

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

HONEYWELL INTERNATIONAL, INC., SIERRA WIRELESS, INC.,
TCL COMMUNICATION TECHNOLOGY HOLDINGS LIMITED, TCT
MOBILE INTERNATIONAL LIMITED, TCT MOBILE, INC., TCT
MOBILE (US) INC., TCT MOBILE (US) HOLDINGS INC., THALES DIS
AIS DEUTSCHLAND GMBH,
Petitioner,

v.

3G LICENSING S.A.,
Patent Owner.

IPR2021-01141
Patent 7,215,653 B2

Before MIRIAM L. QUINN, MONICA S. ULLAGADDI, and
RUSSELL E. CASS, *Administrative Patent Judges*.

CASS, *Administrative Patent Judge*.

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

I. INTRODUCTION

A. Background

In this *inter partes* review, Honeywell International, Inc., Sierra Wireless, Inc., TCL Communication Technology Holdings Limited, TCT Mobile International Limited, TCT Mobile, Inc., TCT Mobile (US) Inc., TCT Mobile (US) Holdings Inc., and Thales DIS AIS Deutschland GMBH¹ (“Petitioner”) challenge the patentability of claims 34–40 (the “challenged claims”) of U.S. Patent No. 7,215,653 B2 (Ex. 1001, “the ’653 patent”), which is assigned to 3G Licensing SA (“Patent Owner”).

We have jurisdiction under 35 U.S.C. § 6. This Final Written Decision, issued pursuant to 35 U.S.C. § 318(a), addresses issues and arguments raised during the trial in this *inter partes* review. For the reasons discussed below, Petitioner has proven by a preponderance of the evidence that claims 34–40 are unpatentable.

¹ On August 24, ZTE Corporation, ZTE (USA) Inc. and Patent Owner filed a joint motion to terminate the ZTE entities from the proceeding due to a settlement reached between the ZTE entities and Patent Owner. Paper 12. We granted the motion and terminated ZTE Corporation and ZTE (USA) Inc. from this proceeding on September 9, 2021. Paper 14. On December 16, 2021, Dell Inc. and Patent Owner filed a joint motion to terminate Dell Inc. from the proceeding due to a settlement reached between Dell and Patent Owner. Paper 20. We granted the motion and terminated Dell Inc. from this proceeding on January 11, 2022. Paper 22. On November 3, 2022, Cradlepoint, Inc. and Patent Owner filed a joint motion to terminate Cradlepoint, Inc. from the proceeding due to a settlement reached between them. Paper 48. We granted the motion and terminated Cradlepoint, Inc. from this proceeding on November 7, 2022. Paper 50.

B. Evidence, Grounds, and Procedural History

Petitioner relies upon the following references:

3rd Generation Partnership Project 2, Technical Specification Group C, Working Group 5, Contribution C50-20010507-015, titled “Effective Reverse Link Data Rate Control for 1xEV-DV-r2,” dated May 7, 2001 (Ex. 1003, “Samsung”);

3rd Generation Partnership Project 2, Technical Specification Group C, Working Group 5, Contribution C50-20010212-011, titled “Per-User Reverse Rate Control for Shared Packet Data Channel in 1xEV-DV,” dated Feb. 12, 2001 (Ex. 1004, “Airvana”);

US 6,741,862 B2, issued May 25, 2004 (Ex. 1005, Chung); and

3rd Generation Partnership Project 2, Technical Specification C.S0002-0 v1.0, titled “Physical Layer Standard for cdma2000 Spread Spectrum Systems (July 1999), published October 1999 (Ex. 1006, “C.S0002-0”).

Petition (Paper 1, “Pet.”) i, 13.

Petitioner submits declarations from James Proctor, M.S. (Exs. 1002, 1019). Petitioner also submits the Declaration of Raziq Yaqub, Ph.D, which discusses the public availability of 3GPP2 documents (Ex. 1010). Patent Owner submits declarations from Todor Cooklev, Ph.D (Exs. 2002, 2012).

Petitioner challenges the patentability of claims 34–40 of the ’653 patent based on the following grounds:

Claims Challenged	35 U.S.C. §	Reference(s)/Basis
34–40	103(a) ²	Samsung, C.S0002-0
34–40	103(a)	Samsung, Airvana, C.S0002-0

² The Leahy-Smith America Invents Act, Pub. L. No. 112-29, 125 Stat. 284 (2011) (“AIA”), included revisions to 35 U.S.C. § 103 that became effective

Claims Challenged	35 U.S.C. §	Reference(s)/Basis
34–40	103(a)	Samsung, Chung, C.S0002-0

Pet. 13. Patent Owner filed a Preliminary Response. Paper 16 (“Prelim. Resp.”). With our permission, Petitioner filed a Reply to the Preliminary Response (Paper 17), and Patent Owner filed a Sur-reply (Paper 19). We instituted trial on all grounds of unpatentability. Paper 23 (“Inst. Dec.”), 35.

During the trial, Patent Owner filed a Response (Paper 30, “PO Resp.”), Petitioner filed a Reply (Paper 32, “Pet. Reply”), and Patent Owner filed a Sur-reply (Paper 35, “PO Sur-reply”).

An oral hearing was held on October 20, 2022, a transcript of which appears in the record. Paper 51 (“Tr.”).

C. Real Parties in Interest

Petitioner states that the real parties in interest are Honeywell International, Inc., Sierra Wireless, Inc., TCL Communication Technology Holdings Limited, TCT Mobile International Limited, TCT Mobile, Inc., TCT Mobile (US) Inc., TCT Mobile (US) Holdings Inc., and Thales DIS AIS Deutschland GMBH, as well as Denali Intermediate Inc., Sierra Wireless America, Inc., Thales DIS AIS USA, LLC, Telefonaktiebolaget LM Ericsson, and Ericsson Inc.³ Pet. 3. Patent Owner states that 3G Licensing S.A. is the real party in interest. Paper 9, 1.

after the filing of the application that led to the ’653 patent. Therefore, we apply the pre-AIA version of 35 U.S.C. § 103.

³ As noted above, Cradlepoint, Dell, and ZTE have settled with Patent Owner and have been terminated from this proceeding. *See* § I.A, *supra*.

D. Related Proceedings

The parties identify multiple district court cases asserting the '653 patent in the U.S. District Courts for the District of Delaware and the Northern District of Texas, including cases brought against Honeywell International, Inc., TCL Communication Technology Holdings Limited, TCT Mobile International Limited, TCT Mobile, Inc., TCT Mobile (US) Inc., TCT Mobile (US) Holdings, Inc., and Thales DIS AIS Deutschland GmbH. Pet. 3–4; Paper 9, 1.

E. The '653 Patent (Ex. 1001)

The '653 patent is directed to a mobile communications system for controlling data transmission rates between a base station and mobile stations served by the base station in order to increase data throughput. Ex. 1001, 1:8–12. The '653 patent explains that various types of mobile communications systems are known, including Code Division Multiple Access (CDMA), which is the most widely accepted. *Id.* at 1:33–35, 1:40. According to the '653 patent, the cdma2000 evolution of CDMA provides integrated voice with simultaneous high-speed packet data, video, and video conferencing. *Id.* at 1:41–45. The '653 patent explains that “[c]urrently, the third generation (3G) evolution of cdma2000 1x wireless communications is being reviewed or partially adopted by certain standards bodies, such as 3GPP and 3GPP2 (The Third Generation Partnership Project 2),” and that “a baseline framework for cdma2000 1xEV-DV (1xEVolution—Data and Voice) was recently reached by the 3GPP2.” *Id.* at 1:45–52.

As the '653 patent further explains, in a communication system such as CDMA, a set of channels allow signals to be transmitted between a base station and a mobile station within a given frequency assignment. Ex. 1001,

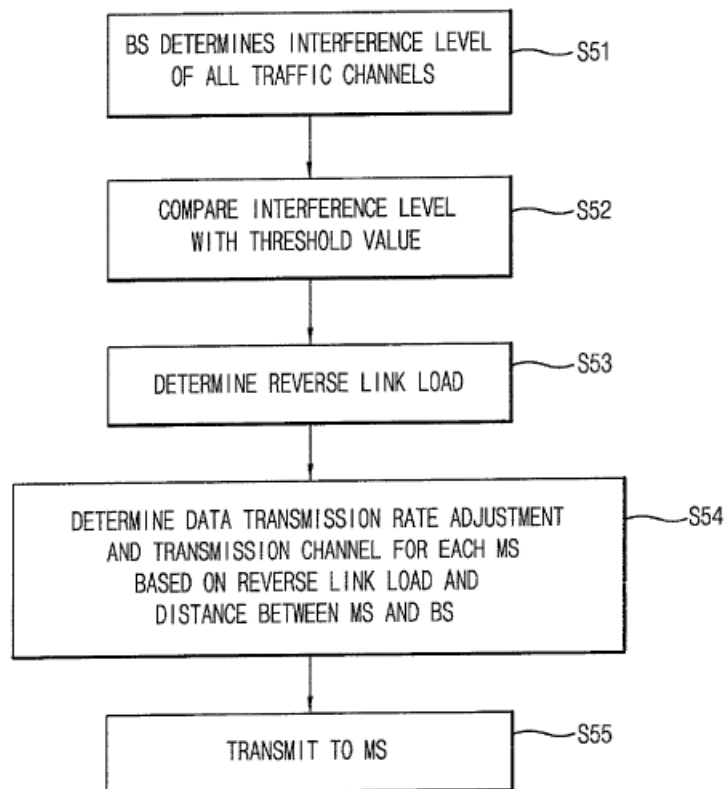
2:6–9. “[F]orward” channels allow signal transmission from the base station to a mobile station, while “reverse” channels allow signal transmissions from the mobile to the base station. *Id.* at 2:9–16. The forward channel includes a portion known as the forward medium access control (MAC) reverse activity (RA) channel, which indicates the load on the reverse channel. *Id.* at 2:24–31.

According to the ’653 patent, previously known techniques for controlling data transmission rates between mobile stations and a base station in CDMA systems “do not effectively consider the particular data transmission circumstances and channel conditions of each mobile station.” *Id.* at 4:36–43. The ’653 patent identifies several purported problems with such previously known techniques. First, they “do not employ effective power control techniques,” and “thus there are difficulties in providing high-speed data transmissions to those mobiles located far from the base station requiring signal transmissions at a higher power.” *Id.* at 4:44–50. Second, “when the base station detects the load on the reverse link to be too large and feeds back this information via a reverse activity (RA) channel, the reverse link packet data rate is unconditionally reduced by one-half for all users (mobiles), and thus overall data throughput at each base station is undesirably reduced.” *Id.* at 4:51–60. Third, the system “is inefficient because no messages are sent to the mobiles to indicate that their packet data rates should be increased when the reverse link load is small.” *Id.* at 4:61–64. Fourth, prior systems “merely consider[] the reverse link load” without considering “the channel or link conditions, such as signal interference and transmission power requirements, and other communications environment

factors [that] [a]ffect data transmissions on the reverse link.” *Id.* at 4:65–5:3.

To address these purported problems, the ’653 patent seeks to improve the data transmission rate over the reverse link by considering the particular data transmission circumstances and channel conditions of each mobile station and, based on these circumstances and conditions, controlling the mobile stations by sending messages telling them to adjust (increase, decrease, or maintain) their data transmission rates. Ex. 1001, 5:4–15. This technique is discussed in more detail in connection with Figure 5, reproduced below.

FIG. 5



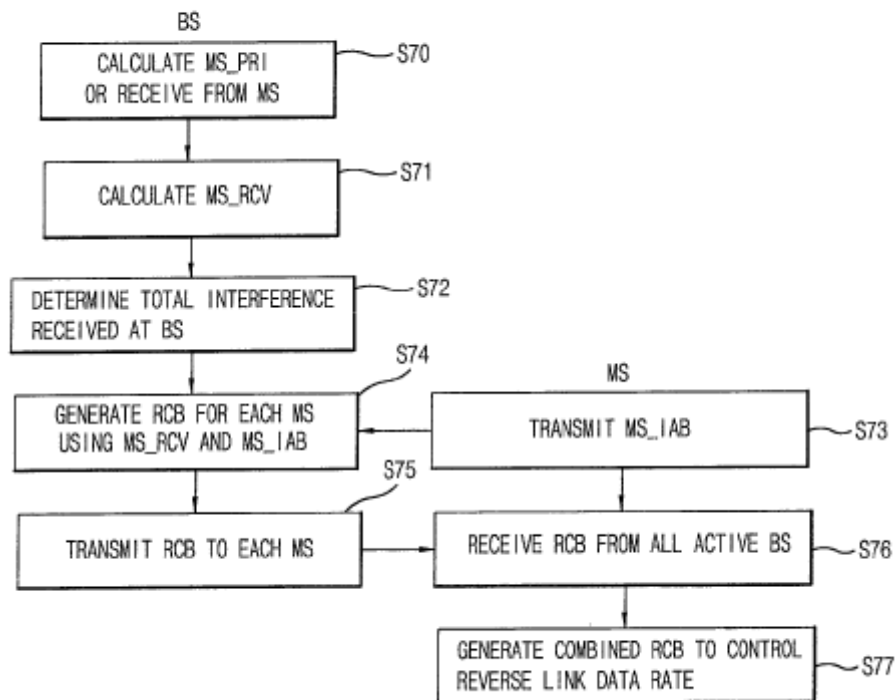
Ex. 1001, Fig. 5. Figure 5 shows the key steps involved in sending transmission data rate adjust information to each mobile station. *Id.* at 9:36–39. First, the base station (BS) detects and determines a level of interference among all communication traffic channels (step S51). *Id.* at 9:39–41. Next, the detected interference level is compared with a threshold so that the load on the reverse link can be approximated (steps S52 and S53). *Id.* at 9:41–43. Then, the system determines transmission data rate adjust information based on the reverse link load and the distance between the mobile station (MS) and the base station (step S54). *Id.* at 9:43–52. This transmission data rate adjustment information includes rate control bits (RCBs), which are transmitted from the base station to the mobile stations. *Id.* at 9:52–55. Upon receiving the RCBs from the base stations, the mobile stations adjust their transmission data rates in increments for gradual increasing or decreasing. *Id.* at 9:56–58. The mobile stations then inform the base station of the adjusted transmission data rate they intend to use by sending to the base station a reverse rate indicator (RRI). *Id.* at 9:58–61. Thereafter, the mobile stations transmit packet data to the base station on the reverse link at the adjusted data rates. *Id.* at 9:61–63.

The '653 patent also describes the use of a parameter called the Mobile Station Rate Increase Available Bit (MS_IAB), which can be sent by the mobile station to the base station. Ex. 1001, 14:4–7. The MS_IAB value has two states, “increase” and “unchanged.” *Id.* at 14:7–8. The MS_IAB is set to “increase” if all of the following conditions are met: (1) the mobile station’s remaining transmission power is above a certain level; (2) the number of bits in the mobile station’s transmission buffer is above a certain level; and (3) the data rate of the current transfer from the

mobile station is below a maximum data rate set by the system. *Id.* at 14:10–19. If any of these conditions is not met, the value is set as “unchanged.” *Id.* at 14:10–12. The system also uses two additional parameters, the Mobile Station Priority (MS_PRI), which is used for determining a probability of cell interference of each mobile station, and the Mobile Station Reverse Control Value (MS_RCV), which is used for determining the transmission energy value necessary for each mobile station based on, for example, its distance from the base station. *Id.* at 12:1–3, 13:22–45.

A flow diagram showing the use of these parameters to determine and generate RCBs is shown in Figure 7, reproduced below.

FIG. 7



Ex. 1001, Fig. 7. As shown in Figure 7, the base station first receives the MS_PRI from the mobile station or calculates it, and then uses that

information, along with the data rate at which the mobile station is transmitting, to calculate the MS_RCV for mobile stations that are in an active state with regard to the base station (steps S70 and S71). *Id.* at 14:20–35. The base station also detects the total interference based on the total energy of signals received at the base station (step S72). *Id.* at 14:36–38. Thereafter, each mobile station transmits the MS_IAB to the base station in every frame (step S73). *Id.* at 14:38–40. The base station then uses the MS_RCV and MS_IAB values to generate a rate control bit (RCB) for controlling the rate of each mobile station, and transmits the RCB to each mobile station (steps S74 and S75). *Id.* at 14:41–44. Here, the RCB can include three types of commands: (1) an increase command for increasing the mobile station’s data rate; (2) a decrease command for decreasing the mobile station’s data rate; and (3) a command for not changing the data rate. *Id.* at 14:44–47.

The ’653 patent claims priority to three Korean applications: 2001-0006839 (filed February 12, 2001) (“Korean App. No. 6839” or the “’6839 application”), 2001-0041363 (filed July 10, 2001) (“Korean App. No. 1363” or the “’1363 application”), and 2001-0057600 (filed September 18, 2001) (“Korean App. No. 7600” or the “’7600 application”). Ex. 1001, code (30).

F. Illustrative Claims

Of challenged claims 34–40, claims 34 and 37 are independent. Claim 34 is illustrative and is reproduced below.

34. [pre] A mobile station apparatus for use in a mobile communications system for controlling a data transmission rate on a reverse link, the apparatus comprising:

[34(a)] receiving means adapted to receive a data rate control command of a base station on a forward link common channel in a dedicated manner,

- [34(b)] the data rate control command being formed of at least one rate control bit that is signal point mapped to at least one symbol of +1, -1, and 0 to indicate whether the mobile station should increase, decrease, or maintain its current data transmission rate; and
- [34(c)] control means connected with the receiving means adapted to control the data transmission rate based on the data rate control command,
- [34(d)] wherein a bit is sent on a reverse packet data control channel to indicate whether the mobile station has enough power and data to increase its data transmission rate on a reverse packet data channel.

Ex. 1001, 20:5–22 (bracketed paragraph identifiers added).

II. DISCUSSION

A. *Claim Construction*

A claim “shall be construed using the same claim construction standard that would be used to construe the claim in a civil action under 35 U.S.C. § 282(b).” 37 C.F.R. § 42.100(b) (2020). Petitioner proposes constructions for two claim terms, the “receiving means . . .” term of limitation 34(a), and the “control means . . .” term of limitation 34(c). Pet. 37–38. Petitioner argues that the function of the “receiving means” is “receiv[ing] a data rate control command of a base station on a forward link common channel in a dedicated manner,” and that the corresponding structure in the specification is “an antenna, reception processor, and demodulator, as disclosed in elements A1, 21, and 22 of Figure 2 and the corresponding discussion at 5:50–56 and 6:19–22.” *Id.* at 37. Petitioner argues that the function of the “control means” is “control[ling] the transmission rate based on the data rate control command,” and that the corresponding structure in the specification is “a transmission data rate controller and transmission processor, in their entirety or portions thereof.”

Id. at 38. Petitioner also represents that its claim construction proposals “match the constructions advanced by Patent Owner during litigation.” *Id.* n.7.

Patent Owner states that it “agrees with Petitioners that the proposed terms for construction have corresponding structure in the ’653 patent.” PO Resp. 13. According to Patent Owner, its “position on claim construction here is the same as the position that it has taken in district court litigation.” Patent Owner further states that “[p]lain and ordinary meaning of all claim terms should apply,” but that it “reserves the right to provide alternate constructions.” *Id.*

Based on the full trial record, we agree with Petitioner’s constructions for the “receiving means . . .” term of limitation 34(a), and the “control means . . .” term of limitation 34(c), which are supported by the specification of the ’653 patent and the testimony of Mr. Proctor. Pet. 37–38; Ex. 1002 ¶¶ 132–141. Specifically, we agree that the function of the “receiving means . . .” is “receiv[ing] a data rate control command of a base station on a forward link common channel in a dedicated manner,” and the structure of the “receiving means” in the ’653 patent specification is an antenna, reception processor, and demodulator, as disclosed in elements A1, 21, and 22 of Figure 2 and the corresponding discussion at 5:50–56 and 6:19–22. Pet. 37; Ex. 1002 ¶¶ 132–136. We also agree that the function of the “control means . . .” is “control[ling] the transmission rate based on the data rate control command,” and the structure of the “control means” is a transmission data rate controller and transmission processor as shown in Figure 2 and discussed at column 5:57 through 6:14. Pet. 37; Ex. 1002 ¶¶ 137–141; Ex. 1001, Fig. 2, 5:57–6:14.

We determine that it is not necessary to provide an express interpretation of any other claim terms for purposes of this Decision. *See Nidec Motor Corp. v. Zhongshan Broad Ocean Motor Co.*, 868 F.3d 1013, 1017 (Fed. Cir. 2017); *Vivid Techs., Inc. v. Am. Sci. & Eng’g, Inc.*, 200 F.3d 795, 803 (Fed. Cir. 1999) (“[O]nly those terms need be construed that are in controversy, and only to the extent necessary to resolve the controversy.”).

B. Principles of Law

To satisfy the written description requirement under 35 U.S.C. § 112(a), the specification must “reasonably convey[] to those skilled in the art that the inventor had possession” of the claimed invention as of the filing date. *Ariad Pharms., Inc. v. Eli Lilly & Co.*, 598 F.3d 1336, 1351 (Fed. Cir. 2010) (en banc). An adequate description does not require any particular form of disclosure or that the specification recite the claimed invention *in haec verba*, but must do more than render the claimed invention obvious. *Id.* at 1352. In evaluating the adequacy of the disclosure, a court may consider “the existing knowledge in the particular field, the extent and content of the prior art, the maturity of the science or technology, [and] the predictability of the aspect at issue.” *Capon v. Eshhar*, 418 F.3d 1349, 1359 (Fed. Cir. 2005) (cited with approval in *Ariad*, 598 F.3d at 1352).

A claim is unpatentable under 35 U.S.C. § 103 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.” *KSR Int’l Co. v. Teleflex Inc.*, 550 U.S. 398, 406 (2007). The question of obviousness is resolved on the basis of underlying factual determinations, including (1) the scope and content of the prior art;

(2) any differences between the claimed subject matter and the prior art; (3) the level of skill in the art; and (4) where in evidence, objective evidence of non-obviousness.⁴ *Graham v. John Deere Co.*, 383 U.S. 1, 17–18 (1966). When evaluating a combination of teachings, we must also “determine whether there was an apparent reason to combine the known elements in the fashion claimed by the patent at issue.” *KSR*, 550 U.S. at 418 (citing *In re Kahn*, 441 F.3d 977, 988 (Fed. Cir. 2006)). Whether a combination of prior art elements would have produced a predictable result weighs in the ultimate determination of obviousness. *Id.* at 416–417.

In an *inter partes* review, the petitioner must show with particularity why each challenged claim is unpatentable. *Harmonic Inc. v. Avid Tech., Inc.*, 815 F.3d 1356, 1363 (Fed. Cir. 2016); 37 C.F.R. § 42.104(b) (2020). The burden of persuasion never shifts to Patent Owner. *Dynamic Drinkware, LLC v. Nat’l Graphics, Inc.*, 800 F.3d 1375, 1378 (Fed. Cir. 2015).

We analyze the challenges presented in the Petition in accordance with the above-stated principles.

C. Level of Ordinary Skill in the Art

Petitioner contends that a person of ordinary skill in the art at the time of the alleged invention “would have had a degree in electrical engineering or a similar discipline, with at least three years of relevant industry or research experience, including experience designing or implementing wireless radio systems for data transmission and retransmission.” Pet. 36 (citing Ex. 1002 ¶¶ 52–54). Petitioner further asserts that one of ordinary skill “would also have familiarity with the 3GPP2 and other wireless

⁴ Patent Owner has not presented objective evidence of non-obviousness.

standard technical specifications,” and “would have understood how to search available literature for relevant publications, including contributions to standardization organizations.” *Id.* (citing Ex. 1002 ¶¶ 52–54, 88; Ex. 1001, 1:33–55, 1:65–2:5).

Patent Owner argues that a person of ordinary skill in the art “would be one with a bachelor’s degree in electrical engineering, computer engineering, computer science, or telecommunications, along with a minimum of three to five years of practical experience in the field.” PO Resp. 11. Patent Owner also contends that “[a] combination of more experience in the field and less education or more education and less experience in the field would also suffice.” *Id.*

We find the parties’ definitions of the person of ordinary skill to be very similar. To the extent necessary, and for purposes of this Decision, we adopt Petitioner’s assessment of the level of skill in the art because Mr. Proctor’s identification of relevant industry experience applicable to designing or implementing wireless radio systems for data transmission or retransmission is consistent with the ’653 patent and the asserted prior art. We note, however, that our determinations in this Decision would not change under either party’s definition of the level of ordinary skill in the art. During the hearing, Patent Owner’s counsel acknowledged that the result in this case would not be different under either party’s definition of the person of ordinary skill in the art. Tr. 21:5–10.

D. Priority Date of the ’653 Patent

The parties dispute the priority date of the challenged claims of the ’653 patent. Pet. 8–9; PO Resp. 16–46, Pet. Reply 4–19; PO Sur-reply 2–22. This dispute is central to this proceeding because Patent Owner

contends that the '653 patent's priority date pre-dates Samsung and Airvana and renders them unavailable as prior art. PO Resp. 1–2.

As noted above, the '653 patent claims priority to three Korean applications: Korean App. No. 6839 filed February 12, 2001, Korean App. No. 1363 filed July 10, 2001, and Korean App. No. 7600 filed September 18, 2001. Ex. 1001, code (30). Petitioner argues that, of these three applications, only Korean App. No. 7600 “possibly supports any priority claim.” Pet. 8–9 (citing Exs. 1011–1016; Ex. 1002 ¶¶ 115–119). The other two Korean applications, according to Petitioner, “do not describe the claimed increase availability bit (referred to as ‘MS_IAB’ in the '653 patent)—*i.e.*, the bit transmitted from the mobile station to the base station indicating that the mobile station has sufficient power and enough data to be transmitted to increase its data transmission rate,” which each of the challenged claims require, and which is recited in limitation 34(d) and similar language in claim 37. *Id.* at 9 (citing Ex. 1002 ¶¶ 115–117); Ex. 1001, 20:18–22, 20:44–48. Accordingly, Petitioner contends that the earliest potential priority date for the challenged claims is the September 18, 2001 date of the Korean App. No. 7600, which is after the effective date of all of the prior art relied upon in the Petition. *Id.* (citing Ex. 1002 ¶¶ 119, 144–148).

Patent Owner disagrees, arguing that Korean App. No. 6839 “provides written description support for every limitation of claims 34 and 37 and entitles the '653 patent to a priority date of February 1[2], 2001.”⁵ PO Resp.

⁵ The '653 patent and the face of Korean App. No. 6839 indicate that Korean App. No. 6839 was filed on February 12, 2001, but the Patent Owner Response mistakenly indicates February 11, 2001 as the filing date for Korean App. No. 6839. Ex. 1001, code (30); Ex. 1011, 1; PO Resp. 16.

16 (citing Ex. 2012 ¶ 10). According to Patent Owner, the “bit” in limitation 34(d) and claim 37 “is based on information that the mobile station has related to its power and data.” PO Resp. 31 (citing Ex. 1001, 20:46–48; Ex. 2012 ¶ 48). Patent Owner asserts that one of ordinary skill “would understand that the mobile station in *Korean App. No. 6839* has information about its power and data because the mobile station operates in at least CDMA, High Data Rate (‘HDR’), and 1xEV-DV systems that are even more advanced than traditional IS-95 systems.” *Id.* (citing Ex. 1011, Fig. 3, Fig. 5, ¶ 16; Ex. 2012 ¶ 49). Patent Owner also contends that one of ordinary skill “would understand that the mobile station in *Korean App. No. 6839* may use information about its power and data to make a decision about whether it can increase its current data transmission rate.” *Id.* at 31–32 (citing Ex. 1011, Fig. 3, Fig. 5, ¶ 16; Ex. 2012 ¶ 50).

“Importantly,” Patent Owner argues, one of ordinary skill would have understood that “the mobile would have no use for, and the base station would have no use for, the mobile station sending to the base station[] its current data transmission rate.” PO Resp. 32 (citing Ex. 1011, Fig. 5; Ex. 2012 ¶ 51). According to Patent Owner, “the current data transmission rate at the mobile station is disclosed in” limitation 34(c) and, in limitation 34(d), “the mobile station is sending to the base station a bit to provide ***adjustment information*** to the base station to indicate whether the mobile station can increase its current data transmission rate.” *Id.* (citing Ex. 1011 ¶ 31; Ex. 2012 ¶ 53); *see* PO Sur-reply 15. “For example,” Patent Owner asserts, “Fig. 3 of the *Korean App. No. 6839* discloses a ‘transmission processing unit (34) for ***adjusting*** the transmission data rate of the transmission signal and transmits it to the base station according to the

transmission data control command delivered from the transmission data rate control unit (33).” *Id.* (citing Ex. 1011, Fig. 3, ¶¶ 32–33; Ex. 2012 ¶ 54); *see* PO Sur-reply 16. According to Patent Owner, a person of ordinary skill “would understand that the transmission processing unit (34) is a unit that is used for adjusting the transmission data rate, and that it is not a unit that is for controlling the data transmission rate.” *Id.* (citing Ex. 1011, Fig. 3, ¶¶ 32–33; Ex. 2012 ¶ 55). “Rather,” Patent Owner contends, “it is the control unit (33)—not the processing unit (34)—that the mobile station uses for current data rate,” and “[t]he processing unit (34) is used for adjusting the current data transmission rate.” *Id.* at 32–33 (citing Ex. 1011, Fig. 3, ¶¶ 32–33; Ex. 2012 ¶¶ 56–57); *see* PO Sur-reply 16.

“When the mobile station sends information about increasing its data transmission rate,” Patent Owner argues, “the base station already has the current data transmission rate.” PO Resp. 33 (citing Ex. 1011, Figs. 2, 5, ¶¶ 31, 46; Ex. 2012 ¶ 58). According to Patent Owner, a person of ordinary skill “looking to *Korean App. No. 6839* would understand that the base station is designed to receive information from the mobile station relating to increasing and decreasing the data transmission rates—and not to duplicate information that the base station already has.” *Id.* (citing Ex. 1011, Figs. 2, 5, ¶¶ 31, 46; Ex. 2012 ¶ 59). “Otherwise,” Patent Owner asserts, “the base station would not have the information that it needs to send the data rate control command.” *Id.* (citing Ex. 1011, Fig. 2; Ex. 2012 ¶ 60).

Patent Owner also argues that “*Korean App. No. 6839* provides written description support for ‘a bit’ . . . ‘to indicate whether the mobile station has enough power and data to increase its data transmission rate,’ by disclosing adjustment information ‘through an RRI (Reverse Rate

Indicator).” PO Resp. 33–34 (citing Ex. 1011 ¶¶ 7, 22, 31, 46, 48; Ex. 2012 ¶ 61). “For example,” Patent Owner asserts, “*Korean App. No. 6839* discloses that *after* the mobile station ‘changes the transmission data rate one step at a time according to the RAB and transmits it,’ then the mobile station ‘*informs the base station of its transmission data rate through an RRI (Reverse Rate Indicator)*.’” *Id.* at 34 (citing Ex. 1011 ¶¶ 7, 22, 48; Ex. 2012 ¶ 62). Patent Owner further contends that “[i]n every instance where RRI is referenced in *Korean App. No. 6839*, it is referenced as the chronological last step that follows after” limitations 34(a), 34(b), and 34(c). *Id.* (citing Ex. 1011 ¶¶ 7, 22, 48; Ex. 2012 ¶ 63).

Additionally, Patent Owner argues that one of ordinary skill would have understood that “[i]n the context of HDR and 1xEV-DV systems, which are expressly incorporated by reference in *Korean App. No. 6839*,” when “the mobile station ‘transmits it,’” this “transmission is necessarily occurring at a transmission data rate from 9.6 kbps to 153.6 kbps.” *Id.* (citing Ex. 1011 ¶ 16; Ex. 2012 ¶ 64). According to Patent Owner, a person of ordinary skill “would also understand in the context of HDR and 1xEV-DV systems, that the mobile station of Figure 3 has information about its power and it has information about its data that can be used for the adjustment of data transmission rates.” *Id.* at 34–35 (citing Ex. 1011 ¶ 16; Ex. 2012 ¶ 65). “For example,” Patent Owner asserts, “with respect to the mobile station having ‘enough power,’ *Korean App. No. 6839* discloses traditional ‘power control methods of IS-95’ which demonstrates that the mobile station has information about its power.” *Id.* at 35 (citing Ex. 1011 ¶ 16; Ex. 2012 ¶ 66). “With respect to ‘enough . . . data,” Patent Owner contends, “*Korean App. No. 6839* discloses ‘a transmission processing unit

(34) for adjusting the transmission data rate of the transmission signal,’ which shows that the mobile station operating in an HDR system has information about its data that is being processed, including specific information about the transmission buffer, and maximum data rate.” *Id.* (citing Ex. 1001, 14:5–19; Ex. 1011, Fig. 3, ¶¶ 16, 32–33; Ex. 2012 ¶ 67).

“Because *Korean App. No. 6839* discloses transmission data rates for mobile stations on the reverse link,” Patent Owner argues, “and discloses that the mobile station ‘transmits’ within this range prior to any mention of RRI, it follows that the RRI in *Korean App. No. 6839* is being used to provide information to the base station for the mobile station’s *next* data transmission rate.” PO Resp. 35 (citing Ex. 1011, Fig. 3, ¶¶ 7, 22, 31–33, 48; Ex. 2012 ¶ 68). “Otherwise,” according to Patent Owner, “the mobile station would unnecessarily be transmitting to the base station duplicate information regarding the current data transmission rate,” which “is not a result disclosed by *Korean App. No. 6839*.” *Id.* (citing Ex. 1021 ¶ 69). Patent Owner further argues that limitation 34(d) “only requires that the mobile station send ‘a bit,’ and that “the RRI in *Korean App. No. 6839*” includes “a bit.” *Id.* at 36 (citing Ex. 1001, 20:44; Ex. 2012 ¶ 72; Ex. 2013, 142:24–143:1).

Additionally, Patent Owner argues that one of ordinary skill “would understand that the *Korean App. No. 6839* processing unit 34 uses a[n] RRI to transmit information about the increase and decrease (adjusting) [of] the current data transmission rate.” PO Resp. 36 (citing Ex. 1011, Fig. 3, ¶¶ 32, 33; Ex. 2012, 73). Patent Owner asserts that one of ordinary skill “would not understand that the RRI is being used in *Korean App. No. 6839* to transmit information about a current data transmission rate because the base

station already has this information . . . when it sends the data rate control command to the mobile station.” *Id.* (citing Ex. 1011, Fig. 2, ¶ 31; Ex. 2012 ¶ 74). According to Patent Owner, “[t]his understanding of the RRI is consistent with” Figure 2 of Korean App. No. 6839, which “shows that the base station has ‘a transmission channel determination unit (24) for deciding **information on the increase and decrease of transmission data rate received from a mobile station.**” *Id.* at 36–37 (citing Ex. 1011, Fig. 2, ¶ 31; Ex. 2012 ¶¶ 76–77); *see* PO Sur-reply 15–16. Patent Owner contends that “Figure 5 also shows the base station receiving information from the mobile station about load information and distance information.” *Id.* at 37 (citing Ex. 1011, Fig. 5, ¶¶ 42–46; Ex. 2012 ¶ 78). Patent Owner further contends that Mr. Proctor confirmed that “the mobile station of *Korean App. No. 6839* includes information [on] its own power.” *Id.* (citing Ex. 2013, 155:23–156:16; Ex. 2013 ¶ 79).

Petitioner responds that one of ordinary skill would not “understand that the RRI in the ’6839 application provides the same information as an IAB” because “the IAB provides different and additional information than the then-known RRI of the ’6839 application.” Pet. Reply 6 (citing Ex. 1019 ¶¶ 12–14). Petitioner asserts that “[t]he ’653 patent explicitly associates IABs with the process of the mobile station determining whether it has enough power (*e.g.*, sufficient transmission power margin) and enough data (*e.g.*, number of bits in the transmission buffer is high enough) to increase its data rate. *Id.* at 6–7 (citing Ex. 1001, 14:3–19). “The ’653 patent does not teach performing this determination,” according to Petitioner, “when the mobile station sends an RRI (after incrementally adjusting its transmission

data rate based on the rate control bit or RCB). *Id.* at 7–8 (citing Ex. 1001, 9:56–63; Ex. 1019 ¶ 16).

Turning to the '6839 application, Petitioner argues that “[t]he '6839 application briefly references RRIs three times,” disclosing “that the mobile station sends an RRI to inform the base station of its transmission data rate.” Pet. Reply 8 (citing Ex. 1011 ¶¶ 7, 22, 48). According to Petitioner, “[t]he '6839 application does not teach that the RRI provides an ‘intended’ data transmission rate, as argued by Patent Owner,” but “instead teaches that the mobile station informs the base station of the data rate the mobile station *will use* in the *current frame*, unless something interferes with the transmission, as instructed by the base station in the RAB (Reverse Activity Bit).” *Id.* (citing Ex. 1011 ¶¶ 7 (the “mobile station . . . informs a base station of its transmission data rate through an RRI (Reverse Rate Indicator), 22, 48; Ex. 1001, 9:56–63). “The '6839 [application],” Petitioner contends, “does not disclose or provide any support for the Patent Owner’s argument that . . . the mobile station sends an RRI to indicate whether the mobile station has enough power and data to increase data rate in a subsequent frame.” *Id.* at 8–9 (citing Ex. 1019 ¶¶ 17–19). “By contrast,” Petitioner argues, “an IAB, e.g., the MS_IAB described in the '653 patent[,] *is* a bit sent to indicate whether a mobile station has enough power and data for an increase in its data rate,” but this IAB was not disclosed until Korean App. No. 7600 filed on September 18, 2001. Pet. Reply 9. However, according to Petitioner, “MS_IABs, or any increase availability bits, are not mentioned at all in the earlier '6839 application.” *Id.* (citing Ex. 1011; Ex. 1019 ¶¶ 15–18).

Petitioner also disagrees with Patent Owner’s arguments that paragraphs 7, 22, and 48 of Korean App. No. 6839 “disclose transmitting

two different things” when stating that the mobile station “changes the transmission data rate one step at a time according to the RAB command and transmits it, and informs a base station of its transmission data rate through an RRI (Reverse Rate Indicator).” Pet. Reply 11 (citing PO Resp. 27–28, 33–35). According to Petitioner, “Patent Owner argues that ‘transmits it’ means that the mobile station sends a transmission at the current data rate[,] while ‘informs the base station of its transmission data rate through an RRI’ is a different transmission with different information” that occurs “*after* the mobile station ‘changes the transmission data rate one step at a time according to the RAB and transmits it.” *Id.* at 12 (citing PO Resp. 34–34). However, Petitioner argues, Korean App. No. 6839 never “indicate[s] that these are separate transmissions, much less that the supposed second ‘informing’ step includes a bit indicating the mobile has enough power and data for an increase in the mobile’s data rate.” *Id.* (citing Ex. 1019 ¶¶ 19–20).

Petitioner also argues that “Patent Owner incorrectly characterizes the disclosure of Paragraph 31 of the ’6839 application to argue that it discloses the ‘mobile station . . . sending to the base station a bit to provide adjustment information to the base station to indicate whether the mobile station can increase its current data transmission rate.’” Pet. Reply 14 (citing PO Resp. 32). To the contrary, Petitioner asserts, “Paragraph 31 and corresponding Figure 2 teach a *base station transmitting information to a mobile station* about increasing/decreasing the mobile station’s transmission data rate, not the other way around.” *Id.* (citing Ex. 1011, Fig. 2, ¶¶ 30–31).

“Similarly,” Petitioner argues, “Figure 3 and Paragraphs 32–33 of the ’6839 application describe the information on the increase and decrease of

transmission data being sent from a base station to a mobile station, not the reverse.” Pet. Reply at 14–15 (citing Ex. 1011, Fig. 3, ¶¶ 32–33).

Specifically, Petitioner asserts, “Paragraph 33 of the ’6839 application makes clear that the mobile station receives signals from the base station that include information regarding the ‘increase and decrease of transmission data rate,’ and that the mobile station’s data rate control unit (33) uses that information to generate a data rate control command sent to the transmission processing unit (34), which implements the command and adjusts the data transmission rate on the reverse link.” *Id.* at 15 (citing Ex. 1011 ¶ 33; Ex. 1019 ¶¶ 33–34). Thus, according to Petitioner, the ’6839 application “makes clear that the mobile station’s data rate control unit (33) and transmission processing unit (34) work together to adjust the mobile station’s data rate with unit (33) generating a command and unit (34) implementing it,” and “do not disclose the transmission processing unit (34) determining whether it has power and data for an increased data rate or determining whether to send a bit indicating whether its data rate can be increased in the future.” *Id.* (citing Ex. 1011, Fig. 3, ¶ 33; Ex. 1019 ¶¶ 33–34).

Additionally, Petitioner argues, Figure 5 and paragraphs 42–46, upon which Patent Owner relies, “again describe[] how the *base station* determines and transmits ‘information on the increase and decrease of transmission data rate *to each mobile station* in a 1xEV-DV system,’ and not what the mobile station transmits.” Pet. Reply 15–16 (citing PO Resp. 33–34, 43–45; Ex. 1011, Fig. 5, ¶¶ 42–46). “Specifically,” Petitioner asserts, “Paragraph 46 makes clear that the data rate control command regarding ‘the increase and decrease of transmission data rate for each

mobile station is determined by using the load information and distance information between the base station and each mobile station.” *Id.* at 16 (citing Ex. 1011 ¶ 46). “Paragraph 46 does not disclose,” according to Petitioner, “considering an increase available bit or an RRI when generating the rate control command/RAB, just the load information (determined in steps 52 and 53) and the distance information between the base station and each mobile station.” *Id.* (citing Ex. 1011 ¶¶ 43–47).

“Finally,” Petitioner argues, “Paragraphs 8, 16, and 42 of the ’6839 application, which reference HDR, IS-95, and/or 1xEV-DV systems, also do not support Patent Owner’s arguments.” Pet. Reply 16. Petitioner does not dispute that one of ordinary skill “would understand that a mobile station in such systems has ‘information about its power and it has information about its data.’” *Id.* (citing PO Resp. 34–35; Ex. 1019 ¶ 35). However, according to Petitioner, “conventional RRI in the HDR and/or 1xEV-DO systems transmit the mobile station’s current data rate, not the bit required by claim limitation” 34(d). *Id.* at 17–19. Specifically, Petitioner contends, “[t]he RRI in the CDMA2000 HRPD/1xEV-DO standard, also known as HDR, signal the data rate of up to 153.6 kbps that the mobile (access terminal) is using in the current frame,” and “[t]he ’6839 application similarly discloses RRI used in the same way to indicate data rates between 9.6 kbps and 153.6 kbps that the mobile will use in the current frame.” *Id.* at 18 (citing Ex. 1019 ¶¶ 6, 8–11; Ex. 1018, 9–35; Ex. 1011 ¶¶ 7, 16, 22, 48). Thus, according to Petitioner, “neither the prior art High Rate Packet Data/HDR standard nor the ’6839 application describe RRI as including a bit to signal to the base station whether the mobile station can support an increased data rate in a subsequent frame,” and “neither describes sending such a bit based

on whether the mobile has sufficient power and data for an increase.” *Id.* “Instead,” Petitioner contends, “both describe the base station telling the mobile station what data rate the mobile device will use, not what is claimed.” *Id.* at 18–19 (citing Ex. 1001, claims 34, 37; Ex. 1001 ¶¶ 7, 22, 48; Ex. 1018, 9-35; Ex. 1019 ¶¶ 11–14).

In its Sur-reply, Patent Owner argues that Petitioner’s argument in its Reply that “the IAB provides different and additional information than the then-known RRI in the ’6839 application” is an improper “new argument” that “is found nowhere in Petitioner[’s] original Petition,” and that the term “RRI” was not used in Mr. Proctor’s opening declaration. PO Sur-reply 6 (citing Pet. Reply 6; Ex. 2014, 45:24–46:8). Patent Owner also argues that “Petitioner[] fail[s] to explain how IABs ‘explicitly associate[]’ with the determinations of the mobile station” in the ’653 patent, and “therefore this argument should not be afforded any weight.” *Id.* at 7–8. Patent Owner further argues that claim limitation 34(d) “do[es] not recite ‘increase availability bit,’ and Petitioner[] ha[s] not offered any express construction to justify their argument,” and thus “it is irrelevant whether or not *Korean App. No. 6839* recites the words ‘MS_IAB,’ ‘IAB,’ or ‘increase availability bit.’” *Id.* at 11 (citing Pet. Reply 9–11; Ex. 1001, 20:18–22, 20:44–48; Pet); *see id.* at 21–22.

Patent Owner further argues in its Sur-reply that it did not waive its argument that Samsung teaches that an RRI includes a bit indicating if the mobile station has enough power and data for a transmission data rate increase by making that argument in its Preliminary Response but failing to raise it in the Patent Owner Response. PO Sur-reply 12–13. According to Patent Owner, slide 8 of Samsung references RRI “for both examples of so-

called ‘IAB setting,’” and Samsung’s “‘adding a dedicated bit’ relies on using RRI.” *Id.* at 13 (citing Pet. Reply 32; Ex. 1003, 8). Patent Owner also contends that Petitioner’s argument that Korean App. No. 6839 discloses a conventional RRI was improperly raised for the first time in the Petition. *Id.* at 18–21.

Based on the full trial record, we find that claims 34 and 37 of the ’653 patent are not supported by Korean App. No. 6839. Claim limitation 34(d) requires that “a bit is sent on a reverse packet data control channel to ***indicate whether the mobile station has enough power and data to increase its data transmission rate*** on a reverse packet data channel,” and claim 37 recites a similar limitation. Ex. 1001, 20:19–22 (emphasis added), 20:44–48. The ’653 patent discloses an MS_IAB bit that indicates whether the mobile station has enough power and data to increase its data transmission rate on a reverse packet data channel. *Id.* at 14:3–20. More specifically, the ’653 patent states that the MS_IAB value is set to “increase” when “transmission power margin (i.e., remaining transmission power) is above a certain level,” the “number of bits in the transmission buffer is above a certain level,” and “the data rate of the current transfer . . . is below a maximum data rate . . . set by the system.” *Id.* at 14:10–19. Thus, the ’653 patent’s disclosure of an MS_IAB supports limitation 34(d). This disclosure, however, does not appear in Korean App. No. 6839, and Patent Owner does not contend otherwise. *See* Pet. 8–9; Pet. Reply 3–4; Ex. 1002 ¶¶ 116–119; PO Resp. 31–46; PO Sur-reply 2–22. Nor is there any similar disclosure in Korean App. No. 6839 of a value that indicates whether the mobile station has enough power and data to increase its data transmission rate, whether referred to as an “MS_IAB” or otherwise.

We also find that the RRI in Korean App. No. 6839 does not provide support for claim limitation 34(d). The relevant portion of the '6839 application states that the base station determines “information on the increase and decrease of transmission data rate (Reverse Activity Bit, RAB) for each mobile station” and sends the RAB to the mobile station. Ex. 1011 ¶¶ 6–7. It then states that “the mobile station that has received its RAB information changes the transmission data rate one step at a time according to the RAB command and transmits it, and *informs a base station of its transmission data rate through an RRI (Reverse Rate Indicator).*” *Id.* ¶ 7 (emphasis added). The '6839 application includes a comparable disclosure in two additional locations, paragraphs 22 and 44. *Id.* ¶¶ 22 (“the mobile station that has received its RAB information changes the transmission data rate one step at a time according to the RAB command and transmits it, and informs the base station of its transmission data rate through an RRI (Reverse Rate Indicator)”), 44 (same). These disclosures merely state that the RRI informs the base station of the mobile station’s transmission rate; they do not disclose that the RRI includes a bit that “indicate[s] whether the mobile station *has enough power and data* to increase its data transmission rate,” as the claims require.

Our conclusion is supported by the testimony of Mr. Proctor. Mr. Proctor testifies that “RRIs were adopted as part of prior art specifications, including for the [3GPP] cdma2000 High Rate Packet Data Air Interface at least as early as October 2000.” Ex. 1019 ¶¶ 6, 8 (citing Ex. 1018). As Mr. Proctor explains, the cdma2000 specification describes a “Reverse Rate Indicator Channel . . . used by the access terminal to indicate the data rate at which the Data Channel is transmitted.” Ex. 1019 ¶¶ 8–9 (citing Ex. 1018,

9-35). Mr. Proctor also testifies that “the Reverse Rate Indicator (RRI) symbols sent on the RRI Channel by the mobile station (access terminal) to the base station ‘indicate the data rate at which the Data Channel is transmitted.’” *Id.* ¶ 9 (citing Ex. 1018, 9-35). “In other words,” Mr. Proctor explains, “the mobile station sends RRI symbols to tell the base station the data rate at which the mobile is transmitting information on the reverse link’s Data Channel (the data Channel of the Reverse Traffic Channel), as the RRI Channel is used to indicate the data rate of the Data Channel being transmitted on the Reverse Traffic Channel.” *Id.* (citing Ex. 1018, 9-26, 9-33, 9-34, 9-35, 9-39). Additionally, Mr. Proctor testifies that “RRIs are only briefly mentioned three times, in paragraphs 7, 22, and 48” in the ’6839 application, and “the prior art 3GPP specification has the same basic disclosure of RRIs as the ’6839 application: using the RRI to confirm to the base station what data rate the mobile station/access terminal is using.” *Id.* ¶¶ 7, 11 (citing Ex. 1018, 9-35; Ex. 1011 ¶¶ 7, 22, 48). “Indeed,” Mr. Proctor states, “the ’6839 application references the same data rates between 9.6 and 153.6 kbps on the reverse link that are referenced in the prior art [3GPP] specification.” *Id.* ¶ 11 (citing Ex. 1011 ¶ 16; Ex. 1018, 9-33, 9-35). We find this testimony to be credible because it is consistent with the disclosures of the ’6839 application and the 3GPP specification (Exhibit 1018).

We also rely on and find credible Mr. Proctor’s testimony that “neither the ’6839 application nor the prior art High Rate Packet Data Specification disclose” an “RRI or other signal that comprises a bit that the mobile station sends to indicate it has sufficient power and data for a subsequent increase.” Ex. 1019 ¶ 12. As Mr. Proctor explains, “the only

disclosure relating to the RRI within the '6839 application" is the "single sentence[] referring to the RRI as informing the base station of its transmission data rate," which is "repeated three times in separate paragraphs." *Id.* (citing Ex. 1011 ¶¶ 7, 22, 48). We agree with and find credible Mr. Proctor's testimony that this sentence "provides no additional teachings beyond what a [person of ordinary skill in the art] would have known to be conventional (*e.g.*, beyond what was known in the current HDR system available at that time, and referenced within the '6839 application)," *id.* ¶ 12, and that "[n]o person of skill in the art reviewing" this disclosure would understand it to disclose "a bit that indicates whether the mobile station has power and data to accept an increase in its data rate," *id.* ¶ 13.

We are not persuaded by Patent Owner's arguments. Patent Owner argues that because a person of ordinary skill in the art would have understood that the mobile station in Korean App. No. 6839 has information about its power and data (which is undisputed), one of ordinary skill would also have understood that the mobile station could have used that information "to make a decision about whether it can increase its current data transmission rate." PO Resp. 31–32. Patent Owner, however, does not point to anything in the '6839 application that actually discloses, either expressly or inherently, that the mobile station uses information about its power and data to make a decision about whether it can increase its data transmission rate. It is not enough to argue that one of ordinary skill would have found it obvious for the mobile station to use information about its power and data to determine whether it can increase its data transmission rate. As the Federal Circuit has explained:

Entitlement to a filing date does not extend to subject matter which is not disclosed, but would be obvious over what is

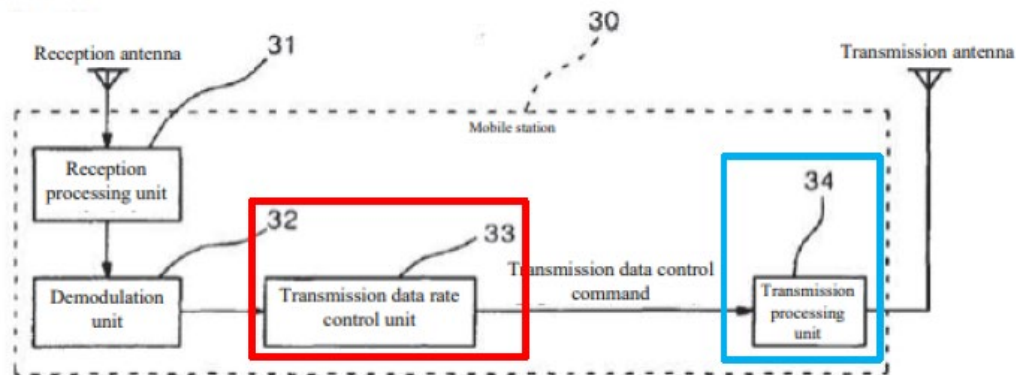
expressly disclosed. It extends only to that which is disclosed. While the meaning of terms, phrases, or diagrams in a disclosure is to be explained or interpreted from the vantage point of one skilled in the art, all the limitations must appear in the specification. The question is not whether a claimed invention is an obvious variant of that which is disclosed in the specification. Rather, a prior application itself must describe an invention, and do so in sufficient detail that one skilled in the art can clearly conclude that the inventor invented the claimed invention as of the filing date sought.

Lockwood v. American Airlines, Inc., 107 F.3d 1565, 1572–73 (Fed. Cir. 1997).

The different aspects of the '6839 application upon which Patent Owner relies are discussed further below.

First, Patent Owner points to transmission data rate control unit 33 and transmission processing unit 34 within mobile station 30 in Figure 3 of the '6839 application, as shown in Patent Owner's annotated version of Figure 3 reproduced below.

[Fig. 3]



Patent Owner's annotated version of Figure 3 of the '6839 application showing mobile station 30 containing transmission data rate control unit 33 with a red box around it, and transmission processing unit 34 with a blue box around it. PO Resp. 33.

Patent Owner argues that transmission data rate control unit 34 adjusts the transmission rate of the signal based on a command delivered from the transmission data rate control unit 33. PO Resp. 32–33.

Transmission data rate processing unit 33 and transmission processing unit 34 are discussed in paragraphs 32 and 33 of the '6839 application, which state that:

<32> Fig. 3 is a configuration diagram of an embodiment for receiving information on the increase and decreases of transmission data from a base station in a mobile station of the mobile communication system according to the present invention.

<33> Furnishes a reception processing unit (31) for converting the signal information transmitted from the transmission processing unit (25) of Fig. 2, a demodulation unit (32) for demodulating the signal that has been down-converted by the reception processing unit (31), ***a transmission data rate control unit (33) for controlling the data rate transmitted to the base station according to the value of information on the increase and decrease of transmission data rate*** carried in the signal demodulated by demodulation unit (32), and a ***transmission processing unit (34) for adjusting the transmission data rate of the transmission signal and transmits it to the base station according to the transmission data control command delivered from the transmission data rate control unit (33).***

Ex. 1011 ¶¶ 32–33. As is apparent from the excerpts reproduced above, paragraphs 32 and 33 say nothing about transmission data rate control unit 33 or transmission processing unit 34 generating or sending to the base station a bit “to indicate whether the mobile station has enough power and data to increase its data transmission rate,” as claims 34 and 37 require. Figure 3 also provides no indication that such a bit is generated, but instead merely depicts transmission data rate control unit 32 and transmission processing unit 33 as black boxes without providing any indication of what

processing occurs within them other than the processing implied by the name of the unit itself.

Patent Owner's citation to Dr. Cooklev's testimony about Figure 3 is also unavailing. PO Resp. 32–33 (citing Ex. 2012 ¶¶ 54–57). In his declaration, Dr. Cooklev merely states that transmission processing unit 34 is “for *adjusting* the transmission data rate of the transmission signal” and that control unit 33 is used for the current data rate. Ex. 2012 ¶¶ 54–57. Dr. Cooklev, however, does not explain how one of ordinary skill would have understood transmission processing unit 34 to send a bit to the base station indicating whether the mobile station has enough power and data to increase its data transmission rate. *Id.* Dr. Cooklev also testifies that one of ordinary skill would have understood that “the mobile station of Figure 3 has information about its power and it has information about its data that can be used for the adjustment of data transmission rates,” but does not explain how, from that, one of ordinary skill would have understood the '6839 application to disclose sending a bit to the base station indicating whether the mobile station has sufficient power and data to increase its data transmission rate. *Id.* ¶¶ 65–74.

Second, Patent Owner points to the transmission channel determination unit 24 in Figure 2 of the '6839 application, which is reproduced below.

[Fig. 2]

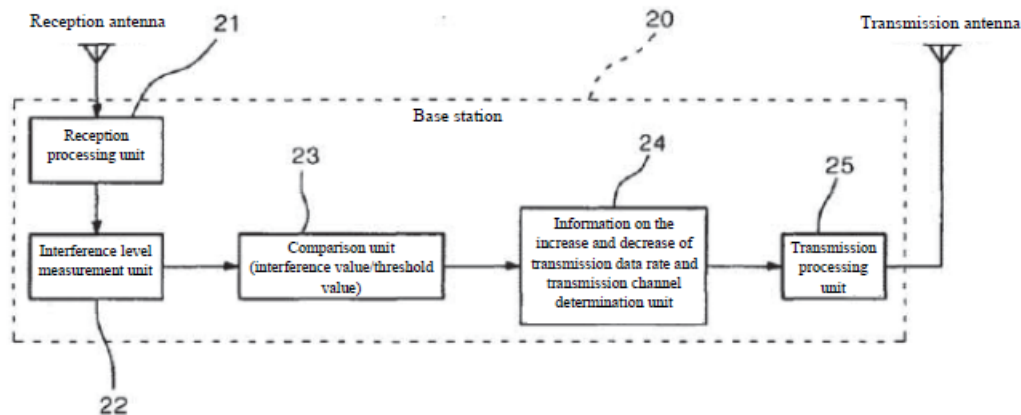


Figure 2 of the '6839 application is a diagram of portions of base station 20 used for transmitting information on the increase and decrease of transmission data to each mobile station. Ex. 1009, Fig. 2, ¶ 30.

Patent Owner argues that Figure 2 indicates that the RRI is not used “to transmit information about a current data transmission rate” because Figure 2 “shows that the base station has a ‘transmission channel determination unit (24) for deciding information on the increase and decrease of transmission data rate received from a mobile station,” and that “[t]he base station receives ‘information on the increase and decrease of transmission data rate’ from the mobile station.” PO Resp. 36–37.

Figure 2 is discussed in paragraphs 30 and 31 of the '6839 application, which state as follows:

<30> Fig. 2 is a configuration diagram of an embodiment for **transmitting information on the increase and decrease of transmission data to each mobile station in a base station** of the mobile communication system according to the present invention.

<31> As illustrated in Fig. 2, the reverse link packet transmission apparatus using forward link feedback information in a mobile communication system of the present invention is composed of a reception processing unit (21) for demodulating **a signal received from a mobile station (terminal) (30) at the base station (20)**, an interference level estimation

(measurement) unit (22) for estimating an interference level for a signal delivered from the reception processing unit (21), *a comparison unit (23) for estimating the load of a reverse link by comparing the estimated value estimated by the interference level estimation unit (22) with a predetermined threshold value, information on the increase and decrease of transmission data rate and a transmission channel determination unit (24) for deciding information on the increase and decrease of transmission data rate received from a mobile station according to the result of the comparison to determine the location of each mobile station according to the RAB location in a channel slot*, and a transmission processing unit (25) for modulating a transmission signal containing said information on the increase and decrease of transmission data rate and information on the increase and decrease of transmission data rate output from the transmission channel determination unit to transmit it to a mobile station (30).

Ex. 1011 ¶¶ 30–31 (emphasis added). As is apparent from paragraphs 30 and 31 above, the '6839 application discloses that transmission channel determination unit 24 within the base station determines the increase or decrease of the mobile station's data rate based on an estimation of the load of the mobile station's reverse link and the location of the mobile station. *Id.* There is no disclosure in paragraphs 30 or 31 of the base station receiving from the mobile station a bit indicating whether the mobile station has sufficient power and data to increase its data transmission rate.

Third, Patent Owner points to Figure 5 of the '6839 application, which is reproduced below.

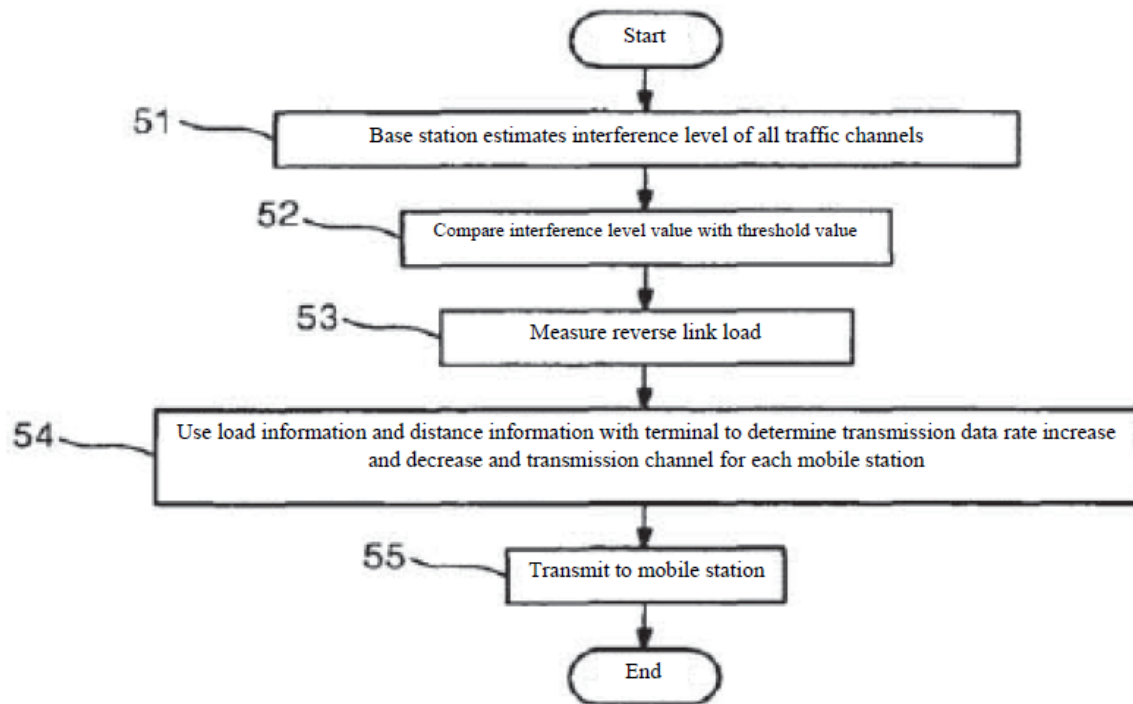


Figure 5 of the '6839 application is a flow chart showing steps by the base station for determining a data rate increase and decrease of the mobile station's reverse link transmission rate, and transmitting that information to the mobile station. Ex. 1009, Fig. 2, ¶ 42.

Patent Owner argues that Figure 5 “shows the base station receiving information from the mobile station about load information and distance information.” PO Resp. 37. As is the case with Figures 2 and 3, however, Figure 5 does not disclose the base station receiving from the mobile station a bit indicating whether the mobile station has sufficient power and data to increase its data transmission rate. Patent Owner also relies on the Cooklev declaration for its arguments concerning Figures 2 and 5, but Dr. Cooklev does not explain how Figures 2 and 5 show the base station receiving from the mobile station a bit indicating whether the mobile station has sufficient power and data to increase its data transmission rate. Ex. 2012 ¶¶ 75–78.

Thus, we find that Figures 2, 3, and 5, and the accompanying disclosure in the '6839 application, do not support the requirement in claims

34 and 37 for a bit sent by the mobile station on a reverse packet data control channel to indicate whether the mobile station has enough power and data to increase its data transmission rate.

We also are not persuaded by Patent Owner's argument that "[b]ecause *Korean App. No. 6839* discloses transmission data rates for mobile stations on the reverse link, and discloses that the mobile station 'transmits' within this range prior to any mention of RRI, it follows that the RRI in *Korean App. No. 6839* is being used to provide information to the base station for the mobile station's *next* data transmission rate." PO Resp. 35. Even if Patent Owner were correct that the RRI provides information used by the base station to determine the mobile station's data rate for the next transmission on the reverse link, that alone would not disclose that the RRI includes a bit indicating whether the mobile station has sufficient power and data to increase its data transmission rate, as required by claims 34 and 37.

Additionally, we disagree with Patent Owner's apparent argument that Petitioner is improperly interpreting the claims to require an "MS_IAB." PO Sur-reply 11, 21–22. We do not understand Petitioner to be arguing that the claims specifically require something called an "MS_IAB," as that term is used in the specification of the '653 patent. Rather, we understand Petitioner to be arguing that the claim language requiring that "a bit is sent on a reverse packet data control channel to indicate whether the mobile station has enough power and data to increase its data transmission rate on a reverse packet data channel" should be given its ordinary meaning, and that the '6839 does not disclose that claim language as it would have been understood by persons of ordinary skill. Pet. 36–39 (asserting that claim

terms other than the “receiving means . . .” and “control means . . .” terms “should be accorded their plain and ordinary meaning, as understood by a [person of ordinary skill in the art] and consistent with the ’653 specification and file history”); Pet. Reply 4–5 (arguing that the ’6839 application fails to disclose “a ‘bit’ indicating ‘whether the mobile station has enough power and data to increase its data transmission rate on a reverse packet data channel’”). We understand Petitioner’s references to the MS_IAB in the ’653 patent to be an illustration of how the ’653 patent discloses the claimed bit “indicat[ing] whether the mobile station has enough power and data to increase its data transmission rate on a reverse packet data channel,” a disclosure that is absent in the ’6839 application. Pet. 8–9; Pet. Reply 2, 6–11. And, as discussed above, we are persuaded by Petitioner’s arguments that the ’6839 application fails to describe any value (whether MS_IAB or otherwise) that supports the claimed bit.

Furthermore, we do not agree with Patent Owner’s argument that Petitioner improperly asserted for the first time in its Reply that the RRI in the ’6839 application does not disclose the claimed bit “indicat[ing] whether the mobile station has enough power and data to increase its data transmission rate on a reverse packet data channel.” PO Sur-reply 6, 18–21. Petitioner argued in the Petition that the ’6839 application did not disclose the claimed bit indicating whether the mobile station has enough power and data to increase its transmission rate. Pet. 8–9. Although the Petition did not include arguments attempting to refute the notion that the RRI disclosed the claimed bit, we do not think that it was readily predictable that Patent Owner would rely on the RRI for this claim element. Once Patent Owner raised this argument in its Preliminary Response (and later in its Patent

Owner Response), Petitioner responded to it, first in its Reply to the Preliminary Response, and later in its Reply to the Patent Owner Response. Paper 17, 1–4, 6; Pet. Reply 5–19. We also discussed Patent Owner’s argument based on the RRI in our Institution Decision. Inst. Dec. 18–20. Therefore, Patent Owner had an adequate opportunity to address Petitioner’s arguments that the RRI in the ’6839 application did not disclose the claimed bit indicating that the mobile station has enough power and data to increase its transmission rate, and Petitioner’s arguments on this point in its Reply were not improper.

Finally, we find that Patent Owner has waived any argument that the RRI in the ’6839 application should be understood to meet the claim language because slide 8 of Samsung references RRI “for both examples of so-called ‘IAB setting’” and Samsung’s “‘adding a dedicated bit’ relies on using RRI.” PO Sur-reply 13–14 (citing Ex. 1003, 8). Patent Owner raised this argument in its Preliminary Response (Prelim. Resp. 17–18), but failed to raise it in its Patent Owner Response. In our Scheduling Order, we specifically cautioned Patent Owner that “any arguments not raised in the response [to the Petition] may be deemed waived.” Paper 24, 9. Additionally our Trial Practice Guide provides that “[o]nce a trial is instituted, the Board may decline to consider arguments set forth in a preliminary response unless they are raised in the patent owner response.” *Consolidated Trial Practice Guide* 52 (Nov. 2019). *See In re Nuvasive, Inc.*, 842 F.3d 1376, 1381 (Fed. Cir. 2016) (explaining that a patent owner waives

an issue presented in its preliminary response if it fails to renew the issue in its response after trial is instituted).⁶

Consequently, based on the full trial record, we find that Petitioner has proven by a preponderance of the evidence that the invention claimed in the '653 patent is not supported by the disclosures in the Korean '6839 application. Thus, we determine that the earliest *potential* priority date for the challenged claims is the July 10, 2001, date of the '1363 application. However, we need not decide whether the '1363 application actually provides support for the challenged claims, because the lack of support in the '6839 application is sufficient for us to decide the Samsung and Airvana references are prior art to the '653 patent.

E. Grounds 1 and 2: Obviousness of Claims 34–40 Based on Samsung and C.S0002-0 or Samsung, Airvana, and C.S0002-0

Petitioner contends that claims 34–40 are obvious over Samsung and C.S0002-0 or Samsung, Airvana, and C.S0002-0. Pet. 13, 39–58.

1. Overview of Samsung (Ex. 1003)

Relying on the testimony of Dr. Yaqub and Mr. Proctor, Petitioner asserts that Samsung “is a contribution made available at or before the end of a 3GPP2 meeting in Palm Springs, California, which was held in May 2001.” Pet. 9–10 (citing Ex. 1002 ¶¶ 149–156; Ex. 1010 ¶¶ 53–64).

⁶ Moreover, even if we did not consider this issue waived, we do not agree that slide 8 of Samsung necessarily means that the RRI disclosed in the '6839 application “indicate[s] whether the mobile station has enough power and data to increase the data transmission rate.” See Prelim. Resp. 17–18; PO Sur-reply 13. Samsung is dated after the first Korean application, and we find insufficient information in the record to conclude by a preponderance of the evidence that the RRI described in Samsung’s slide 8 is the same RRI as that disclosed in the first Korean application.

Accordingly, Petitioner asserts, Samsung “published in or before May 2001, and is prior art under at least pre-AIA 35 U.S.C. § 102(a).” *Id.* at 9.

Petitioner’s assertions are supported by Mr. Yaqub’s testimony that Samsung “was available on the 3GPP2 FTP site on or before May 11, 2001,” and “an interested [person of ordinary skill in the art] using reasonable diligence could have located Samsung on the 3GPP2 FTP site, downloaded the reference without providing any credentials, and disseminated the reference to others.” Ex. 1012 ¶ 64.

As discussed above, we find that the ’653 patent is not supported by the ’6839 application and thus is not entitled to an effective filing date earlier than the July 10, 2001 date of the ’1363 application. *See* § II.D, *supra*. Patent Owner does not argue that Samsung was not made publicly available before July 10, 2001. *See* PO Resp. Based on the full trial record, including the declarations of Dr. Yaqub and Mr. Proctor, we find that Petitioner has made a sufficient showing that Samsung was made available to interested persons of skill in the art before July 10, 2001, and therefore is prior art to the ’653 patent. *See* Ex. 1002 ¶¶ 145–147, 149–156, 164–165; Ex. 1010 ¶¶ 53–64, 74, 78).

Samsung “proposes the IAB [Increase Availability Bit] concept for the effective data rate control of the 1xEV-DV reverse link.” Ex. 1003, 1. The IAB is a “1 bit indicator” that can be set to “0” to enable an increase in data rate and to “1” to disable an increase in the data rate. *Id.* at 5–6. The mobile may send an IAB set to “1” (no increase requested) if any of the following are met: (1) the “[c]urrent data rate is the same as [the] data rate limited by [the] RRL message”; (2) the “[d]ata rate is limited due to [the] MS’s transmission power”; (3) “[t]he MS has a small amount of data to be

sent in [the] Tx buffer” (“[l]ess than the threshold of [the] Tx Buffer”); or (4) “[a]t least one RAB is set to ‘Down’ when the MS is being controlled by two or more base stations.” *Id.* On the other hand, the “MS may (will) set an IAB to ‘0’ when the MS wants to increase its data rate due to buffer overflow.” *Id.* at 6.

Samsung also summarizes existing control schemes for the reverse link. Ex. 1003, 3–4. For example, Samsung describes the 1xEV-DO scheme as a “[c]ommon control scheme,” using a “1 bit RAB[](Up and Down Reverse Activity Bit) through [a] Forward common control channel.” *Id.* at 3. Samsung further describes “Dedicated Control schemes” where “[d]esignated information from the BS is sent to each MS in the cell,” providing “dynamic and efficient reverse link data rate control.” *Id.* at 4. Additionally, Samsung states that “LGE and Airvana’s proposals for 1xEV-DV” uses “2 bits RAB[](Up, Down and Keep) through [a] Forward dedicated control channel.” *Id.*

2. Overview of Airvana (Ex. 1004)

Relying on the testimony of Dr. Yaqub and Mr. Proctor, Petitioner asserts that Airvana “is a contribution made available at or before the end of a 3GPP2 meeting in Phoenix, Arizona, which was held in February 2001—*i.e.*, approximately three months before the meeting where Samsung was presented.” Pet. 10 (citing Ex. 1002 ¶¶ 157–160; Ex. 1010 ¶¶ 65–74). Accordingly, Petitioner asserts, Airvana “published in or before February 2001, and is prior art under at least pre-AIA 35 U.S.C. § 102(a).” *Id.* at 10. Petitioner’s argument is supported by Dr. Yaqub’s testimony that Airvana “was available on the 3GPP2 FTP site in February of 2001 on or before the date of the last date of the relevant 3GPP2 TSG-C WG5 meeting in Phoenix,

Arizona,” and “by February 16, 2001, an interested [person of ordinary skill in the art] using reasonable diligence could have located Samsung on the 3GPP2 FTP site, downloaded the reference without providing any credentials, and disseminated the reference to others.” Ex. 1012 ¶ 74.

As discussed above, we find that the ’653 patent is not supported by the ’6839 application and thus is not entitled to an effective filing date earlier than the July 10, 2001 date of the ’1363 application. *See* § II.D, *supra*. Patent Owner does not argue that Airvana was not made publicly available before July 10, 2001. *See* PO Resp. Based on the full trial record, including the declarations of Dr. Yaqub and Mr. Proctor, we find that Petitioner has made a sufficient showing that Airvana was made available to interested persons of skill in the art before July 10, 2001, and therefore is prior art. *See* Ex. 1002 ¶¶ 145–147, 153–155, 157–160, 164–165; Ex. 1010 ¶¶ 64–74, 78).

Airvana describes a Forward Rate Control Channel (F-RCCH) for each active mobile station sharing a packet data channel that can be implementing by using a 2-bit indicator to indicate whether the data rate should be increased (“rate up”), decreased (“rate down”), or maintained (“no change”). Ex. 1004, 5–6. Specifically, Airvana includes the following disclosure:

In this contribution, we propose a per-user Forward Rate Control CHannel (F-RCCH) for each active MS sharing a packet data channel. This channel can be used to control each MS’s reverse link rate as a function of its reverse link channel condition

The F-RCCH can be implemented in different ways. Since rapid rate changes are not necessary ~~desirable~~ it may be sufficient to use a 2-bit indicator to send “rate up”/“rate down”/“no change” information once every L frames of 20 ms.

The value of L can be ~~determined by the~~ configurable access network.

Id. at 6 (underlining and strikethrough in original). Airvana further explains that “[t]o effectively support such variable-rate reverse link operation, a per-user rate control mechanism needs to be included 1xEV-DV.” *Id.* at 2.

3. Overview of C.S0002-0 (Ex. 1006)

Petitioner asserts that C.S0002-0 is the Physical Layer Specification for the cdma2000 system, which 1xEV-DV and 1xEV-DO are built upon. Pet. 33. According to Petitioner, C.S0002-0 was published on or before October 1999, and is prior art under at least pre-AIA 35 U.S.C. §§ 102(a) and 102(b). Pet. 11. Petitioner’s argument is supported by Dr. Yaqub’s testimony that C.S0002 “was available on the 3GPP2 FTP site in or before October 1999,” and “by October 31, 1999, an interested [person of ordinary skill in the art] using reasonable diligence could have located C.S0002 on the 3GPP2 FTP site, downloaded the reference without providing any credentials, and disseminated the reference to others.” Ex. 1012 ¶ 79.

As discussed above, we find that the ’653 patent is not supported by the ’6839 application and thus is not entitled to an effective filing date earlier than the July 10, 2001 date of the ’1363 application. *See* § II.D, *supra*. Patent Owner does not argue that C.S0002-0 was not made publicly available before July 10, 2001. *See* PO Resp. Based on the full trial record, including the declarations of Dr. Yaqub and Mr. Proctor, we find that Petitioner has made a sufficient showing that C.S0002-0 was made available to interested persons of skill in the art before July 10, 2001, and therefore is prior art. *See* Ex. 1002 ¶¶ 145–147, 153–155, 164–165; Ex. 1010 ¶¶ 64, 74, 78).

C.S0002-0 discloses, among other things, a method of “single point mapping” a symbol (set to either 0 or 1) and its presence or lack thereof to a three-value signal where a value of 0 maps to +1, a value of 1 maps to -1, and no value (the symbol not being present) maps to a value of 0. Ex. 1006, 226. C.S0002-0 also discloses the use of a power control bit to control the power levels of a mobile station. *Id.* at 80.

4. Motivation to Combine Samsung and Airvana

Petitioner argues that one of ordinary skill would have been motivated to combine Samsung and Airvana because “Samsung incorporates Airvana by reference.” Pet. 39. “Specifically,” Petitioner asserts, “Samsung expressly references the disclosures of Airvana and then, importantly, makes a proposal that builds upon and improves Airvana’s ideas.” *Id.*

Petitioner also argues that, even if Samsung and Airvana are “treated as entirely separate references,” one of ordinary skill would have been motivated to combine them because “Samsung specifically references and discusses the content of ‘Airvana’s proposal[] for 1xEV-DV’ in the context of reverse link rate control.” Pet. 40. “Moreover,” Petitioner contends, “Samsung was a contribution to the same 3GPP2 TSG working group (3GPP2 TSG-C WG5) as Airvana, so Samsung’s reference to ‘Airvana’s proposal[]’ for a dedicated control scheme for reverse link data rates could not be misunderstood.” *Id.* (citing Ex. 1004, 4; Ex. 1002 ¶¶ 161–163). Petitioner further argues that Samsung “states that its proposal for an increase availability bit (‘IAB’) from the mobile station ‘can be applicable for both common and dedicated control scheme[s] for reverse link data rate,’ and that “Airvana proposes such a control scheme.” *Id.* (citing Ex. 1003, 5).

Patent Owner does not argue a lack of motivation to combine Samsung and Airvana. *See* PO Resp.

Based on the full trial record, including the testimony of Mr. Proctor, Petitioner has proven by a preponderance of the evidence that one of ordinary skill would have been motivated to combine Samsung and Airvana based on Samsung's incorporation by reference of Airvana's proposal, the fact that Samsung was a contribution to the same 3GPP2 TSG working group as Airvana, and Samsung's statement that its proposal for an IAB can be applicable to a control scheme such as that proposed by Airvana. *See* Ex. 1002 ¶¶ 161–163; Ex. 1004, 4.

5. *Motivation to Combine Samsung with C.S0002-0, and Samsung and Airvana with C.S0002-0*

Petitioner argues that it would have been obvious to combine Samsung and/or Airvana with “C.S0002-0's disclosure of signal point mapping a single bit (and its presence) to a ternary (three-value) signal.” Pet. 41. According to Petitioner, one of ordinary skill would have been motivated to combine these references “because all three references relate to 3GPP2 standards,” and “C.S0002-0 is part of the very cdma2000 standard that Samsung and Airvana were improving upon.” *Id.* (citing Ex. 1002 ¶¶ 173–174; Ex. 1003, 1; Ex. 1004, 1; Ex. 1005, title page, xxxiii–xxxiv). In particular, Petitioner asserts, one of ordinary skill would have known to look to C.S0002-0 for the protocols for allowing a base station to signal control data to mobile stations. *Id.* at 42 (citing Ex. 1006, xxxiii; Ex. 1002 ¶ 175).

Petitioner further argues that one of ordinary skill “would have been aware of the advantages of mapping the presence and value of a single bit to three different values, as taught in C.S0002-0, to increase the efficiency of messages and save bits by not using two bits for signaling three possible

values.” Pet. 42 (citing Ex. 1002 ¶ 176; Ex. 1003, 5, 15; Ex. 1004, 2). The signal point mapping technique in C.S0002-0, according to Petitioner, “was a known, proven and reliable means for signaling similar control information (for power control) with three possible states.” *Id.* Additionally, Petitioner argues, one of ordinary skill “would have had a reasonable expectation of success in implementing the signal point mapping in C.S0002-0 in Samsung’s system (which uses the IAB and controls mobile stations in a dedicated manner) because signal point mapping had known effects.” *Id.* at 43 (citing Ex. 1006, 3–8; Ex. 1002 ¶ 179). Moreover, according to Petitioner, “the ’653 patent even admits that signal point mapping is a ‘conventional’ technique that was particularly used for ‘sending transmission data rate increase information from a base station to a mobile,’ and identifies signal point mapper 11 as ‘prior art.’” *Id.* (citing Ex. 1001, 4:13–27, Fig. 1; Ex. 1002 ¶¶ 173–180).

Patent Owner argues that “Petitioner[] fail[s] to articulate sufficient reasoning and instead rely on a conclusory opinion regarding C.S0002-0.” PO Resp. 47 (citing Ex. 2012 ¶ 81); *see* PO Sur-reply 22–23. “For example,” Patent Owner asserts, “the C.S0002-0 figure from 1999 that Petitioner[] rel[ies] on is based primarily on applicant admitted prior art for signal point mapping and fails to address how the so-called ‘power control messages’ of C.S0002-0 would have been obvious to combine with Samsung or Airvana.” PO Resp. 47; *see* PO Sur-reply 22–23. “Instead,” according to Patent Owner, “Petitioner[] rel[ies] on a conclusory statement that ‘[i]t thus would have been obvious to a [person of ordinary skill in the art] to use signal point mapping,’ simply because a single bit could be

mapped to three different symbols.” PO Resp. 47 (citing Ex. 2012); *see* PO Sur-reply 22–23.

Petitioner responds that its Petition provided seven pages of analysis about the issue, which was “neither conclusory nor insufficient.” Pet. Reply 20. Petitioner also asserts that “Figure 4 of the ’6839 application, which Patent Owner alleges provides support for elements 34[b] and 37[b] is ***almost identical*** to a figure from C.S000-0 that is expressly cited by Petitioner.” *Id.* (citing Ex. 1011, Fig. 4; Ex. 1006, 3-8 (Fig. 3.1.3.1.1.1-4)). According to Petitioner, “[i]t also would have been obvious for one of skill in the art to map the increase, decrease, and maintain values for the rate control command disclosed in Samsung and/or Airvana . . . to a single bit in view of ternary signal point mapping, including as disclosed in C.S0002-0.” *Id.* (citing Pet. 41–43, 47–49, 59–60, 62–63). Finally, Petitioner argues that Patent Owner relies on paragraphs 81 and 82 of Dr. Cooklev’s declaration for support, but Dr. Cooklev admitted at his deposition that his opinions in those paragraphs were only about the disclosure of C.S0002-0, not the combination relied on by Petitioner. *Id.* at 20–21 (citing Ex. 1020, 79:7–80:9).

We find that Petitioner has proven by a preponderance of the evidence that one of ordinary skill would have found it obvious to combine Samsung and/or Airvana with C.S0002-0’s disclosure of signal point mapping a single bit (and its presence) to a ternary (three-value) signal. Our conclusion is supported by the testimony of Mr. Proctor, which we find credible, that Samsung, Airvana, and C.S0002-0 all “relate to actual or developing 3GPP2 standards that implement CDMA technology” and that, “[w]hen looking to ways to improve aspects of cellular technology that is under development, a

[person of ordinary skill in the art] would have naturally looked to techniques in previous, especially previous related, cellular standards.”

Ex. 1002 ¶ 174. “For example,” Mr. Proctor states, one of ordinary skill would have been “looking for ways to minimize the number of bits required to transmit a particular command in a reverse link rate control system, such as in Samsung or Samsung combined with Airvana,” and would have “naturally look[ed] to previous standards for techniques, such as signal point mapping, to minimize the required overhead, and particularly within the same ‘family’ of standards within the very same organization.” *Id.* ¶ 175. According to Mr. Proctor, one of ordinary skill “would have found it particularly obvious to combine C.S0002-0 with Samsung or with Samsung combined with Airvana because [they] would have known that C.S0002-0 deals with other protocols for signaling control data over the air interface, just as was being considered for data rate messages, e.g., RABs, in Samsung and/or Samsung combined with Airvana.” *Id.* (citing Ex. 1006, xxxiii, 1-2, 2-20, 3-8, 3-21; Ex. 1003, 1-7; Ex. 1004, 1-6).

Our conclusion is also supported by Mr. Proctor’s testimony that one of ordinary skill would “have been aware of the potential advantages of transmitting a single bit, including the absence of that bit, to provide three different potential values using signal point mapping, as discussed in C.S0002-0, because this allowed for more efficiently signaling [of] three possible values (for example +1, -1, 0) using a single bit and its presence.” Ex. 1002 ¶ 176 (citing Ex. 1006, 3-8, 3-21). Mr. Proctor also testifies that one of ordinary skill would have understood that this technique “would have accomplished goals described in Samsung and Airvana, namely reducing overhead,” which would have been “important for a base station to

individually control the numerous mobile stations, so that many mobile stations can be controlled within a short period of time.” *Id.* (citing Ex. 1003, 4, 5; Ex. 1004, 5–6). “For example,” Mr. Proctor explains, “by sending (or not sending) one bit instead of two bits (which are typically used for indicating up to three or four states) to indicate the three states, a base station is able to control twice as many mobile stations in the same period of time.” *Id.* According to Mr. Proctor, one of ordinary skill would have been motivated to use this technique with Samsung’s IAB, which “is a single bit,” because it “was a known and proven/reliable means for signaling similar control information that indicates three states over an interface.” *Id.* ¶ 177 (citing Ex. 1003, 1-7; Ex. 1006, 3-8, 3-113–3-115).

Mr. Proctor further testifies that one of ordinary skill “would have had a reasonable expectation of success in combining the ternary signal point mapping, like that disclosed by C.S0002-0, with Samsung’s system or the system described by the combination of Samsung and Airvana.” Ex. 1002 ¶ 178. Indeed, according to Mr. Proctor, “the ’653 patent describes signal point mapping as ‘conventional’ and at least some signal point mapping as in the prior art.” *Id.* (citing Ex. 1001, 4:13–27). Thus, Mr. Proctor explains, “the combination provides a predictable result, specifically, the base station using C.S0002-0’s signal point mapping to generate a data rate control command based on the IAB sent by the mobile station in Samsung and/or the combination of Samsung and Airvana.” *Id.* ¶ 179.

We agree with and find credible Dr. Proctor’s testimony as discussed above because it is based on sound reasoning and is consistent with the disclosures of Samsung, Airvana, C.S0002-0 and the ’653 patent. We disagree with Patent Owner that Dr. Proctor’s testimony is merely a

“conclusory opinion,” and find that Dr. Proctor sufficiently explains his reasons for concluding that one of ordinary skill would have been motivated to use C.S0002’s signal point mapping technique with Samsung’s IAB. Additionally, although Patent Owner cites to paragraphs 80–82 of Dr. Cooklev’s declarations, those paragraphs are cursory and merely assert that there has been a failure of proof by Petitioner:

80. Claim limitation 34[b] provides for the base station’s “[] data rate control command being formed of at least one rate control bit that is signal point mapped to at least one symbol of +1, -1, and 0 to indicate whether the mobile station should increase, decrease, or maintain its current data transmission rate[.]” Ex. 1001, 20:10–15; Ex. 2012 at ¶ 80.)

81. Here, Petitioners fail to articulate sufficient reasoning and instead rely on a conclusory opinion regarding C.S0002–0.

82. Instead, Petitioners rely on a conclusory statement that “[i]t thus would have been obvious to a POSITA to use signal point mapping,” simply because a single bit could be mapped to three different symbols.

Ex. 2012 ¶¶ 80–82. We find that these cursory statements are insufficient to rebut the detailed testimony provided by Mr. Proctor.

Consequently, we find that Petitioner has proven by a preponderance of the evidence that one of ordinary skill would have found it obvious to combine C.S0002-0’s signal point mapping technique with Samsung’s (or Samsung/Airvana’s) signaling by the base station to indicate whether the mobile station should increase, decrease, or maintain its current data transmission data rate.

6. *Analysis of Independent Claim 34*

- a) 34[pre]: “[a] mobile station apparatus for use in a mobile communications system for controlling a data transmission rate on a reverse link, the apparatus comprising:”

Petitioner asserts that, to the extent the preamble of claim 34 is limiting, Samsung discloses the preamble. Pet. 44. Petitioner argues that “Samsung’s discloses a mobile station (‘MS’) connected to and in communication with a base station (‘BS’) in a mobile communication system—specifically, a 1xEV-DV system.” *Id.* (citing Ex. 1003, 1, 4, 7). According to Petitioner, “Samsung further discloses that the mobile station controls the data transmission rate on the reverse link (from the mobile station to the base station) using a dedicated control scheme,” by referencing and discussing “Airvana[’s] proposal for a dedicated control scheme for the reverse link rate (one where the reverse link data rate is controlled for each mobile in a cell individually),” in which “the base station sends ‘2 bits RAB (Up, Down and Keep) through the Forward dedicated control channel’ to each mobile station in order to signal to the mobile station whether to increase, decrease or maintain its data transmission rate.” *Id.* (citing Ex. 1003, 4; Ex. 1002 ¶¶ 181–185, 223, 257).

Patent Owner does not present argument directed to the preamble. PO Resp. 46–47.

Based on the full trial record, we find that Samsung discloses a mobile station communicating with a base station in a 1xEV-DV system, and that the mobile station controls the data transmission rate on the reverse link

using a dedicated control scheme. Ex. 1003, 1, 4, 7; Ex. 1002 ¶¶ 181–185, 223, 257. Thus, we find that Samsung discloses the preamble of claim 34.⁷

b) 34(a): “receiving means adapted to receive a data rate control command of a base station on a forward link common channel in a dedicated manner;”

Petitioner argues that Samsung, either alone or in combination with Airvana, teaches this limitation. Pet. 45. Specifically, Petitioner asserts that “Samsung references Airvana, which Samsung describes as teaching that the mobile station receives a 2-bit RAB command from a base station that contains ‘designated information for each mobile.’” *Id.* (citing Ex. 1003, 4; Ex. 1002 ¶¶ 186–187). “This RAB,” according to Petitioner, “is part of a dedicated control scheme transmitted over a forward control channel that transmits a 2*N RAB bits per cell (one ‘2 bit RAB’ message for each active mobile station in the cell).” *Id.*

Additionally, Petitioner argues that, to the extent Samsung does not expressly teach this limitation through its incorporation and summary of Airvana’s proposals, Airvana itself teaches it. Pet. 45. Specifically, according to Petitioner, “Airvana proposes ‘**a per-user Forward Rate Control Channel (F-RCCH)** for each active MS sharing a packet data channel’ used by the base station to send messages to control the data rate at which each mobile station may transmit on the reverse link, noting that ‘it may be sufficient to use a **2-bit indicator to send “rate up”/“rate down”/“no change” information** once every L frames of 20 ms.’” *Id.* at 45–46 (citing Ex. 1004, 6 (emphasis added); Ex. 1002 ¶ 188).

⁷ Because we are persuaded that Samsung discloses the subject matter recited in the preamble, we need not decide whether the preamble is limiting.

Petitioner further argues that the combination of Samsung and/or Airvana and C.S0002-0, would have rendered the “receiving means” of claim 34 obvious. Pet. 46. According to Petitioner, one of ordinary skill “would have understood a mobile station to include an antenna, reception processor, and demodulator used to receive signals from a base station on a forward link channel in a dedicated manner and to extract data from such signals.” *Id.* (citing Ex. 1002 ¶¶ 189–190). “Such components of cellular handsets,” Petitioner asserts, “were known and standard in the art to an extent well beyond how those components are disclosed in the ’653 patent.” *Id.* (citing Ex. 1002 ¶¶ 189–190; Ex. 1001, Fig. 2, 5:50–57, 6:15–22). “For example,” Petitioner contends, “C.S0002-0, which defines the physical layer requirements for mobile stations in cdma2000 systems, makes clear that the mobile station includes a receiving means with an antenna, reception processor, and demodulator.” *Id.* at 46–47 (citing Ex. 1006, 2-151–2-152, 2-153; Ex. 1002 ¶¶ 189–191). “Similarly,” according to Petitioner, “Samsung and Airvana both are predicated on the mobile station receiving and decoding (*e.g.*, processing and demodulating) data transmission rate control signals.” *Id.* at 47 (citing Ex. 1003, 4–7; Ex. 1004, 5–6; Ex. 1002 ¶¶ 186–191, 224).

Patent Owner does not present argument directed to limitation 34(a). PO Resp. 46–47.

Based on the full trial record, we find that the prior art teaches this limitation. We agree with Petitioner that Samsung alone and Samsung in combination with Airvana teach that the mobile station receives a 2-bit RAB command from a base station that contains “designated information for each mobile,” which is a “data rate control command.” Pet. 45; Ex. 1003, 4;

Ex. 1002 ¶¶ 186–187). We also agree with Petitioner that the combination of Samsung and/or Airvana and C.S0002-0, would have rendered the “receiving means” of claim 34 obvious because one of ordinary skill would have understood from those reference that a mobile station would include an antenna, reception processor, and demodulator to receive signals from a base station on a forward link and to extract data from such signals. Pet. 46–47; Ex. 1002 ¶¶ 186–191, 224; Ex. 1001, Fig. 2, 5:50–57, 6:15–22; Ex. 1006, 2-151–2-152, 2-153; Ex. 1002 ¶¶ 189–191; Ex. 1003, 4–7; Ex. 1004, 5–6; Ex. 1002 ¶¶ 186–191, 224.

- c) 34(b): *“the data rate control command being formed of at least one rate control bit that is signal point mapped to at least one symbol of +1, -1, and 0 to indicate whether the mobile station should increase, decrease, or maintain its current data transmission rate;”*

Petitioner argues that Samsung (or Samsung/Airvana) and C.S0002-9 teach this limitation. Pet. 47. According to Petitioner, “Airvana and Samsung both teach signaling three different values for the rate control command (increase/rate up, decrease/rate down, or maintain/not change the current rate) using a 2-bit message.” *Id.* (citing Ex. 1003, 4–5; Ex. 1004, 5–6; Ex. 1002 ¶¶ 192–194). Petitioner asserts that it was well known that a 2-bit message could be used to convey four different commands, but it was also known in the art, as taught in C.S0002-0, that transmitting a single bit (or its absence) “could be mapped to three different symbols (*e.g.*, values) by assigning a value to whether the bit is present or not.” *Id.* at 47–48 (citing Ex. 1002 ¶¶ 194–195; Ex. 1006, 3-8, 3-21, 3-113–3-115). Thus, according to Petitioner, it would have been obvious “to use signal point mapping, as taught in C.S0002-0, to indicate the three possible states of Samsung/Airvana’s 2-bit rate control command.” *Id.* at 48. Petitioner

argues that “the ’653 patent’s specification does not focus on signal point mapping or suggest that LGE believed itself to have invented this concept” but, to the contrary, “admits that ‘signal point mappers’ that map a bit from 0 or 1 to +1 or -1 were conventional.” *Id.* (citing Ex. 1001, Fig. 1, 4:22–27; Ex. 1002 ¶¶ 196–197).

“Moreover,” Petitioner contends, “C.S0002-0 taught mapping control messages, such as power control messages each having a binary value, to three potential values of +1, -1, and 0, with the bit: not present meaning a value of 0; being present and set to 1 meaning a value of -1; and being present and set to 0 to mean a value of +1.” Pet. 48–49 (citing Ex. 1006, 3-8, 3-21). To show this disclosure, Petitioner relies on an annotated version of C.S0002-0’s Figure 3.1.3.1.1-4, reproduced below:

3GPP2 C.S0002-0 v1.0

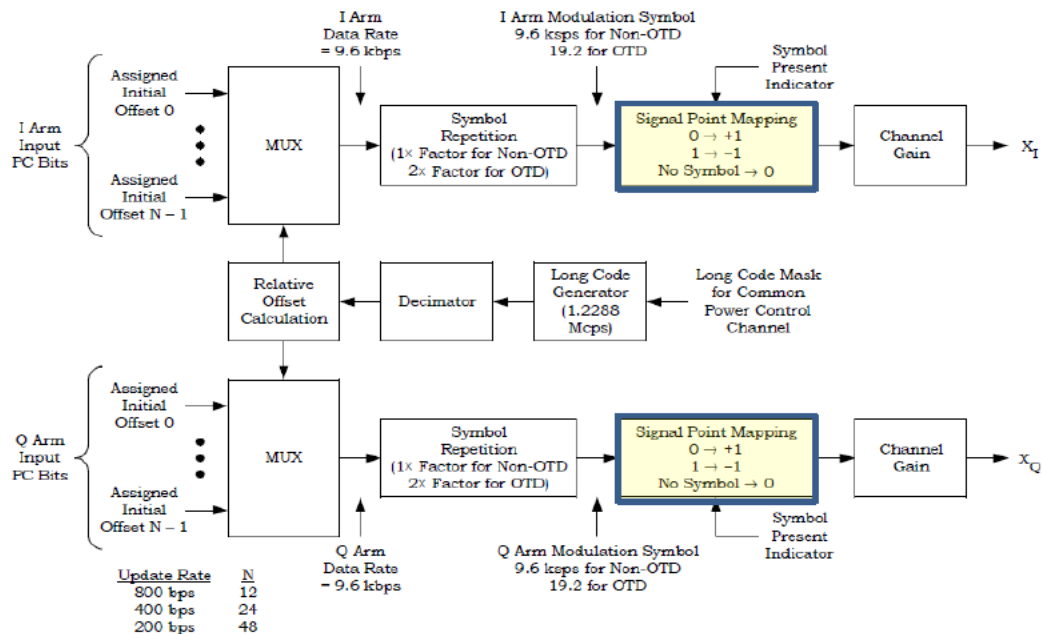


Figure 3.1.3.1.1-4. Common Power Control Channel Structure for Spreading Rate 1

Petitioner’s annotated Figure 3.1.3.1.1-4 of C.S0002-0 shows a “common power control channel structure” with the signal point mapping function

highlighted, in which that function maps a “0” to +1, a “1” to -1, and “No Symbol” to 0. Pet. 49 (citing Ex. 1006, 3-8).

Based on these disclosures, Petitioner asserts, one of ordinary skill “would have been motivated to use ternary signal mapping, such as that described in C.S0002-0, because it enables reliable and efficient communications.” *Id.* (citing Ex. 1002 ¶¶ 192–198, 225). Specifically, according to Petitioner, C.S0002-0’s ternary signal mapping “allows the system to save sending at least 1 bit per frame because the desired three values could be signaled using a single bit rather than two (Ex. 1002, ¶ 198) and provides desired granularity in rate control (allowing for a no-change command) while still minimizing the number of bits used.” *Id.*

As discussed in Section II.E.5 above, Patent Owner argues that, for limitation 34(b), “Petitioner[] fail[s] to articulate sufficient reasoning and instead rel[ies] on a conclusory opinion regarding C.S0002-0.” PO Resp. 47 (citing Ex. 2012 ¶ 81); *see* PO Sur-reply 22–23. “For example,” Patent Owner asserts, “the C.S0002-0 figure from 1999 that Petitioner[] rel[ies] on is based primarily on applicant admitted prior art for signal point mapping and fails to address how the so-called ‘power control messages’ of C.S0002-0 would have been obvious to combine with Samsung or Airvana.” PO Resp. 47; *see* PO Sur-reply 22–23. “Instead,” according to Patent Owner, “Petitioner[] rel[ies] on a conclusory statement that ‘[i]t thus would have been obvious to a [person of ordinary skill in the art] to use signal point mapping,’ simply because a single bit could be mapped to three different symbols.” PO Resp. 47 (citing Ex. 2012); *see* PO Sur-reply 22–23.

We agree with Petitioner that C.S0002-0 teaches mapping control messages, such as power control messages having potential values of +1, -1,

and 0, with the bit not being present meaning a value of 0, the bit being present and set to 1 meaning a value of -1, and the bit being present and set to 0 meaning a value of +1. Pet. 48–49; Ex. 1006, 3-8, 3-21. We also agree that this information is disclosed by Figure 3.1.3.1.1.1-4 of CS.S0002-0. Pet. 49; Ex. 1006, 3-8.

Additionally, as discussed in Section II.E.5 above, we find that Petitioner has proven by a preponderance of the evidence that it would have been obvious to use C.S0002-0's signal point mapping technique with Samsung's (or Samsung/Airvana's) messages with Samsung's signaling by the base station to indicate whether the mobile station should increase, decrease, or maintain its current data transmission data rate. We disagree with Patent Owner's contentions for the reasons discussed above in Section II.E.5.

Consequently, based on the full trial record, we find that Petitioner has proven by a preponderance of the evidence that the combination of Samsung (or Samsung/Airvana) and C.S0002-0 teaches this limitation.

d) 34(c): “control means connected with the receiving means adapted to control the data transmission rate based on the data rate control command;”

Petitioner argues that Samsung (or Samsung/Airvana) teaches this limitation. Pet. 50. Specifically, Petitioner contends that “both Samsung and Airvana disclose the mobile station increasing (rate up), decreasing (rate down), or not changing (keeping) the mobile station's data rate for transmitting data on the reverse link based on control commands, *e.g.*, a 2-bit signal sent by the base station.” *Id.* (citing Ex. 1003, 4–6, 9; Ex. 1004, 1, 5–6, 9; Ex. 1002 ¶¶ 199–201). Petitioner further argues that “Samsung discusses and expressly references the control scheme in Airvana, which

sends signals from the base station to mobile stations over a forward channel to command the mobile stations as to whether and how to change the mobile station's data transmission rate.” *Id.* (citing Ex. 1003, 3–6).

Additionally, Petitioner argues that the combination of Samsung and Airvana, with or without C.S0002-0, would have rendered the “control means” aspect of this limitation obvious. Pet. 50–51. According to Petitioner, one of ordinary skill “would have understood that Samsung and/or Airvana’s mobile station includes hardware (*e.g.*, a transmission data rate controller and/or transmission processor) that controlled the data rate at which the mobile transmitted data back to a base station,” which was “known and standard in the art.” *Id.* (citing Ex. 1003, 3–7, 15; Ex. 1004, 5–6; Ex. 1002 ¶¶ 202–203; Ex. 1001, Fig. 2, 5:50–54, 5:57–60, 5:64–6:19).

Patent Owner does not present argument directed to limitation 34(c). PO Resp. 46–47.

Based on the full trial record, we find that the prior art teaches this limitation. We agree with Petitioner that both Samsung and Airvana disclose having the mobile station increase, decrease, or maintain its data rate based on control commands sent by the base station. Pet. 50; Ex. 1003, 4–6, 9; Ex. 1004, 1, 5–6, 9; Ex. 1002 ¶¶ 199–201. We also agree that Samsung discusses and expressly references Airvana’s control scheme, which sends commands from the base station to mobile stations over a forward channel to tell the mobile stations whether and how to change their data transmission rate. Pet. 50; Ex. 1003, 3–6. We also agree with Petitioner that the combination of Samsung (or Samsung and Airvana) renders the “control means” obvious because one of ordinary skill would have understood that Samsung and/or Airvana’s mobile station includes

hardware (such as a transmission data rate controller and/or transmission processor) that controls the data rate at which the mobile station transmits data back to a base station. Pet. 51; Ex. 1003, 3–7, 15; Ex. 1004, 5–6; Ex. 1002 ¶¶ 202–203; Ex. 1001, Fig. 2, 5:50–54, 5:57–60, 5:64–6:19.

- e) 34(d): “wherein a bit is sent on a reverse packet data control channel to indicate whether the mobile station has enough power and data to increase its data transmission rate on a reverse packet data channel.”

Petitioner argues that Samsung discloses this limitation. Pet. 52. Specifically, Petitioner contends that “Samsung discloses that the mobile station sends a ‘1 bit indicator IAB’ (Increase Availability Bit) that provides ‘effective reverse link data rate control.’” *Id.* (citing Ex. 1003, 5–6; Ex. 1002 ¶¶ 205–206). According to Petitioner, Samsung also discloses “that the IAB signals to the base station whether the mobile requests an increased data rate on the reverse link (‘IAB is set to “0”’: Rate Increase Enabled’) or does not request a change to the data rate (‘IAB is set to “1”’: Rate Increase Disabled’).” *Id.* (citing Ex. 1003, 6; Ex. 1002 ¶ 207).

Petitioner also argues that Samsung discloses that “the mobile station will only set the IAB sent on the reverse link to ‘0’ or ‘Rate Increase Enabled’ if it has enough power for an increase.” *Id.* (citing Ex. 1003, 6; Ex. 1002 ¶ 207). In support, Petitioner points to Samsung’s disclosure that the “MS may(will) set an IAB to ‘1’ when . . . [d]ata rate is limited due to MS’s transmission power.” *Id.* Petitioner further argues that Samsung discloses that “the mobile station will only set the IAB to ‘0’ if the mobile station has enough data in the transmission (Tx) buffer that needs to be transmitted,” pointing to Samsung’s disclosure that the “MS may (will) set an IAB to ‘1’ when . . . [t]he MS has a small amount of data to be sent in

the Tx buffer.” *Id.* at 52–53 (citing Ex. 1003, 6; Ex. 1002 ¶ 207). Thus, Petitioner asserts, “Samsung discloses that the IAB indicates whether the criteria for a requested increase in data rate is met, including that [the] mobile station has enough power and data in its buffer to justify requesting an increase in the data rate on the reverse link.” *Id.* at 53 (citing Ex. 1002 ¶¶ 207–208).

Patent Owner does not present argument directed to limitation 34(d). PO Resp. 46–47.

Based on the full trial record, we find that the prior art teaches this limitation. We agree with Petitioner that Samsung discloses that the mobile station sends an increase availability bit (IAB), which is a one-bit indicator that requests an increased data rate when set to “0” and does not request a change to the data rate when set to “1.” Pet. 52; Ex. 1003, 5–6; Ex. 1002 ¶¶ 205–207. We also find that Samsung discloses that the mobile station will only set the IAB sent on the reverse link to “0” or “Rate Increase Enabled” if it has enough power for an increase and has enough data in the transmission (Tx) buffer that needs to be transmitted. Pet. 52–53; Ex. 1003, 6; Ex. 1002 ¶ 207. Thus, we find that Samsung discloses that the IAB indicates whether the criteria for a requested increase in data rate is met based on whether the mobile station has enough power and data in its buffer to justify requesting an increase in the data rate on the reverse link. Pet. 53; Ex. 1002 ¶¶ 207–208.

f) Summary for Claim 34

For the foregoing reasons, and based on the full trial record, we find that Petitioner has proven by a preponderance of the evidence that claim 34

would have been obvious over Samsung and C.S0002-0 or Samsung, Airvana, and C.S0002-0.

7. Independent Claim 37

Claim 37 is similar to claim 34, but written in the form of a method claim instead of an apparatus claim. Ex. 1001, 20:32–49. Petitioner contends that claim 37 is obvious over Samsung and C.S0002-0, or Samsung, Airvana, and C.S0002-0, for essentially the same reasons as claim 34. Pet. 43–53. Patent Owner lumps together its discussion of claims 34 and 37 and does not separately argue claim 37. PO Resp. 46–47. For the reasons discussed above with respect to claim 34, we find that Petitioner has proven by a preponderance of the evidence that claim 37 is unpatentable over Samsung and C.S0002-0 or Samsung, Airvana, and C.S0002-0.

8. Dependent Claims 35 and 38

Dependent claims 35 and 38 state as follows:

35. The apparatus of claim 34, wherein the control means is adapted to determine data rate information as “increase” or “unchanged” to indicate how the mobile station should transmit data in a next frame to the base station.

38. The method of claim 37, further comprising determining the data rate information as “increase” or [“]unchanged” to indicate how the mobile stations should transmit valid data in the next frame to the base station.

Ex. 1001, 20:23–26, 20:49–52.

Petitioner argues that Samsung discloses the limitations of claims 35 and 38. Pet. 54. Petitioner relies on its argument for element 34(d) that Samsung discloses an IAB that “indicates either an increase (‘Rate Increase Enabled’) or an unchanged data rate (‘Rate Increase Disabled’). *Id.* (citing Ex. 1003, 6; Ex. 1002 ¶¶ 210–212). Petitioner also argues that “Samsung

and Airvana both teach that the data rate control message, *i.e.*, the RAB, can be sent by the base station once per frame.” *Id.* (citing Ex. 1003, 4, 9; Ex. 1004, 6; Ex. 1002 ¶¶ 212–213. “Accordingly,” Petitioner asserts, “when the mobile station sends the IAB in a particular frame, the IAB indicates to the base station whether the mobile station asks to increase or not change the data rate in the next frame on the reverse link.” *Id.* (citing Ex. 2002 ¶¶ 212–213). According to Petitioner, “Samsung specifically describes the mobile station setting the IAB to ‘0’ if its data rate should be increased in the next frame and setting the IAB to ‘1’ if the mobile station does not determine that its data rate should be increased.” *Id.* (citing Ex. 2002 ¶ 213).

Petitioner also relies on its argument for element 34(c) that “Samsung and C.S0002-0 and/or Samsung, Airvana, and C.S0002 teach the ‘control means’ structure,” and argues that “that same structure would also have determined the value of the IAB as taught by Samsung.” Pet. 55 (citing Ex. 1003, 3–7; Ex. 1004, 5–6; Ex. 1002 ¶ 214).” “Thus,” Petitioner contends, “each of these combinations teaches the ‘control means’ of claim 35 having the additional function of ‘determin[ing] data rate information . . . to the base station.” *Id.*

Patent Owner does not present argument directed to claims 35 and 38 under Grounds I and II. PO Resp. 46–47.

Based on the full trial record, we find that the prior art teaches the limitations of claims 35 and 38. Specifically, we find that Samsung and Airvana teach determining data rate information as “increase” or “unchanged” to indicate how the mobile station should transmit data in a next frame to the base station. Ex. 1003, 4, 6, 9; Ex. 1002 ¶¶ 210–213. We also find that Samsung and C.S0002-0 and Samsung, Airvana, and C.S0002

teach the “control means” structure, and having this structure determine the value of the IAB. Ex. 1003, 3–7; Ex. 1004, 5–6; Ex. 1002 ¶ 214. Therefore, we find that Petitioner has proven by a preponderance of the evidence that claims 35 and 38 are unpatentable over Samsung and C.S0002-0 or Samsung, Airvana, and C.S0002-0.

9. Dependent Claims 36 and 39

Dependent claims 36 and 39 state as follows:

36. The apparatus of claim 35, wherein the control means is adapted to determine the data rate information based on at least one of a remaining power, a current transmission data rate, and a number of bits within a transmission buffer of each mobile station.

39. The method of claim 38, wherein determining the data rate information is based on at least one of a remaining power, a current tran[s]mission data rate, and a number of bits within a transmission buffer of each mobile station.

Ex. 1001, 20:27–31, 20:53–56.

Petitioner argues that Samsung discloses the limitations of claims 36 and 39. Pet. 55. “Specifically,” Petitioner asserts, “Samsung discloses that the mobile station determines to set the IAB to 0 (Rate Increase Enabled) or to 1 (Rate Increase Disabled) based on whether the ‘[c]urrent data rate is the same as [the] data rate limited by RRL Message.’” *Id.* (citing Ex. 1003, 6; Ex. 1002 ¶¶ 216–218). “In other words,” according to Petitioner, “Samsung discloses that the IAB is determined based on whether the current data rate of the mobile station has reached a limit.” *Id.* “Additionally,” Petitioner contends, “Samsung discloses that the value of the IAB is determined based on whether the ‘amount of data to be sent in’ the transmission buffer is less than the threshold of the buffer.” *Id.* at 56 (citing Ex. 1003, 6, 9; Ex. 1002 ¶¶ 219–220). According to Petitioner, “Samsung also discloses setting the

IAB based on whether the ‘[d]ata rate is limited due to MS’s transmission power’ meaning the IAB is determined based on whether the MS has remaining power.” *Id.* (citing Ex. 1003, 6; Ex. 1002 ¶ 218).

Petitioner also relies on its arguments for limitation 34(c) and claim 35 that “the Samsung and C.S000-2 and/or Samsung, Airvana, and C.S0002-0 combinations teach the ‘control means’ structure, and that same structure would be used to determine the value of the IAB based on the mobile station’s remaining power, current transmission data rate, and/or data in a transmission buffer.” Pet. 56 (citing Ex. 1003, 3–7, 9, 15; Ex. 1002 ¶ 221).

Patent Owner does not present argument directed to claims 36 and 39 under Grounds I and II. PO Resp. 46–47.

Based on the full trial record, we find that the prior art teaches the limitations of claims 36 and 39. Specifically, we find that Samsung and Airvana teach the mobile station determining to set the IAB to 0 or 1 based on whether the current data rate of the mobile station has reached a limit, as well as whether the amount of data to be sent in the transmission buffer is less than the threshold of the buffer. Ex. 1003, 6, 9; Ex. 1002 ¶¶ 216–220. We also find that Samsung discloses setting the IAB based on whether the mobile station has remaining power. Ex. 1003, 6; Ex. 1002 ¶ 218. Additionally, we find that Samsung and C.S0002-0 and Samsung, Airvana, and C.S0002 teach the “control means” structure, and having this structure determine the value of the IAB based on the mobile station’s remaining power, current transmission data rate, and/or data in a transmission buffer. Ex. 1003, 3–7, 9, 15; Ex. 1002 ¶ 221. Therefore, we find that Petitioner has proven by a preponderance of the evidence that claims 36 and 39 are

unpatentable over Samsung and C.S0002-0 or Samsung, Airvana, and C.S0002-0.

10. Dependent Claim 40

Dependent claim 40 states as follows:

40. The method of claim 37, wherein the data rate information is set as “increase” if a remaining transmission power of the mobile station is above a threshold and if the data rate of a current transmission is below a maximum data rate; otherwise the data rate information is set as “unchanged.”

Ex. 1001, 20:57–62.

Petitioner argues that Samsung discloses or renders obvious the limitations of claim 40. Pet. 57. “Specifically,” Petitioner asserts, “Samsung discloses that the mobile station will transmit an IAB set to 1 (Rate Increase Disabled, meaning the mobile does not request a change in data rate) if either of the following is true: (a) ‘[d]ata rate is limited due to MS’s transmission power;[’] or (b) ‘[c]urrent data rate is the same as data rate limited by RRL message.’” *Id.* (citing Ex. 1003, 6; Ex. 1002 ¶¶ 230–232). Petitioner argues that “[t]he converse is also true,” namely that “the mobile station described by Samsung will only set the IAB to 0 (Rate Increase Enabled) if the mobile station is not limited in terms of its transmission power and thus has remaining power to support an increased data rate, in addition to the mobile station not already operating at the maximum data rate that is set by the base station in the RRL message.” *Id.* (citing Ex. 1003, 6; Ex. 1002 ¶ 232). “Accordingly,” Petitioner asserts, one of ordinary skill “would understand that Samsung discloses this limitation by disclosing setting an IAB to ‘increase’ enabled when the mobile station has both enough remaining power such that the data rate is not limited by the available power and a current data rate below a maximum rate.” *Id.* “If one

of these two conditions is not met,” according to Petitioner, “Samsung teaches setting the IAB to increase disabled (‘unchanged’).” *Id.* at 57–58.

Petitioner also argues that, “[t]o the extent this claim requires the mobile station to send an ‘increase’ message if **both** the data rate and power conditions are met, regardless of other conditions (*e.g.*, that the MS does not have at least one RAB set to down (rate decrease)), Samsung renders this limitation obvious.” Pet. 58. Although “Samsung lists four factors the mobile station may use to determine whether to set the IAB to 0/increase enabled,” Petitioner asserts, it would have been obvious to a person of ordinary skill “to use a subset of only two of the four conditions” because doing so “would reduce the logic and processing power required to set the IAB” even though it would also “lead to the tradeoff of taking fewer factors into account.” *Id.* (citing Ex. 1002 ¶¶ 233–235). According to Petitioner, “[p]ersons of skill in the art would have understood the advantages and disadvantages of making such tradeoffs.” *Id.* (citing Ex. 1002 ¶ 235).

Patent Owner does not present argument directed to claim 40 under Grounds I and II. PO Resp. 46–47.

Based on the full trial record, we find that the prior art teaches the limitations of claim 40. Specifically, we find that Samsung teaches having the mobile station transmit an IAB of 0 (rate increase enabled) if the mobile station’s remaining power is above a threshold and the mobile station is not already operating at the maximum data rate. Ex. 1003, 6; Ex. 1002 ¶ 232. We also find that Samsung teaches having the mobile station transmit an IAB of 1 (rate increase disabled) when the data rate is limited due to the mobile station’s transmission power or the data rate is the same as the maximum data rate. Ex. 1003, 6; Ex. 1002 ¶¶ 230–232. Therefore, we find

that Petitioner has proven by a preponderance of the evidence that claim 40 is unpatentable over Samsung and C.S0002-0 or Samsung, Airvana, and C.S0002-0.

F. Ground III: Obviousness Based on Samsung, Chung, and C.S0002-0

In Grounds I and II, we found that claims 34–40 of the ’653 patent are unpatentable. Therefore, we need not separately analyze Petitioner’s challenge to those claims under Ground III. *See SAS Inst. Inc. v. Iancu*, 138 S. Ct. 1348, 1359 (2018) (holding that a petitioner “is entitled to a final written decision addressing all of the claims it has challenged”); *Bos. Sci. Scimed, Inc. v. Cook Grp. Inc.*, 809 F. App’x 984, 990 (Fed. Cir. 2020) (non-precedential) (recognizing that the “Board need not address issues that are not necessary to the resolution of the proceeding” and, thus, agreeing that the Board has “discretion to decline to decide additional instituted grounds once the petitioner has prevailed on all its challenged claims”).

III. CONCLUSION⁸

For the reasons discussed above, Petitioner has proven, by a preponderance of the evidence, that the challenged claims are unpatentable, as summarized in the following table:

Claim(s)	35 U.S.C. §	Reference(s)/Basis	Claims Shown Unpatentable	Claims Not Shown Unpatentable
34–40	103(a)	Samsung, C.S0002-0	34–40	
34–40	103(a)	Samsung, Airvana, C.S0002-0	34–40	
34–40	103(a)	Samsung, Chung, C.S0002-0 ⁹		
Overall Outcome			34–40	

⁸ Should Patent Owner wish to pursue amendment of the challenged claims in a reissue or reexamination proceeding subsequent to the issuance of this 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).

⁹ As explained above, because we find that claims 34–40 are unpatentable on other grounds, we decline to address those claims in this ground.

IV. ORDER

Accordingly, it is

ORDERED that claims 34–40 of the '653 patent have been shown to be unpatentable; and

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

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