals with teletext data to head end 12. Ex. 1006, 1:61–2:10, 3:21–34, 3:66–68, Figs. 1–2; *see id.* at 1:13–34; Ex. 1003 ¶¶ 52–54, 65, 84; Ex. 2001 ¶ 43. The teletext data may produce multiple pages in a programming guide. Ex. 1006, 2:1–5, 3:23–51, 4:32–46, 6:36–43; *see* Ex. 1003 ¶¶ 55, 84; Ex. 2001 ¶ 44. The programming guide corresponds to “audio or video programming,” i.e., “audio or video that is transmitted electronically to entertain, instruct or inform.” *See* Ex. 1001, 6:31–34; Ex. 1003 ¶ 84; Ex. 1013, 14–17, 21–22, 87; Inst. Dec. 21–22. And each page in the programming guide corresponds to a unit of “audio or video programming.” *See* Ex. 1003 ¶ 84.

Cox also discloses television channel modulator 24 at head end 12 generating television signals from the teletext data and distributing the television signals over cable 14 to television receivers 16. Ex. 1006, 3:59–62, 6:8–21; *see* Ex. 1003 ¶¶ 53–54, 84; Ex. 2001 ¶ 44. The “programming guide pages are thereby received by television receivers 16 and displayed for viewing by the system subscribers.” Ex. 1006, 3:62–65;

see Ex. 1003 ¶¶ 54–55. Thus, the system subscribers receive the programming guide pages as video signals. Ex. 1006, 3:59–65, 6:17–21; *see* Ex. 1003 ¶¶ 53–55, 84; Ex. 2001 ¶ 44.

(c) Passing Data Identifying Said Units or Subject Matter

Claim 7 recites “passing to said transmitter at said one or more programming origination stations, data identifying said units of audio or video programming or subject matter included in said units of audio or video programming.” Ex. 1001, 288:37–41.

Petitioner contends that the combined disclosures in Lovett and Cox teach this limitation. *See* Pet. 32–34. Specifically, Petitioner asserts that Cox’s teletext data “includes identifying data in the form of teletext headers (i.e., data identifying said units of audio or video programming or subject matter included in said units of audio or video programming).” *Id.* at 33 (citing Ex. 1006, 3:28–42, 4:20–37, Fig. 2). Petitioner also asserts that Lovett discloses “identifying teletext data using a catalogue number” that a subscriber may use to request content. *Id.* at 34 (citing Ex. 1005, 7:20–30, 11:9–12:11, Fig. 12). Petitioner further asserts that “[i]t would have been obvious to a person of skill to combine the features of Lovett and Cox such that the headers of the broadcast teletext information include both the header information in Lovett,” e.g., a catalogue number, and “the header information in Cox,” e.g., a page identifier and time-on and time-off codes. *Id.* Dr. Neuhauser’s testimony supports Petitioner’s assertions. *See* Ex. 1003 ¶¶ 85–87.

Patent Owner contends that Cox’s “head end has no ability to identify television programming, since it will cycle through each page of storage and compare the stored time codes against the current time of day.” Resp. 8

(citing Ex. 1006, 6:21–33); *see* Ex. 2001 ¶ 45. Patent Owner also contends that the “magazine and page number codes” in Cox’s teletext header are “used to allow each head end to store only the programming guide authorized for that head end.” Resp. 8 (citing Ex. 1006, 4:53–58); *see* Ex. 2001 ¶ 45.

We agree with Petitioner that the combined disclosures in Lovett and Cox teach claim 7’s “passing data identifying” limitation. *See* Pet. 32–34; Ex. 1003 ¶¶ 52, 54, 65–67, 85–87, 106. Specifically, Cox discloses that the teletext data for each teletext page includes a header with a magazine code and a page number for the teletext page. Ex. 1006, 1:49–52, 3:68–4:7, 4:53–58, Fig. 2; *see* Ex. 1003 ¶¶ 52, 85; Ex. 2001 ¶ 45. The magazine code and the page number for the teletext page identify the teletext page to a decoder to allow only selected head ends to acquire the teletext page, thus “facilitating the broadcast of different information to each of a plurality of head end facilities.” Ex. 1006, 1:37–42, 4:53–58, 5:14–18; *see* Ex. 1003 ¶ 85; Ex. 2001 ¶ 45. Cox also discloses satellite 10 transmitting television signals with teletext data including teletext headers to head end 12. Ex. 1006, 1:49–2:10, 3:21–34, 3:66–4:7, 4:53–58, Figs. 1–2; *see id.* at 1:13–34; Ex. 1003 ¶¶ 52–54, 65, 84; Ex. 2001 ¶ 43.

Additionally, Lovett discloses a catalogue number that identifies content, e.g., a teletext page. Ex. 1005, 7:10–33, 7:53–66, 9:33–37, 11:9–15, 11:67–12:17, 13:11–23, 15:33–35, Figs. 12–13; *see* Ex. 1003 ¶ 86. Moreover, for the reasons explained below, an ordinarily skilled artisan would have been motivated to combine the teachings of Lovett and Cox such that the teletext data includes teletext headers with Cox’s header

information and Lovett's catalogue number. *See* Ex. 1003 ¶¶ 65–67, 85–87, 106; *infra* § III.D.3(i).

Also, we disagree with Patent Owner's contention that Cox's "head end has no ability to identify television programming, since it will cycle through each page of storage and compare the stored time codes against the current time of day." *See* Resp. 8; Ex. 2001 ¶ 45. As just discussed, the magazine code and the page number in the teletext header identify the teletext page to a decoder to allow only selected head ends to acquire the teletext page. Ex. 1006, 1:37–42, 4:53–58, 5:14–18; *see* Ex. 1003 ¶ 85; Ex. 2001 ¶ 45. By doing so, the magazine code and the page number in the teletext header identify the teletext page (unit of programming) according to claim 7's "passing data identifying" limitation. *See* Ex. 1003 ¶ 85.

Furthermore, Petitioner relies on the combined disclosures in Lovett and Cox for claim 7's "passing data identifying" limitation, and Lovett discloses a catalogue number that identifies content, e.g., a teletext page. *See* Pet. 32–34; Ex. 1003 ¶ 86; Ex. 1005, 7:10–33, 7:53–66, 9:33–37, 11:9–15, 11:67–12:17, 13:11–23, 15:33–35, Figs. 12–13. Patent Owner does not dispute that Lovett discloses a catalogue number that identifies content. *See, e.g.*, Resp. 4–6, 11–18; Ex. 2001 ¶¶ 40–41.

(d) Data Effective to Instruct When to Retransmit

Claim 7 recites "said data effective to instruct: at least one of said plurality of intermediate transmission stations to indicate when to retransmit said plurality of units of audio or video programming to at least one of said plurality of subscriber stations." Ex. 1001, 288:41–45.

Petitioner contends that the combined disclosures in Lovett and Cox teach this limitation. *See* Pet. 35–37. Specifically, Petitioner asserts that

Lovett discloses “retransmitting content when it receives a request with a particular catalogue number from a subscriber.” *Id.* at 35 (citing Ex. 1005, 11:9–12:11, Fig. 12). Petitioner also asserts that the catalogue number “indicate[s] when to retransmit” because “the intermediate transmission station in Lovett retransmits the units of programing when it receives a request with the catalogue number.” *Id.* Petitioner further asserts that Cox discloses a teletext header with time-on and time-off codes “for when to rebroadcast a teletext page.” *Id.* at 36–37 (citing Ex. 1006, 3:28–42, 4:23–32, Fig. 2).

Patent Owner makes no arguments specific to claim 7’s “data effective to instruct” limitation. *See, e.g.*, Resp. 11–18; Sur-reply 1–11. Nonetheless, the burden remains on Petitioner to demonstrate unpatentability. *See Dynamic Drinkware*, 800 F.3d at 1378.

We agree with Petitioner that the combined disclosures in Lovett and Cox teach claim 7’s “data effective to instruct” limitation. *See* Pet. 35–37; Ex. 1003 ¶¶ 47, 52, 85–86, 88–90. Specifically, Lovett discloses that head-end computer 138 retrieves content from storage, e.g., disk storage, based on a subscriber-specified catalogue number. Ex. 1005, 11:9–15, 11:50–62; *see id.* at 7:10–26; Ex. 1003 ¶¶ 47, 86. After retrieving the content, head-end computer 138 provides the content and the catalogue number to head end 100, and head end 100 transmits the content and the catalogue number to control station 140. Ex. 1005, 11:62–12:11; *see id.* at 7:30–33; Ex. 1003 ¶ 47. Then, control station 140 retransmits the content to the subscriber terminal of the subscriber who specified the catalogue number. Ex. 1005, 13:11–45; *see id.* at 7:53–66; Ex. 1003 ¶ 89. Hence, as Petitioner asserts,

the catalogue number “indicate[s] when to retransmit” the content. *See* Ex. 1003 ¶ 89; Pet. 35.

In addition, Cox discloses a teletext header with time-on and time-off codes. Ex. 1006, 1:49–60, 4:18–44, 4:58–5:1, 5:68–6:3, code (57), Fig. 2; *see* Ex. 1003 ¶¶ 52, 85, 90. Cox explains that “by suitably specifying the time-on and time-off codes” for the programming guide pages, “any sequence of pages may be automatically rebroadcast from the head end facility at selected times during the day without requiring any action or intervention on the part of the head end operator.” Ex. 1006, 4:63–5:1. The time-on and time-off codes “indicate when to retransmit” the programming guide pages “to at least one of said plurality of subscriber stations” according to claim 7’s “data effective to instruct” limitation. *See* Ex. 1003 ¶¶ 52–54, 90.

(e) Storing Based on Predetermined Capacities

Claim 7 recites “wherein data of one or more predetermined transmission station capacities is processed at said at least one of said plurality of intermediate transmission stations to identify one of said plurality of storage locations at which to store at least one said plurality of units of audio or video programming.” Ex. 1001, 288:45–51.

Petitioner contends that the combined disclosures in Lovett and Cox teach this limitation. *See* Pet. 38–41. Specifically, Petitioner asserts that Lovett discloses storing subscriber-selectable content, including teletext pages, “in various storage locations” at the head end. *Id.* at 38 (citing Ex. 1005, 7:20–26). Petitioner admits that Lovett “does not expressly disclose processing data of one or more predetermined transmission station capacities at the computer in the head end to identify one of said plurality of

storage locations at which to store the teletext programing.” *Id.* at 38–39. But Petitioner asserts that an ordinarily skilled artisan would have known that a conventional computer processes data about storage capacities to identify storage locations. *Id.* at 39–40. In particular, Petitioner contends that an ordinarily skilled artisan would have understood that Lovett’s “disclosure of storing information on a disk of a conventional computer” involved (1) managing “information on the allocable pieces of storage,” i.e., storage locations, and (2) using “that information to store the units of audio or video programing in portions of the storage that are free.” *Id.* at 39 (citing Ex. 1003 ¶ 93; Ex. 1007, 2:3–10, 2:62–68).

To support Petitioner’s position, Dr. Neuhauser testifies that “it was well known to store information in free space of the storage medium to avoid data being overwritten.” Ex. 1003 ¶ 93. He also testifies that a conventional computer’s operating system typically managed “mappings of files” to a storage medium. *Id.* (citing Ex. 1007, 2:3–5). Dr. Neuhauser explains that well-known techniques for managing “mappings of files” included keeping two kinds of tables: (1) “tables that relate each file to the pieces of disk storage that make up the file”; and (2) “tables that keep track of the pieces of the disk storage currently not in use.” *Id.* (citing Ex. 1007, 2:5–11).

Patent Owner disputes that Lovett teaches claim 7’s “storing” limitation. *See* Resp. 11. Specifically, Patent Owner asserts that Lovett “does not expressly disclose processing of ‘predetermined transmission station capacities.’” *Id.* at 15; *see* Ex. 2001 ¶ 53.

We agree with Petitioner that the combined disclosures in Lovett and Cox teach claim 7’s “storing” limitation. As Patent Owner asserts and

Petitioner admits, Lovett “does not expressly disclose processing data of one or more predetermined transmission station capacities at the computer in the head end to identify one of said plurality of storage locations at which to store the teletext programing.” *See, e.g.*, Pet. 38–39; Resp. 11; Ex. 1005, 11:50–12:17. But Lovett discloses a head end containing a conventional computer with disk storage, i.e., computer 138 with disk and tape storage 137. Ex. 1005, 11:50–62, Fig. 6; *see* Ex. 1003 ¶¶ 47, 79, 93.

As Dr. Neuhauser testifies, “it was well known to store information in free space of the storage medium to avoid data being overwritten,” and a conventional computer’s operating system typically managed “mappings of files” to a storage medium. Ex. 1003 ¶ 93 (citing Ex. 1007, 2:3–5); *see* Ex. 1007, 2:3–5. As Dr. Neuhauser explains, well-known techniques for managing “mappings of files” included keeping two kinds of tables: (1) “tables that relate each file to the pieces of disk storage that make up the file”; and (2) “tables that keep track of the pieces of the disk storage currently not in use.” Ex. 1003 ¶ 93 (citing Ex. 1007, 2:5–11); *see* Ex. 1007, 2:5–11. Those conventional tables “allow for dynamic expansion of files and for the efficient allocation of free space.” Ex. 1007, 2:9–11. Hence, an ordinarily skilled artisan would have known that a conventional computer processes data about storage capacities to identify storage locations. *See* Ex. 1003 ¶ 93.

(f) Storing Using Different Storage Locations

Claim 7 recites “wherein said identified storage locations are different for each of said plurality of units of audio or video programming.” Ex. 1001, 288:52–54.

Petitioner contends that the combined disclosures in Lovett and Cox teach this limitation. *See* Pet. 41. Specifically, Petitioner asserts that the Lovett-Cox combination “teaches storing the units of programing in free space” so that “data is not stored in the same location.” *Id.* (citing Ex. 1003 ¶ 97). Dr. Neuhauser’s testimony supports Petitioner’s assertion. Ex. 1003 ¶ 97; *see id.* ¶¶ 93–95.

Patent Owner makes no arguments specific to claim 7’s “different storage locations” limitation. *See, e.g.,* Resp. 11–18; Sur-reply 1–11. Nonetheless, the burden remains on Petitioner to demonstrate unpatentability. *See Dynamic Drinkware*, 800 F.3d at 1378.

We agree with Petitioner that the combined disclosures in Lovett and Cox teach claim 7’s “different storage locations” limitation. As Dr. Neuhauser testifies, the Lovett-Cox combination “teaches storing the units of programing in free space” so that “data is not stored in the same location.” Ex. 1003 ¶ 97; *see id.* ¶ 93. Also, as Patent Owner concedes, Cox discloses a satellite transmitting teletext data including “the memory address at which to store the teletext page,” and “[u]pon receiving a teletext page, the head end stores the page in the memory location specified in the transmission.” *See* Ex. 1006, 3:27–54, 4:25–32; Ex. 2001 ¶¶ 43–44; Resp. 7–8 (citing Ex. 1006, 4:25–32). Each teletext page has a unique memory address specified in “the memory page address of row 24.” Ex. 1006, 4:37–40, code (57), Fig. 2; *see id.* at 3:51–54, 4:7–10. Hence, the “identified storage locations are different for each” teletext page according to claim 7’s “different storage locations” limitation.

(g) Transferring Based on Data Identifying Said Units
or Subject Matter and Predetermined Capacities

Claim 7 recites “wherein said stored at least one of said plurality of units of programming is transferred from said identified one of said plurality of storage locations to another of said plurality of storage locations based on said data identifying said units of audio or video programming or subject matter included in said units of audio or video programming and said data of one or more predetermined transmission station capacities.” Ex. 1001, 288:55–62.

Petitioner contends that Lovett teaches this limitation for two related reasons. *See* Pet. 41–44. First, Petitioner asserts that Lovett discloses a computer in the head end that:

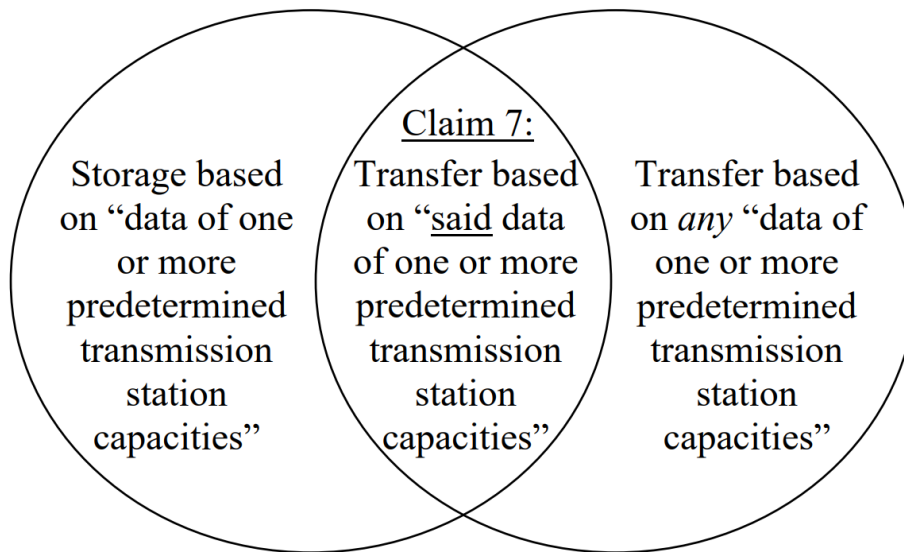
- (1) “receives a catalogue number” for a program, e.g., a teletext page;
- (2) uses the catalogue number to retrieve the program “from a determined address” on a disk, i.e., a first storage location; and
- (3) outputs the program and catalogue number.

Id. at 42 (citing Ex. 1003 ¶ 99; Ex. 1005, 7:53–66, 11:42–54, 13:13–18, Fig. 12). Second, Petitioner asserts that the computer in the head end provides the program and catalogue number to a control station and that the control station uses information about the availability of frame stores to store the program in a particular frame store, i.e., a second storage location. *Id.* at 42–43 (citing Ex. 1003 ¶ 100; Ex. 1005, Figs. 7, 12–13).

Patent Owner disputes that Lovett teaches claim 7’s “transferring” limitation. *See* Resp. 11–18; Sur-reply 1–11; Ex. 2001 ¶¶ 49–57. Specifically, Patent Owner asserts that claim 7 “refers to transfer based on

‘said data of one or more predetermined transmission station capacities,’ with the word ‘said’ indicating that the ‘data of . . . capacities’ were previously recited and used in the claim.” Resp. 12 (alteration by Patent Owner) (emphasis by Patent Owner); *see* Sur-reply 1–3; Ex. 2001 ¶ 50. Patent Owner also asserts that claim 7 requires “that the ‘data of . . . capacities’ must be the same ‘data of . . . capacities’ used in the ‘storage’ step.” Resp. 12 (alteration by Patent Owner) (emphasis by Patent Owner); *see* Sur-reply 4–5; Ex. 2001 ¶¶ 49–51. Patent Owner further asserts that “[o]ne skilled in the art would not understand ‘said data’ to refer to ‘other data,’ ‘additional data,’ or ‘different data,’ which is what Petitioner points to” for claim 7’s “transferring” limitation. Resp. 12 (emphasis by Patent Owner); *see* Sur-reply 5; Ex. 2001 ¶ 50.

To support its assertions, Patent Owner provides the diagram reproduced below (Sur-reply 2):



The above diagram depicts two overlapping circles with (1) the circle on the left identified as “Storage based on ‘data of one or more predetermined transmission station capacities,’” (2) the circle on the right identified as

“Transfer based on *any* ‘data of one or more predetermined transmission station capacities,’” and (3) the common area identified as “Claim 7: Transfer based on ‘said data of one or more predetermined transmission station capacities.’” *See* Sur-reply 2. According to Patent Owner, the above diagram “shows the overlap of data that is required for both the storage and transfer steps of claim 7.” *Id.*

In addition, Patent Owner contends that claim 7 differs from Lovett because in Lovett “entirely different ‘data of . . . capacities’ are used at the central computer’s ‘disk & tape storage’ as compared with the control station’s ‘frame store.’” Resp. 12 (alteration by Patent Owner); *see id.* at 15–16; Sur-reply 3; Ex. 2001 ¶¶ 54–56. Patent Owner also contends that in Lovett “the head-end storage relies on one set of data, and the frame stores rely on an entirely different set of data.” Sur-reply 3; *see id.* at 5–6, 10–11.

Also, Patent Owner asserts that “Petitioner does not contend” that:

- (1) “the individual ‘capacities’ of various components of Lovett collectively satisfy the ‘capacities’ claim element”; and
- (2) “all capacities of Lovett’s components form a ‘superset’ of capacities, and therefore any subset of Lovett’s capacities would satisfy the claim.”

Resp. 17 (emphases omitted) (citing Ex. 2001 ¶ 57); *see* Sur-reply 5; Ex. 2001 ¶ 57.

Petitioner replies by explaining that it relies on Lovett’s head end 100, bridger amplifier 104, and control station 140 located together “in the same physical station” as an “intermediate transmission station.” Reply 2–5 (citing Ex. 1003 ¶ 78; Inst. Dec. 30–31); *see id.* at 11; Pet. 24–27. Petitioner

then contends that “(i) both the control station frame stores and the head end storage are ‘storage locations’ at the ‘intermediate transmission station’ and (ii) both information on the control station frame stores and information on the head end storage are ‘data of [one] or more predetermined transmission station capacities.’” Reply 5 (emphasis omitted); *see id.* at 5–9. Petitioner also contends that in Lovett “the ‘data of [one] or more predetermined transmission station capacities’ is used for both transfer and storage.” *Id.* at 9 (emphasis omitted); *see id.* at 9–11.

We agree with Petitioner that Lovett teaches claim 7’s “transferring” limitation. Specifically, Lovett discloses that head-end computer 138 retrieves content from storage, e.g., disk storage, based on a subscriber-specified catalogue number. Ex. 1005, 11:9–15, 11:50–62; *see id.* at 7:10–26; Ex. 1003 ¶¶ 47, 86. After retrieving the content, head-end computer 138 provides the content and the catalogue number to head end 100, and head end 100 transmits the content and the catalogue number to control station 140. Ex. 1005, 11:62–12:11; *see id.* at 7:30–33; Ex. 1003 ¶ 47.

When control station 140 receives the content and the catalogue number, mini-computer 148 in control station 140 compares the received catalogue number “to the catalogue numbers stored in its RAM.” Ex. 1005, 13:3–13, Fig. 13; *see* Ex. 1003 ¶ 100. When mini-computer 148 finds a match, it: (1) signals frame grabber 146 to retrieve the frame with that catalogue number; (2) “operates switching circuit 156 so as to direct the frame with that catalogue number to one of the frame stores 150”; and (3) “operates switching circuit 158 . . . so as to direct the output of the same frame store to the modulator 154 corresponding to the subscriber who

requested the data.” Ex. 1005, 13:13–23, Fig. 13; *see* Ex. 1003 ¶¶ 48, 100. Mini-computer 148 operates switching circuit 156 to direct the frame to the first available frame store. Ex. 1005, 9:35–37, Fig. 13; *see* Ex. 1003 ¶ 100.

Lovett explains that the “number of frame stores 150 included in the control station 140 need not be as large as the number of modulators” because “only enough frame stores are needed to handle the peak volume of data requests.” Ex. 1005, 12:51–54. Hence, storing data based on frame-store availability corresponds to storing data based on frame-store capacity. *See* Ex. 1003 ¶¶ 48, 98–100. Consistent with this, the ’920 patent discloses storing data based on storage availability, e.g., based on a storage device’s “recording capacity,” “level of fullness,” or “available space.” Ex. 1001, 17:46–52, 47:54–64, 141:9–13, 141:34–41, 143:34–42, 153:62–154:11, 156:62–157:12, 171:45–63, 179:55–64; *see* Ex. 1003 ¶ 92 (citing Ex. 1001, 17:46–52, 19:46–47, 48:54–64, 141:34–41, 171:50–61).

As an analysis of the intrinsic evidence demonstrates, Patent Owner’s argument that Lovett fails to teach claim 7’s “transferring” limitation rests on a misunderstanding of claim 7’s scope. *See* Resp. 11–18; Sur-reply 1–11. Initially, claim 7’s preamble recites an “intermediate transmission station” with a “plurality of storage locations.” Ex. 1001, 288:25–33. Then, claim 7’s “storing” limitation references the “plurality of storage locations” but does not specify where they reside at the “intermediate transmission station.” *Id.* at 288:45–51. In particular, the “storing” limitation requires processing “data of one or more predetermined transmission station capacities” to identify “one of said plurality of storage locations” to store programming. *Id.* Next, claim 7’s “transferring” limitation references the “plurality of storage locations” but does not specify where they reside at the

“intermediate transmission station.” *Id.* at 288:55–62. In particular, the “transferring” limitation requires transferring the stored programming to “another of said plurality of storage locations.” *Id.*

Claim 7’s language permits the “plurality of storage locations” to reside within a single storage device or within multiple storage devices at the “intermediate transmission station.” *See* Ex. 1001, 288:25–67; Tr. 21:1–10, 22:3–11 (Patent Owner’s counsel agreeing that the “storage locations can be in multiple storage devices at the intermediate transmission station”). So the phrase “data of one or more predetermined transmission station capacities” in the “storing” and “transferring” limitations encompasses data of capacities for multiple storage devices at the “intermediate transmission station.” Tr. 22:3–8.

Claims 8 and 9 depend from claim 7 and confirm that the phrase “data of one or more predetermined transmission station capacities” in the “storing” and “transferring” limitations encompasses data of capacities for multiple storage devices at the “intermediate transmission station.” *See* Ex. 1001, 289:1–14. Claim 8 narrows claim 7 by requiring that “said predetermined transmission station capacities specify a plurality of storage devices and/or transmitters” *Id.* at 289:1–7. Claim 9 narrows claim 7 by requiring that “said predetermined transmission station capacities specify a plurality of storage devices and/or receivers” *Id.* at 289:8–14. Thus, each of claims 8 and 9 expressly recites “capacities” for a “plurality of storage devices,” i.e., multiple storage devices.

According to the language of claims 8 and 9, the phrase “data of one or more predetermined transmission station capacities” in the “storing” and “transferring” limitations must encompass data of capacities for multiple

storage devices, i.e., a “plurality of storage devices.” Moreover, that phrase must encompass data of capacities for multiple other devices, e.g., a “plurality of . . . transmitters” according to claim 8 and a “plurality of . . . receivers” according to claim 9.

Consistent with the claim language, the ’920 patent’s specification indicates that the phrase “data of one or more predetermined transmission station capacities” in the “storing” and “transferring” limitations encompasses data of capacities for multiple storage devices at the “intermediate transmission station.” *See* Ex. 1001, 10:11–13, 168:66–169:3, Figs. 6A–6B. For instance, Figures 6A–6B illustrate an “intermediate transmission station” including computer 73, matrix switch 75, recorder/player 76, and recorder/player 78. *Id.* at 10:11–13, 167:61–64, 168:7–15, 169:61–64, 178:1–11, Figs. 6A–6B. Each recorder/player receives video, stores video, and plays video, and thus serves as a video storage device. *Id.* at 168:7–20, 170:28–36, 170:57–62, 172:4–11, 172:29–39, 178:1–11; *see* Tr. 6:25–7:3; Paper 27, 4–5.

The ’920 patent’s specification explains that computer 73 “is preprogrammed with information on the operating speeds and **capacities of all station apparatus** and the connections of said apparatus with matrix switch, 75.” Ex. 1001, 168:66–169:3 (emphasis added); *see* Reply 8–9 (quoting Ex. 1001, 168:66–169:3). For example, computer 73 “has capacity for determining what programming is prerecorded on the magnetic tapes (or other recording media) loaded on” recorder/player 76 and recorder/player 78. Ex. 1001, 170:53–57.

Additionally, the ’920 patent’s specification discloses an example where units of programming are transferred between two storage devices

at an “intermediate transmission station.” *See* Ex. 1001, 171:32–172:55. Specifically, computer 73 causes matrix switch 75 to, among other things, (1) transfer unit D from recorder/player 76 to recorder/player 78 and (2) transfer unit Y from recorder/player 78 to recorder/player 76. *Id.* at 171:35–45, 172:4–11, 172:29–36.

Hence, the ’920 patent’s specification indicates that the phrase “data of one or more predetermined transmission station capacities” in the “storing” and “transferring” limitations encompasses data of capacities for “all station apparatus,” including multiple storage devices, at the “intermediate transmission station.” *See* Ex. 1001, 168:66–169:3, 170:53–57.

For these reasons, the claim language and the ’920 patent’s specification indicate that the phrase “data of one or more predetermined transmission station capacities” in the “storing” and “transferring” limitations encompasses data of capacities for multiple storage devices at the “intermediate transmission station.” And because that phrase encompasses data of capacities for multiple storage devices, Petitioner identifies the same “data of one or more predetermined transmission station capacities” for the “storing” and “transferring” limitations. *See* Pet. 38–44; Reply 5–11; Ex. 1003 ¶¶ 91–93, 98–100.

Specifically, for Lovett’s “intermediate transmission station,” the multiple storage devices include (1) disk and tape storage 137 for head-end computer 138 and (2) frame stores 150 in control station 140. Ex. 1005, 11:50–60, 12:45–54, 13:13–23, Figs. 6–7; *see* Ex. 1003 ¶¶ 47–48, 79–80, 93, 99–100. Collectively, disk and tape storage 137 and frame stores 150

correspond to a “plurality of storage devices” having a “plurality of storage locations” as claimed. *See* Ex. 1003 ¶¶ 47–48, 79–80, 93, 99–100.

As noted above, Patent Owner contends that claim 7 differs from Lovett because in Lovett “entirely different ‘data of . . . capacities’ are used at the central computer’s ‘disk & tape storage’ as compared with the control station’s ‘frame store.’” Resp. 12 (alteration by Patent Owner). That contention rests on the incorrect premise that the “storing” and “transferring” limitations must use a “plurality of storage locations” within the same storage device at the “intermediate transmission station.” As just discussed, however, the claim language and the ’920 patent’s specification refute that premise.

Moreover, the ’920 patent’s specification discloses an example where units of programming are transferred between different storage devices at an “intermediate transmission station.” *See* Ex. 1001, 171:32–172:55. Hence, Patent Owner’s interpretation of the “storing” and “transferring” limitations excludes a preferred embodiment. An interpretation excluding a preferred embodiment is “rarely, if ever correct.” *PPC Broadband, Inc. v. Corning Optical Commc’ns RF, LLC*, 815 F.3d 747, 755 (Fed. Cir. 2016).

As for Patent Owner’s assertion that “Petitioner does not contend” that “the individual ‘capacities’ of various components of Lovett collectively satisfy the ‘capacities’ claim element,” we disagree. *See* Resp. 17. As discussed above, Petitioner identifies Lovett’s head end 100, bridger amplifier 104, and control station 140 located together “in the same physical station” as an “intermediate transmission station.” Pet. 24–27; Reply 2–5; *see* Ex. 1003 ¶ 78; *supra* § III.D.3(a)(iii). As also discussed above, those components collectively include a “plurality of storage devices” having a

“plurality of storage locations,” e.g., disk and tape storage 137 for head-end computer 138 and frame stores 150 in control station 140. Ex. 1005, 11:50–60, 12:45–54, 13:13–23, Figs. 6–7; *see* Ex. 1003 ¶¶ 47–48, 79–80, 93, 99–100; *supra* § III.D.3(g).

The Petition relies on the capacities of those components collectively for the “storing” and “transferring” limitations. Pet. 38–44; *see* Ex. 1003 ¶¶ 91–93, 98–100. The Reply explains that reliance in more detail. Reply 5–11, 14, 19. For instance, the Reply notes that the Petition contended “that information on the control station’s frame stores and information on the head end’s internal and attached storage ‘collectively’ satisfy the ‘capacities’ claim element.” *Id.* at 8 (emphasis omitted) (citing Pet. 39).

(h) Transmitting Units of Audio or Video
Programming and Identifying Data

Claim 7 recites “transmitting said plurality of units of audio or video programming and said data that identify said units of audio or video programming or a subject matter included in said units of audio or video programming to said plurality of intermediate transmission stations.” Ex. 1001, 288:63–67.

Petitioner contends that the combined disclosures in Lovett and Cox teach this limitation. *See* Pet. 44–45. Specifically, Petitioner asserts that Cox discloses transmitting teletext data, including identifying data, by embedding the teletext data in the vertical blanking intervals of television signals transmitted by a satellite to a cable television head end. *Id.* at 44–45 (citing Ex. 1003 ¶ 101; Ex. 1006, 1:13–17).

Patent Owner makes no arguments specific to claim 7’s “transmitting” limitation. *See, e.g.*, Resp. 11–18; Sur-reply 1–11. Nonetheless, the burden

remains on Petitioner to demonstrate unpatentability. *See Dynamic Drinkware*, 800 F.3d at 1378.

We agree with Petitioner that the combined disclosures in Lovett and Cox teach claim 7’s “transmitting” limitation. Specifically, Cox discloses satellite 10 transmitting television signals with teletext data to head end 12. Ex. 1006, 1:61–2:10, 3:21–34, 3:66–68, Figs. 1–2; *see id.* at 1:13–34; Ex. 1003 ¶¶ 52–54, 65, 84; Ex. 2001 ¶ 43. The teletext data for each teletext page includes a header with a magazine code and a page number for the teletext page. Ex. 1006, 1:49–52, 3:68–4:7, 4:53–58, Fig. 2; *see* Ex. 1003 ¶¶ 52, 85; Ex. 2001 ¶ 45. Cox’s system embeds the teletext data including the teletext headers in the vertical blanking intervals of the television signals transmitted by satellite 10. Ex. 1006, 1:13–34, 1:61–2:10, 3:12–15, 3:27–34; *see id.* at 5:10–14; Ex. 1003 ¶¶ 52, 85, 90, 101; Ex. 2001 ¶ 43.

(i) Alleged Reasons for Combining the Teachings of the References

Petitioner contends that an ordinarily skilled artisan would have been motivated to combine the teachings of Lovett and Cox because the combination “would result in a system that is overall more desirable and efficient.” Pet. 20; *see id.* at 21; Ex. 1003 ¶ 66. Petitioner also contends that there would have been “a reasonable expectation of success because Lovett suggests including systems like those disclosed” in Cox. Pet. 20; *see* Ex. 1003 ¶ 66.

To support Petitioner’s contentions, Dr. Neuhauser testifies that Lovett “discloses a system architecture that provides dedicated channels for individual subscribers” to receive content, such as teletext pages, that the subscriber selects. Ex. 1003 ¶ 65. He also testifies that Cox’s teletext communication system “has the advantages of (1) allowing more

information to be conveyed (e.g., information that is greater than one page or frame) and (2) preventing stale information from being disseminated.” *Id.* Dr. Neuhauser then explains that a “person of skill would have been motivated” to use Cox’s “known method” for distributing teletext content with “the teletext content distributed by Lovett” to achieve the advantages of Cox’s teletext communication system. *Id.* ¶ 67.

Regarding claim 7’s “passing data identifying” limitation, Dr. Neuhauser states that “[i]t would have been obvious to a person of skill to combine the features of Lovett and Cox such that the headers of the broadcast teletext information include both the header information in Lovett (e.g., catalogue number) and the header information in Cox.” Ex. 1003 ¶ 87; *see id.* ¶ 106. He explains that “the systems are analogous art because both relate to the distribution of teletext information where a head end, rather than a subscriber terminal, renders the teletext information.” *Id.* ¶ 87. He also explains that receiving teletext information “from the originating source,” as Lovett suggests and Cox discloses, “provides several advantages, such as allowing for mass distribution of consistent content across a wide geographic area.” *Id.*

Patent Owner makes no arguments against combining the teachings of Lovett and Cox. *See, e.g.,* Resp. 11–18; Sur-reply 1–11. Nonetheless, the burden remains on Petitioner to demonstrate unpatentability. *See Dynamic Drinkware*, 800 F.3d at 1378.

We agree with Petitioner that an ordinarily skilled artisan would have had sound reasons, i.e., the reasons articulated by Dr. Neuhauser, to combine the teachings of Lovett and Cox as Petitioner proposes. *See* Ex. 1003 ¶¶ 65–67, 78, 86–87. For example, a “person of skill would have been

motivated” to use Cox’s “known method” for distributing teletext content with “the teletext content distributed by Lovett” to achieve the advantages of Cox’s teletext communication system. *Id.* ¶ 67. We also agree with Petitioner that an ordinarily skilled artisan would have had a reasonable expectation of success. *Id.* ¶ 66.

(j) Conclusion on Obviousness of Claim 7

For the reasons discussed above, the combined disclosures in Lovett and Cox teach claim 7’s subject matter. *See supra* §§ III.D.3(a)–(h). Moreover, an ordinarily skilled artisan would have been motivated to combine the teachings of Lovett and Cox as Petitioner proposes and would have had a reasonable expectation of success. *See supra* § III.D.3(i). Hence, Petitioner has shown by a preponderance of the evidence that claim 7 is unpatentable under § 103(a) as obvious over Lovett and Cox.

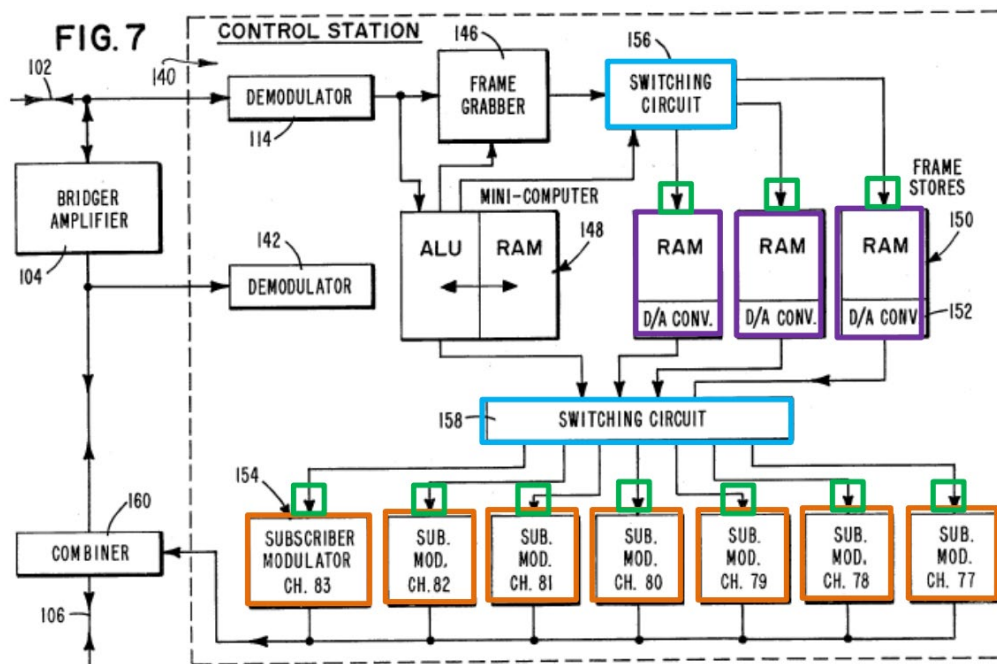
4. DEPENDENT CLAIM 8

Claim 8 depends directly from claim 7 and further requires that (1) “said one or more selective communications devices at said at least one of said plurality of intermediate transmission stations comprise a switch with a plurality of outputs” and (2) “said predetermined transmission station capacities specify a plurality of storage devices and/or transmitters operatively connected to said plurality of outputs.” Ex. 1001, 289:1–7.

Petitioner contends that Lovett teaches claim 8’s limitations for two independent reasons. *See* Pet. 45–46; Reply 12–14; Paper 29, 2–3. First, Petitioner asserts that switching circuit 156 in control station 140 corresponds to “a switch with a plurality of outputs” and that frame stores 150 in control station 140 correspond to “a plurality of storage devices . . . operatively connected to said plurality of outputs.” Pet. 45; *see* Reply

12–13; Paper 29, 2–3. Second, Petitioner asserts that switching circuit 158 in control station 140 corresponds to “a switch with a plurality of outputs” and that subscriber modulators 154 in control station 140 correspond to “a plurality of . . . transmitters operatively connected to said plurality of outputs.” Pet. 45.

To support Petitioner’s assertions, Dr. Neuhauser provides an annotated version of Lovett’s Figure 7 as reproduced below (Ex. 1003 ¶ 102):



This annotated version of Figure 7 depicts a block diagram for control station 140 with purple boxes around frame stores 150, orange boxes around subscriber modulators 154, blue boxes around switching circuits 156 and 158, and green boxes denoting the outputs of switching circuits 156 and 158. See Ex. 1003 ¶ 102; Ex. 1005, 9:24–25, 12:38–50, Fig. 7.

Patent Owner disputes that Lovett teaches claim 8’s limitations. See Resp. 18–20; Sur-reply 11–12; Paper 28, 3–4. For switching circuit 156,

Patent Owner asserts that “the availability of frame stores 150 is not the “said predetermined transmission station capacities” of claim 8 (or claim 7).” Resp. 19 (emphasis by Patent Owner); *see* Paper 28, 3–4; Ex. 2001 ¶ 62. For switching circuit 158, Patent Owner asserts that “the availability of a frame store 150 has no bearing on which output ‘switching circuit 158’ will use to send data to ‘subscriber modulators 154’ (the alleged ‘transmitters’).” Resp. 19; *see* Ex. 2001 ¶ 61.

We agree with Petitioner that Lovett teaches claim 8’s limitations for two independent reasons. *See* Pet. 45–46; Reply 12–14; Paper 29, 2–3; Ex. 1003 ¶ 102. First, as Petitioner asserts, switching circuit 156 in control station 140 corresponds to “a switch with a plurality of outputs,” and frame stores 150 in control station 140 correspond to “a plurality of storage devices . . . operatively connected to said plurality of outputs.” *See* Ex. 1003 ¶ 102; Pet. 45; Reply 12–13; Paper 29, 2–3. Frame stores 150 directly connect to the outputs of switching circuit 156, and thus are “operatively connected” to the outputs. Ex. 1005, 12:45–50, 13:13–18, Fig. 7; *see* Ex. 1003 ¶ 102; *supra* § III.C.3. Frame stores 150 store digital signals supplied by frame grabber 146. Ex. 1005, 13:25–33, Fig. 7.

Capacities for frame stores 150 satisfy claim 8’s requirement that “said predetermined transmission station capacities specify a plurality of storage devices.” *See* Ex. 1003 ¶ 102. Specifically, as discussed above, the phrase “data of one or more predetermined transmission station capacities” in claim 7 encompasses data of capacities for multiple storage devices. *See* Ex. 1001, 10:11–13, 168:66–169:3, 171:32–172:55, Figs. 6A–6B; Ex. 1003 ¶¶ 91–93, 98–100; *supra* § III.D.3(g). Hence, “said predetermined transmission station capacities” in claim 8 include capacities for multiple

storage devices at the “intermediate transmission station,” such as frame stores 150. *See* Ex. 1003 ¶ 102.

Because “said predetermined transmission station capacities” in claim 8 include capacities for multiple storage devices at the “intermediate transmission station,” such as Lovett’s frame stores 150, we disagree with Patent Owner’s assertion that “the availability of frame stores 150 is not the “said predetermined transmission station capacities” of claim 8 (or claim 7).” *See* Resp. 19; *supra* § III.D.3(g).

Second, as Petitioner asserts, switching circuit 158 in control station 140 corresponds to “a switch with a plurality of outputs,” and subscriber modulators 154 in control station 140 correspond to “a plurality of . . . transmitters operatively connected to said plurality of outputs.” *See* Ex. 1003 ¶ 102; Pet. 45. Subscriber modulators 154 directly connect to the outputs of switching circuit 158, and thus are “operatively connected” to the outputs. Ex. 1005, 12:45–50, 13:13–23, Fig. 7; *see* Ex. 1003 ¶ 102; *supra* § III.C.3. Subscriber modulators 154 transmit modulated signals, i.e., using UHF carrier frequencies, to subscriber terminals. Ex. 1005, 13:34–45; *see id.* at 7:61–8:13, code (57), Fig. 7.

Capacities for subscriber modulators 154 satisfy claim 8’s requirement that “said predetermined transmission station capacities specify a plurality of . . . transmitters.” *See* Ex. 1003 ¶ 102. Specifically, as discussed above, the ’920 patent’s specification explains that computer 73 “is preprogrammed with information on the operating speeds and **capacities of all station apparatus** and the connections of said apparatus with matrix switch, 75.” Ex. 1001, 168:66–169:3; *see* Reply 8–9 (quoting Ex. 1001, 168:66–169:3); *supra* § III.D.3(g). Hence, “said predetermined transmission

station capacities” in claim 8 include capacities for multiple transmitters at the “intermediate transmission station,” such as subscriber modulators 154. *See* Ex. 1003 ¶ 102.

Patent Owner’s assertion that “the availability of a frame store 150 has no bearing on which output ‘switching circuit 158’ will use to send data to ‘subscriber modulators 154’ (the alleged ‘transmitters’)” disregards claim 8’s “and/or” language. *See* Resp. 19; Ex. 1001, 289:4–7. Claim 8 requires storage devices “and/or” transmitters “operatively connected” to switch outputs. Ex. 1001, 289:4–7. That frame stores 150 are not “operatively connected” to the outputs of switching circuit 158 does not matter because subscriber modulators 154 are “operatively connected” to the outputs of switching circuit 158. Ex. 1005, 12:45–50, 13:13–23, Fig. 7; *see* Ex. 1003 ¶ 102.

In the Sur-reply, Patent Owner asserts that “Petitioner appears to drop its contention that ‘switching circuit 158’ meets the ‘switch’ requirements of claim 8” because the Reply addresses only switching circuit 156 for claim 8. Sur-reply 11; *see* Tr. 31:21–24. But Petitioner did nothing to disavow its theory that switching circuit 158 corresponds to “a switch with a plurality of outputs” according to claim 8. *See, e.g.*, Pet. 45–46; Reply 12–14; Paper 29, 2–3.

For the reasons discussed above, Petitioner has shown by a preponderance of the evidence that claim 8 is unpatentable under § 103(a) as obvious over Lovett and Cox.

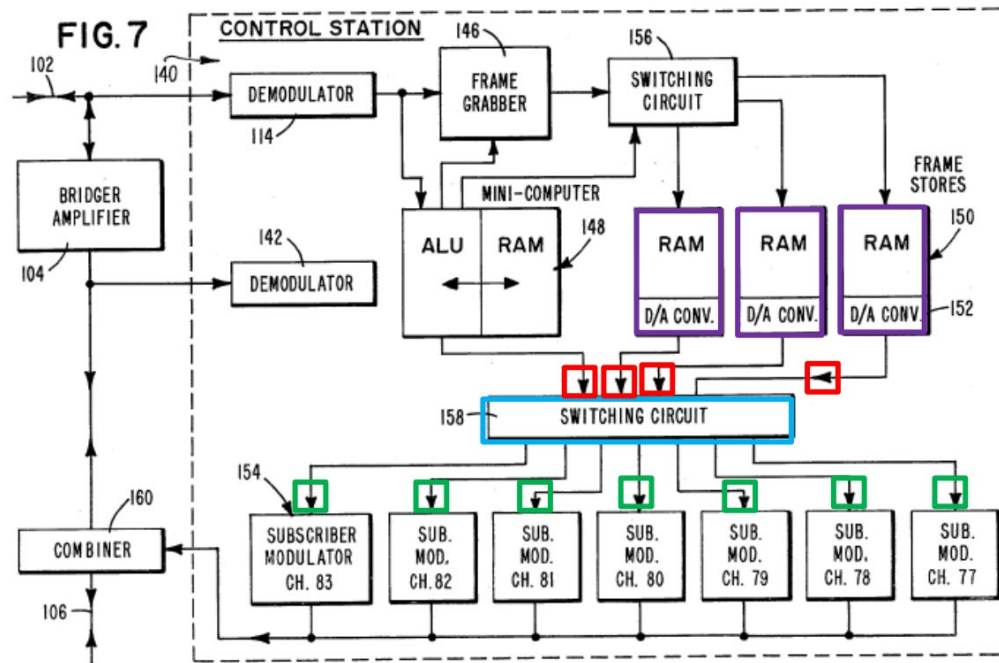
5. DEPENDENT CLAIM 9

Claim 9 depends directly from claim 7 and further requires that (1) “said one or more selective communications devices at said at least one

of said plurality of intermediate transmission stations comprise a switch with a plurality of inputs and outputs” and (2) “said predetermined transmission station capacities specify a plurality of storage devices and/or receivers operatively connected to said plurality of inputs and outputs.” Ex. 1001, 289:8–14.

Petitioner contends that Lovett teaches claim 9’s limitations. *See* Pet. 46–47; Reply 14–19; Paper 29, 3. Specifically, Petitioner asserts that switching circuit 158 in control station 140 corresponds to “a switch with a plurality of inputs and outputs.” Pet. 46; *see* Reply 14; Paper 29, 3. Petitioner also asserts that frame stores 150 in control station 140 correspond to “a plurality of storage devices . . . operatively connected to” the inputs of switching circuit 158. Pet. 46–47; *see* Reply 14–15; Paper 29, 3. Additionally, Petitioner identifies subscriber modulators 154 in control station 140 as connected to the outputs of switching circuit 158. Pet. 47; Reply 14; Paper 29, 3.

To support Petitioner's assertions, Dr. Neuhauser provides an annotated version of Lovett's Figure 7 as reproduced below (Ex. 1003 ¶ 103):



This annotated version of Figure 7 depicts a block diagram for control station 140 with purple boxes around frame stores 150, a blue box around switching circuit 158, red boxes denoting the inputs of switching circuit 158, and green boxes denoting the outputs of switching circuit 158. See Ex. 1003 ¶ 103; Ex. 1005, 9:24–25, 12:38–50, Fig. 7.

Patent Owner disputes that Lovett teaches claim 9's limitations. See Resp. 20–22; Sur-reply 12–15. Specifically, Patent Owner asserts that claim 9 “requires the storage device or receiver to be connected to both inputs and outputs” of the switch. Resp. 20–21; see Sur-reply 13. Patent Owner also asserts that none of frame stores 150 and none of subscriber modulators 154 “are connected to both the ‘inputs and outputs’ of switching circuit 158.” Resp. 21; see Ex. 2001 ¶ 66. Patent Owner further asserts that “the availability of frame stores 150 is not the ‘said predetermined

transmission station capacities’ of claim 9 (or claim 7).” Resp. 21 (emphasis by Patent Owner); *see* Ex. 2001 ¶ 68.

Petitioner replies by arguing that Patent Owner “misreads the claim language” because “[n]othing in the claim requires a single storage device or receiver be connected to both an input and an output or to more than one input or output.” Reply 16 (emphases omitted); *see* Paper 27, 5–6.

Petitioner argues that Patent Owner’s “reading of claim 9 is unsupported by the ’920 patent’s disclosure” in Figures 6A–6B. *See* Reply 16–18; Paper 27, 5–6.

We disagree with Petitioner that Lovett teaches claim 9’s limitations. Petitioner has not identified in Lovett (or Cox) an arrangement according to one of claim 9’s “and/or” alternatives:

- a “plurality of storage devices **and** receivers” that are “operatively connected” to a “plurality of [switch] inputs and outputs” (the “and” alternative);
- a “plurality of storage devices **or** receivers” that are “operatively connected” to a “plurality of [switch] inputs and outputs” (the “or” alternative).

See Pet. 46–47; Reply 14–15; Paper 29, 3; Ex. 1003 ¶ 103; Ex. 2001 ¶ 66.

First, for claim 9’s “and” alternative, frame stores 150 directly connect to inputs of switching circuit 158, and subscriber modulators 154 directly connect to outputs of switching circuit 158. Ex. 1005, 12:45–50, 13:13–23, Fig. 7. Although Petitioner identifies frame stores 150 as a “plurality of storage devices,” Petitioner does not identify subscriber modulators 154 as a “plurality of receivers.” *See* Pet. 46–47; Reply 14–19; Paper 29, 3. Hence, Petitioner does not contend that Lovett discloses a “plurality of storage devices **and** receivers” that are “operatively connected”

to a “plurality of [switch] inputs and outputs,” with storage devices “operatively connected” to switch inputs and receivers “operatively connected” to switch outputs. Nor does Petitioner contend that Lovett discloses an arrangement as depicted in ’920 patent Figures 6A–6B, with storage devices “operatively connected” to switch outputs and receivers “operatively connected” to switch inputs. *See* Pet. 46–47; Reply 14–19; Paper 29, 3; *supra* § III.C.3. Thus, Petitioner has not shown that Lovett teaches claim 9’s “and” alternative.

Second, for claim 9’s “or” alternative, frame stores 150 connect only to inputs of switching circuit 158. Ex. 1005, 12:45–50, 13:13–23, Fig. 7; *see* Paper 28, 4–6. Regarding this alternative’s option for a “plurality of storage devices” that are “operatively connected” to a “plurality of [switch] inputs and outputs,” frame stores 150 do not comport with that option because data communication operations occur only between the frame stores and switch inputs. *See* Ex. 1005, 12:45–50, 13:3–23, 13:34–45, Fig. 7; *supra* § III.C.3. Regarding this alternative’s option for a “plurality of receivers” that are “operatively connected” to a “plurality of [switch] inputs and outputs,” Petitioner does not contend that subscriber modulators 154 comport with that option. *See* Pet. 46–47; Reply 14–19; Paper 29, 3. Thus, Petitioner has not shown that Lovett teaches claim 9’s “or” alternative.

For the “intermediate transmission station” illustrated in ’920 patent Figures 6A–6B, Petitioner asserts that “many of the components are connected to *either* an input *or* an output” of matrix switch 75 “but not both.” Paper 27, 5 (emphases by Petitioner). Petitioner also asserts that (1) “there is no ‘receiver’ that is ‘connected to both an input and an output’ of the switch” and (2) “there is no ‘receiver’ or ‘storage device’ that is

‘connected to both inputs and outputs.’” Reply 17 (emphases omitted); *see* Paper 27, 6. Based on Figures 6A–6B, Petitioner contends that “a component can be ‘operatively connected to said plurality of inputs and outputs,’ as claim 9 requires, simply by being connected to either an input or an output of the switch.” Paper 27, 5; *see* Reply 16–17; Tr. 18:15–19, 19:1–3.

We disagree with that contention. The phrase “operatively connected to said plurality of inputs and outputs” means just what it says and requires components connected to at least two switch inputs and at least two switch outputs. A variety of arrangements could produce the required connections. Those arrangements include the following:

- (1) storage devices connected to switch inputs and receivers connected to switch outputs;
- (2) receivers connected to switch inputs and storage devices connected to switch outputs;
- (3) storage devices connected to switch inputs and the same or different storage devices connected to switch outputs; and
- (4) receivers connected to switch inputs and the same or different receivers connected to switch outputs.

As explained above for claim 9’s “and” alternative, Figures 6A–6B show receivers “operatively connected” to switch inputs and storage devices “operatively connected” to switch outputs. *See supra* § III.C.3. As explained above for claim 9’s “or” alternative, Figures 6A–6B show storage devices “operatively connected” to switch inputs and storage devices “operatively connected” to switch outputs. *See id.* Petitioner does not analyze each of claim 9’s “and/or” alternatives, and thus overlooks the

support in Figures 6A–6B for each alternative. *See, e.g.*, Reply 16–19; Paper 27, 1–6; Paper 29, 1–3.

Figures 6A–6B do not show receivers “operatively connected” to switch inputs and receivers “operatively connected” to switch outputs. Ex. 1001, Fig. 6A. But that does not matter because Figures 6A–6B show storage devices “operatively connected” to switch inputs and storage devices “operatively connected” to switch outputs, and thus support claim 9’s “or” alternative.

Although a variety of arrangements could satisfy claim 9, Petitioner has not identified in Lovett (or Cox) any arrangement that does. Hence, Petitioner has not shown by a preponderance of the evidence that claim 9 is unpatentable under § 103(a) as obvious over Lovett and Cox.

6. DEPENDENT CLAIM 10

Claim 10 reads as follows (with formatting added for clarity):

10. The method of claim 7,
wherein said one or more selective communications devices at said at least one of said plurality of intermediate transmission stations comprise a plurality of storage locations,
said method further comprising the step of embedding said data in a signal including said plurality of units of audio or video programming before transmitting said plurality of units of audio or video programming to said at least one of said plurality of intermediate transmission stations.

Ex. 1001, 289:15–23.

Petitioner contends that the combined disclosures in Lovett and Cox teach claim 10’s limitations. *See* Pet. 47–49. For the claimed “one or more selective communications devices” at Lovett’s “intermediate transmission station” that “comprise a plurality of storage locations,” Petitioner identifies

computer 138 at “the head end station” and “internal and attached storage” for head-end computer 138. *Id.* at 48 (citing Ex. 1005, 11:50–12:11). As discussed above, Petitioner asserts that head-end computer 138 “is a selective communications device because it selects data and communicates” data to head end 100 and because it takes data “from one of the data sources” to provide “to the master distribution unit.” *Id.* at 27–28; *see supra* § III.D.3(a)(iii).

For the claimed “embedding” data identifying programming units “in a signal” before transmitting the programming units, Petitioner asserts that (1) Cox’s teletext data “includes identifying data in the form of teletext headers” and (2) Lovett discloses “identifying teletext data using a catalogue number.” Pet. 33–34 (citing Ex. 1005, 7:20–30, 11:9–12:11, Fig. 12; Ex. 1006, 3:28–42, 4:20–37, Fig. 2); *see id.* at 48; *supra* § III.D.3(c). Petitioner also asserts that Cox discloses embedding a teletext header “in the vertical blanking interval” of a television signal transmitted by a satellite. Pet. 48–49 (citing Ex. 1006, 1:13–17).

Patent Owner disputes that the combined disclosures in Lovett and Cox teach claim 10’s limitations because (1) “claim 10 depends from claim 7” and (2) “the cited references, either separately or in combination,” do not disclose “all elements of claim 7.” Resp. 22; Sur-reply 15.

We agree with Petitioner that the combined disclosures in Lovett and Cox teach claim 10’s limitations. *See* Pet. 47–49; Ex. 1003 ¶¶ 47, 74–79, 93, 104–106. As discussed above, Lovett’s head end 100, bridger amplifier 104, and control station 140 correspond to an “intermediate transmission station.” Ex. 1005, 1:32–38, 10:1–3, 10:12–18, 11:40–49, 12:7–11, 13:3–45, Figs. 6–7; *see* Ex. 1003 ¶¶ 74–78; *supra* §§ III.D.3(a)(iii),

III.D.3(g). That transmission station includes Lovett's head-end computer 138 with disk and tape storage 137. Ex. 1005, 11:50–62, Fig. 6; *see* Ex. 1003 ¶¶ 47, 79, 93, 105. Head-end computer 138 corresponds to a “selective communications device” according to claim 10, and disk and tape storage 137 “comprise[s] a plurality of storage locations” according to claim 10. *See* Ex. 1003 ¶¶ 47, 79, 93, 105.

As discussed above, Cox discloses that the teletext data for each teletext page includes a header with a magazine code and a page number for the teletext page. Ex. 1006, 1:49–52, 3:68–4:7, 4:53–58, Fig. 2; *see* Ex. 1003 ¶¶ 52, 85; Ex. 2001 ¶ 45; *supra* § III.D.3(c). The magazine code and the page number for the teletext page identify the teletext page to a decoder to allow only selected head ends to acquire the teletext page. Ex. 1006, 1:37–42, 4:53–58, 5:14–18; *see* Ex. 1003 ¶ 85; Ex. 2001 ¶ 45. As also discussed above, Lovett discloses a catalogue number that identifies content, e.g., a teletext page. Ex. 1005, 7:10–33, 7:53–66, 9:33–37, 11:9–15, 11:67–12:17, 13:11–23, 15:33–35, Figs. 12–13; *see* Ex. 1003 ¶ 86; *supra* § III.D.3(c).

Additionally, Cox discloses satellite 10 transmitting television signals with teletext data including teletext headers to head end 12. Ex. 1006, 1:49–2:10, 3:21–34, 3:66–4:7, 4:53–58, Figs. 1–2; *see id.* at 1:13–34; Ex. 1003 ¶¶ 52–54, 65, 84; Ex. 2001 ¶ 43. Cox's system embeds the teletext data including the teletext headers in the vertical blanking intervals of the television signals transmitted by satellite 10. Ex. 1006, 1:13–34, 1:61–2:10, 3:12–15, 3:27–34; *see id.* at 5:10–14; Ex. 1003 ¶¶ 52, 85, 90, 101, 106; Ex. 2001 ¶ 43.

For the reasons discussed above, Petitioner has shown by a preponderance of the evidence that claim 10 is unpatentable under § 103(a) as obvious over Lovett and Cox.

*E. Alleged Obviousness over Lovett, Cox,
and Either Olson or Knight*

Petitioner contends that claims 7–10 are unpatentable under § 103(a) as obvious over Lovett, Cox, and either Olson or Knight. *See* Pet. 1–2, 19–45. Above, we provided overviews of Lovett and Cox. *See supra* §§ III.D.1–III.D.2. Below, we provide overviews of Olson and Knight, and then we consider the obviousness issues raised by the parties. As explained below, we agree with Petitioner that claims 7, 8, and 10 are unpatentable under § 103(a) as obvious over Lovett, Cox, and either Olson or Knight but disagree that claim 9 is unpatentable based on these references.

1. OVERVIEW OF OLSON (EXHIBIT 1007)

Olson is a U.S. patent titled “Improved Disk File Allocation and Mapping System Utilizing Cylinder Control Blocks and File Map Having Unbalanced Tree Structure,” filed on May 25, 1982, and issued on August 20, 1985. Ex. 1007, codes (22), (45), (54). In the Background of the Invention, Olson explains that disk space “available for allocation to files is conventionally managed in a variety of ways.” *Id.* at 2:62–63; *see id.* at 2:63–3:4 (citing Madnick & Donovan, *Operating Systems* (1974)). In addition, Olson discusses a known technique for allocating disk space using a file map and a free space map. *Id.* at 3:19–36.

In the Summary of the Invention, Olson discloses a “disk file management system” that (1) minimizes overhead by minimizing “head switching and arm movement during allocation, deallocation, and file

access” and (2) employs “data structures [that] are highly resistant to hardware and software failures.” Ex. 1007, 4:3–8; *see id.* at 5:53–58, code (57). Olson organizes data structures “on a logical cylinder basis” with a file map and a free space map embedded in a cylinder control block (CCB). *Id.* at 4:13–16, code (57); *see id.* at 6:57–7:8.

“Each entry in the CCB corresponds to a page in the CCB’s cylinder.” Ex. 1007, code (57); *see id.* at 4:20–25. “Depending on whether a page is allocated to a file or not, the corresponding CCB entry is a file map entry for a file to which the page is allocated or an entry in a free space map.” *Id.* at code (57); *see id.* at 4:25–33. “When disk pages are allocated to a file, the CCB is updated in memory by changing the CCB entry for the formerly free pages into file allocation map pointers.” *Id.* at 4:29–33. “For a given file, each file map entry includes up to two pointers.” *Id.* at code (57); *see id.* at 4:51–54. “The free space map for a given cylinder is preferably a chained free space list.” *Id.* at code (57); *see id.* at 8:16–25.

2. OVERVIEW OF KNIGHT (EXHIBIT 1008)

Knight is a U.S. patent titled “Television Signal Disc Drive Recorder,” filed on June 14, 1979, and issued on October 16, 1984. Ex. 1008, codes (22), (45), (54). Knight discloses a system “adapted to record and reproduce television signals” on a disk drive “using digital techniques.” *Id.* at 1:62–65, 2:63–66, code (57). The system specifies a first group of tracks as “bulk tracks” and a second group of tracks as “working tracks.” *Id.* at code (57); *see id.* at 3:21–25, 12:33–39. The bulk tracks comprise a “greater proportion of the total number of tracks” than the working tracks. *Id.* at code (57); *see id.* at 3:21–25, 12:33–37. The bulk tracks may serve as a “relatively permanent library” for a broadcast

television station. *Id.* at 3:6–8, 12:37–39, code (57). The system “generally prohibits erasing or overrecording of bulk tracks.” *Id.* at code (57); *see id.* at 3:8–13, 3:27–35.

When a drive is put online, the system performs an initial search of all tracks on a disk to determine track status. Ex. 1008, 14:9–13. After performing an initial search, the system stores the search results in memory. *Id.* Because the system stores the search results in memory, the system may automatically record on the “next available deleted track” without repeating the initial search. *Id.* at 13:68–14:15. Thus, the system “does not require stepping through the tracks to find a deleted one.” *Id.* at 14:3–6.

3. INDEPENDENT CLAIM 7

(a) Storing Based on Predetermined Capacities

Petitioner relies on either Olson or Knight for claim 7’s “storing” limitation: “wherein data of one or more predetermined transmission station capacities is processed at said at least one of said plurality of intermediate transmission stations to identify one of said plurality of storage locations at which to store at least one said plurality of units of audio or video programming.” *See* Pet. 38–41; Ex. 1001, 288:45–51.

In particular, Petitioner contends that Olson discloses a technique for managing “mappings of files onto underlying disk memories” using a “free space map.” Pet. 39–40 (citing Ex. 1007, code (57)). Petitioner also contends that Olson organizes data structures “on a logical cylinder basis” with a file map and a free space map embedded in a cylinder control block. *Id.* at 40 (citing Ex. 1007, 4:13–16). According to Petitioner, when Olson creates a file, “enough pages are allocated to satisfy an initial size parameter.” *Id.* (citing Ex. 1007, 9:63–64).

Alternatively, Petitioner asserts that Knight discloses “a system for recording television signals to discs where the status of tracks on the drives are stored in a computer system’s memory after an initial search when a drive is put online.” Pet. 40 (citing Ex. 1008, 14:1–15). Petitioner also asserts that Knight’s system “automatically makes recordings on the next available track without having to redo the initial search.” *Id.* (citing Ex. 1008, 14:1–15).

Patent Owner asserts that Olson “does not disclose any storage of ‘audio or video programming,’ or a determination of where to store ‘units of audio or video programming’ based on processing of predetermined capacities.” Resp. 9–10 (citing Ex. 1007, code (57)); *see* Sur-reply 10. Similarly, Patent Owner asserts that Knight “does not disclose a determination of where to store ‘units of audio or video programming’ based on processing of predetermined capacities.” Resp. 10–11 (citing Ex. 1008, code (57)).

We agree with Petitioner that (1) the combined disclosures in Lovett, Cox, and Olson and (2) the combined disclosures in Lovett, Cox, and Knight teach claim 7’s “storing” limitation. *See* Pet. 39–41; Ex. 1003 ¶¶ 58, 61, 65, 93–96. Specifically, Olson discloses organizing data structures “on a logical cylinder basis” with a file map and a free space map embedded in a cylinder control block (CCB). Ex. 1007, 4:13–16, code (57); *see id.* at 6:57–7:8; Ex. 1003 ¶¶ 58, 94; Ex. 2001 ¶ 47. “Each entry in the CCB corresponds to a page in the CCB’s cylinder.” Ex. 1007, code (57); *see id.* at 4:20–25; Ex. 2001 ¶ 47. “Depending on whether a page is allocated to a file or not, the corresponding CCB entry is a file map entry for a file to which the page is allocated or an entry in a free space map.” Ex. 1007, code (57); *see id.*

at 4:25–33; Ex. 2001 ¶ 47. “When disk pages are allocated to a file, the CCB is updated in memory by changing the CCB entry for the formerly free pages into file allocation map pointers.” Ex. 1007, 4:29–33. Hence, Olson discloses storing data based on processing predetermined capacities, i.e., predetermined capacities associated with unallocated disk space. Ex. 1003 ¶¶ 58, 65, 93–94; Ex. 1007, 4:13–33, 6:57–7:8, code (57).

In addition, Knight discloses storing data, i.e., video data, based on processing predetermined capacities, i.e., predetermined capacities associated with previously deleted tracks. *See* Ex. 1003 ¶¶ 61, 65, 95; Ex. 1008, 1:62–65, 2:63–66, 13:68–14:15, code (57). Specifically, Knight discloses a system “adapted to record and reproduce television signals” on a disk drive “using digital techniques.” Ex. 1008, 1:62–65, 2:63–66, code (57); *see* Ex. 1003 ¶¶ 61, 95. When a drive is put online, the system performs an initial search of all tracks on a disk to determine track status. Ex. 1008, 14:9–13; *see* Ex. 1003 ¶¶ 61, 95. After performing an initial search, the system stores the search results in memory. Ex. 1008, 14:9–13; *see* Ex. 1003 ¶¶ 61, 95. Because the system stores the search results in memory, the system may automatically record on the “next available deleted track” without repeating the initial search. Ex. 1008, 13:68–14:15; *see* Ex. 1003 ¶¶ 61, 95.

Patent Owner’s assertion that Olson “does not disclose any storage of ‘audio or video programming’” does not respond to Petitioner’s proposed combination because Petitioner relies on Lovett and Cox, not Olson, for disclosing the storage of “audio or video programming.” *See* Pet. 30–32; Resp. 10; *In re Keller*, 642 F.2d 413, 425 (CCPA 1981) (considering “what

the combined teachings of the references would have suggested to those of ordinary skill in the art”).

In addition, we disagree with Patent Owner’s assertion that Olson does not disclose data storage “based on processing of predetermined capacities.” *See* Resp. 10. When determining where to store data, Olson processes predetermined capacities associated with unallocated disk space. *See* Ex. 1003 ¶¶ 58, 65, 93–94; Ex. 1007, 4:13–33, 6:57–7:8, code (57). For example, “[t]he free space within a logical cylinder is managed by appropriately marking the allocation field in the CCB [cylinder control block] entry for each unallocated page.” Ex. 1007, 4:28–30.

We also disagree with Patent Owner’s assertion that Knight does not disclose data storage “based on processing of predetermined capacities.” *See* Resp. 11. When determining where to store video data, Knight’s system processes predetermined capacities associated with previously deleted tracks. *See* Ex. 1003 ¶¶ 61, 65, 95; Ex. 1008, 1:62–65, 2:63–66, 13:68–14:15, code (57).

(b) Storing Using Different Storage Locations

Petitioner relies on either Olson or Knight for claim 7’s “different storage locations” limitation: “wherein said identified storage locations are different for each of said plurality of units of audio or video programming.” *See* Pet. 41; Ex. 1001, 288:52–54.

Petitioner contends that (1) the combined disclosures in Lovett, Cox, and Olson and (2) the combined disclosures in Lovett, Cox, and Knight teach this limitation. *See* Pet. 41. Specifically, Petitioner asserts that each combination “teaches storing the units of programing in free space” so that “data is not stored in the same location.” *Id.* (citing Ex. 1003 ¶ 97).

Patent Owner makes no arguments specific to claim 7's "different storage locations" limitation. *See, e.g.*, Resp. 11–18; Sur-reply 1–11. Nonetheless, the burden remains on Petitioner to demonstrate unpatentability. *See Dynamic Drinkware*, 800 F.3d at 1378.

We agree with Petitioner that (1) the combined disclosures in Lovett, Cox, and Olson and (2) the combined disclosures in Lovett, Cox, and Knight teach claim 7's "different storage locations" limitation. *See* Pet. 41; Ex. 1003 ¶¶ 58, 93–94, 97. We credit Dr. Neuhauser's testimony that each combination "teaches storing the units of programing in free space" so that "data is not stored in the same location." Ex. 1003 ¶ 97. Also, Cox's head end processes "an incoming memory address and store[s] the teletext page in that page memory." *See* Prelim. Resp. 30; Ex. 1006, 3:27–54. Because each teletext page has a unique memory address, the "identified storage locations are different for each" teletext page according to claim 7. *See* Ex. 1006, 3:51–54, 4:7–10, 4:37–40, code (57).

(c) Alleged Reasons for Combining the Teachings of the References

Petitioner contends that an ordinarily skilled artisan would have been motivated to combine the teachings of Olson or Knight with the teachings of Lovett and Cox because Olson and Knight "both disclose known ways of determining how to store data on a magnetic disc using two known techniques to avoid errors," such as "accidental overwriting of data." Pet. 21 (citing Ex. 1007, 4:1–12; Ex. 1008, 14:1–15); *see id.* at 40–41. Petitioner also contends that there would have been "a reasonable expectation of success because Lovett suggests including systems like those disclosed in Cox, Olsen, and Knight." Pet. 20; *see* Ex. 1003 ¶ 66.

To support Petitioner’s contentions, Dr. Neuhauser testifies that Olson and Knight “disclose two of the many ways a computer system can allocate magnetic disc capacity to allow storage of information on one or more discs” while “prevent[ing] errors caused by unintentionally overwriting previously stored files.” Ex. 1003 ¶ 65; *see id.* ¶ 68 (citing Ex. 1007, 4:1–12; Ex. 1008, 14:1–15).

Dr. Neuhauser also testifies that Olson and Knight each “provide[] express motivation to use its solution.” Ex. 1003 ¶¶ 94–95. He explains that Olson’s system “uses minimum overhead, and the data structures are highly resistant to hardware and software failures.” *Id.* ¶ 94 (citing Ex. 1007, 4:6–8). He explains that Knight’s system protects against “inadvertent or unauthorized erasure or over recording.” *Id.* ¶ 95 (citing Ex. 1008, 3:6–13). He also explains that combining the teachings of Olson or Knight with the teachings of Lovett and Cox “would result in a system that is as a whole more desirable and efficient.” *Id.* ¶ 66.

Patent Owner makes no arguments against combining the teachings of Olson or Knight with the teachings of Lovett and Cox. *See, e.g.,* Resp. 11–18; Sur-reply 1–11. Nonetheless, the burden remains on Petitioner to demonstrate unpatentability. *See Dynamic Drinkware*, 800 F.3d at 1378.

We agree with Petitioner that an ordinarily skilled artisan would have had sound reasons, i.e., the reasons articulated by Dr. Neuhauser, to combine the teachings of Olson or Knight with the teachings of Lovett and Cox as Petitioner proposes. *See* Ex. 1003 ¶¶ 65–66, 68, 94–95. We also agree with Petitioner that an ordinarily skilled artisan would have had a reasonable expectation of success. *Id.* ¶ 66.

(d) Conclusion on Obviousness of Claim 7

For the reasons discussed above, (1) the combined disclosures in Lovett, Cox, and Olson and (2) the combined disclosures in Lovett, Cox, and Knight teach claim 7's subject matter. *See supra* §§ III.D.3(a)–(h), III.E.3(a)–(b). Moreover, an ordinarily skilled artisan would have been motivated to combine the teachings of Olson or Knight with the teachings of Lovett and Cox as Petitioner proposes and would have had a reasonable expectation of success. *See supra* § III.E.3(c).

Hence, Petitioner has shown by a preponderance of the evidence that claim 7 is unpatentable under § 103(a) as obvious over Lovett, Cox, and either Olson or Knight.

4. DEPENDENT CLAIMS 8–10

For claims 8–10, Petitioner makes the same unpatentability arguments for the grounds that add Olson and Knight as for the ground based on the combination of Lovett and Cox. *See* Pet. 45–49; Reply 12–19.

For claims 8–10, Patent Owner makes the same patentability arguments for the grounds that add Olson and Knight as for the ground based on the combination of Lovett and Cox. *See* Resp. 18–22; Sur-reply 15.

For the same reasons that Petitioner has shown by a preponderance of the evidence that claims 8 and 10 are unpatentable under § 103(a) as obvious over Lovett and Cox, Petitioner has shown by a preponderance of the evidence that claims 8 and 10 are unpatentable under § 103(a) as obvious over Lovett, Cox, and either Olson or Knight. *See* Pet. 45, 47–49; Ex. 1003 ¶¶ 102, 104; *supra* §§ III.D.4, III.D.6, III.E.3(a)–(b).

For claim 9, Petitioner does not rely on Olson or Knight to cure the deficiency in Lovett discussed above. *See* Pet. 46–47; *supra* § III.D.5. For the same reasons that Petitioner has not shown by a preponderance of the evidence that claim 9 is unpatentable under § 103(a) as obvious over Lovett and Cox, Petitioner has not shown by a preponderance of the evidence that claim 9 is unpatentable under § 103(a) as obvious over Lovett, Cox, and either Olson or Knight. *See* Pet. 46–47; Ex. 1003 ¶ 103; *supra* § III.D.5.

IV. PATENT OWNER’S CONSTITUTIONAL CHALLENGE

Patent Owner contends that “this proceeding is unconstitutional and violates the Appointments Clause.” Resp. 22. Patent Owner also contends that the Federal Circuit “attempted to cure the constitutional violation by eliminating tenure protections afforded to PTAB judges by the statute” and that “this purported remedy by itself simply fails to cure the violation.” *Id.* at 22–23 (citing *Arthrex, Inc. v. Smith & Nephew, Inc.*, 941 F.3d 1320 (Fed. Cir. 2019)).

We do not reach Patent Owner’s Appointments Clause challenge because the Supreme Court resolved the issue in *United States v. Arthrex, Inc.*, 141 S. Ct. 1970, 1986–87, 1997 (2021).

V. CONCLUSION

Based on the evidence presented with the Petition, the evidence introduced during the trial, and the parties’ respective arguments, Petitioner has shown by a preponderance of the evidence that:

- (1) claims 7, 8, and 10 are unpatentable under § 103(a) as obvious over Lovett and Cox;
- (2) claims 7, 8, and 10 are unpatentable under § 103(a) as obvious over Lovett, Cox, and Olson; and

- (3) claims 7, 8, and 10 are unpatentable under § 103(a) as obvious over Lovett, Cox, and Knight.

But Petitioner has not shown by a preponderance of the evidence that claim 9 is unpatentable under § 103(a) on any ground presented in the Petition.⁴

In summary:

Claims	35 U.S.C. §	Reference(s)/ Basis	Claims Shown Unpatentable	Claims Not Shown Unpatentable
7–10	103(a)	Lovett, Cox	7, 8, 10	9
7–10	103(a)	Lovett, Cox, Olson	7, 8, 10	9
7–10	103(a)	Lovett, Cox, Knight	7, 8, 10	9
Overall Outcome			7, 8, 10	9

VI. ORDER

Accordingly, it is

ORDERED that claims 7, 8, and 10 in the '920 patent are determined to be unpatentable;

⁴ Should Patent Owner wish to pursue amendment of the challenged claims in a reissue or reexamination proceeding after the issuance of this Final Written Decision, we draw Patent Owner's attention to the April 2019 Notice Regarding Options for Amendments by Patent Owner Through Reissue or Reexamination During a Pending AIA Trial Proceeding. *See* 84 Fed. Reg. 16,654 (Apr. 22, 2019). If Patent Owner chooses to file a reissue application or a request for reexamination of the challenged patent, we remind Patent Owner of its continuing obligation to notify the Board of any such related matters in updated mandatory notices. *See* 37 C.F.R. §§ 42.8(a)(3), (b)(2).

ORDERED that claim 9 in the '920 patent is not determined to be unpatentable; and

FURTHER ORDERED that, because this is a Final Written Decision, the 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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