

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

APPLE INC.,
Petitioner,

v.

TELEFONAKTIEBOLAGET LM ERICSSON,
Patent Owner.

IPR2022-00457
Patent 9,509,440 B2

Before SALLY C. MEDLEY, GEORGIANNA W. BRADEN, and
NATHAN A. ENGELS, *Administrative Patent Judges*.

MEDLEY, *Administrative Patent Judge*.

DECISION
Granting Institution of *Inter Partes* Review
35 U.S.C. § 314

I. INTRODUCTION

Apple Inc. (“Petitioner”) filed a Petition for *inter partes* review of claims 1–9, 11–19, 21, 23, 25, and 27 of U.S. Patent No. 9,509,440 B2 (Ex. 1001, “the ’440 patent”). Paper 1 (“Pet.”). Telefonaktiebolaget LM Ericsson (“Patent Owner”) filed a Preliminary Response. Paper 6 (“Prelim. Resp.”). Institution of an *inter partes* review is authorized by statute when “the information presented in the petition . . . and any response . . . shows that there is a reasonable likelihood that the petitioner would prevail with respect to at least 1 of the claims challenged in the petition.” 35 U.S.C. § 314(a) (2018). Upon consideration of the Petition, the Preliminary Response, and the evidence of record, we determine that Petitioner has established a reasonable likelihood of prevailing with respect to the unpatentability of at least one claim of the ’440 patent. Accordingly, for the reasons that follow, we institute an *inter partes* review of all challenged claims of the ’440 patent.

A. Real Parties in Interest

Petitioner lists Apple Inc. as the real party-in-interest. Pet. 72.

Patent Owner lists Telefonaktiebolaget LM Ericsson and Ericsson Inc. as the real parties-in-interest. Paper 3 (“Patent Owner’s Mandatory Notices”), 2.

B. Related Matters

The parties indicate that the ’440 patent was the subject of *Samsung Electronics Co., Ltd. v. Telefonaktiebolaget LM Ericsson*, IPR2021-00509, which has been terminated. Pet. 70–71; Prelim. Resp. 1.

C. The '440 Patent

The '440 patent relates to “a radio node of a cellular network, a User Equipment, UE and methods therein, for enabling use of a high order modulation when communicating radio signals.” Ex. 1001, 1:9–12. Link adaptation in systems according to Long Term Evolution (LTE) is based on adaptive modulation and coding, “which controls data rate by adaptively adjusting the modulation scheme and/or channel coding rate according to the radio-link conditions.” *Id.* at 1:32–36. The Modulation and Coding Scheme (MCS) for Physical Downlink Shared Channel (PDSCH) transmission is indicated in the downlink MCS signaling by the serving radio node (base station) to the UE. *Id.* at 1:23–24, 1:36–40. Through uplink signaling, the UE informs the radio node about the channel quality through Channel Quality Indicator (CQI) signaling, including sending CQI reports to the radio node. *Id.* at 1:40–43. However, the “formats or protocols of today do not support any modulation with higher order than six bits per symbol, as in 64QAM [Quadrature Amplitude Modulation].” *Id.* at 2:16–20.

The '440 patent describes enabling higher-order modulation in a radio communication with a UE. *Id.* at code (57). A first table configuration comprises a first MCS table and a first CQI table that supports a certain maximum modulation order. *Id.* When the radio node detects that a modulation order higher than the maximum modulation order is potentially possible to use, the radio node instructs the UE to apply a second table configuration which comprises a second MCS table and a second CQI table. *Id.* At least one modulation order entry from the first MCS table is maintained in the second MCS table as a fallback in case it is desirable to use the modulation order entry from the first MCS table when the second MCS table is applied. *Id.* In one embodiment, “the lowest MCS entry with

MCS index 0, in the MCS table and/or at least one CQI entry, e.g. the lowest CQI entry for the lowest coding rate of the lowest modulation order with CQI index 1, in the CQI table is preserved or maintained from the basic MCS and/or CQI table.” *Id.* at 6:58–63. Thus a “fallback is provided in case it is only possible or desirable to use a modulation order lower than the higher modulation order, e.g. the lowest modulation order, when the second table configuration is applied.” *Id.* at 6:65–7:2.

D. Illustrative Claim

Petitioner challenges claims 1–9, 11–19, 21, 23, 25, and 27 of the ’440 patent. Claim 1, reproduced below with bracketed numbering added,¹ is illustrative.

1. [Preamble] A method performed by a radio mode of a cellular network,

[1.1] the radio node being operable to apply a first table configuration in radio communications with User Equipments (UEs), the first table configuration comprising at least one of a first Modulation and Coding Scheme (MCS) table and a first Channel Quality Indicator (CQI) table,

[1.2] wherein the at least one of the first MCS table and the first CQI table support a certain maximum modulation order, the method comprising:

[1.3] detecting that a higher modulation order, which is higher than the maximum modulation order of the first table configuration, is potentially possible to use in a radio communication between the radio node and a first UE; and

[1.4] instructing the first UE to apply a second table configuration in the radio communication, the second table configuration comprising at least one of a second MCS table and a second CQI table, wherein the at least one of the second MCS

¹ For ease of reference, we adopt the bracketed numbering Petitioner uses in the Petition. *See* Pet. 20–37, 74–75.

table and the second CQI table support the higher modulation order,

[1.5] wherein at least one entry for at least one modulation order in the at least one of the first MCS table and the first CQI table is maintained in the at least one of the second MCS table and the second CQI table as a fallback in case it is desirable to use the at least one modulation order in the at least one of the first MCS table and the first CQI table when the second table configuration is applied; and

[1.6] wherein the at least one modulation order in the at least one of the first MCS table and the first CQI table comprises a lowest modulation order of the first table configuration, and

[1.7] wherein the first entry for the lowest modulation order in the first MCS table is maintained in the second MCS table as the fallback, and an entry for the lowest coding rate of the lowest modulation order in the first CQI table is maintained in the second CQI table as the fallback.

Ex. 1001, 15:50–16:21.

E. Asserted Challenges to Patentability

Petitioner asserts that claims 1–9, 11–19, 21, 23, 25, and 27 would have been unpatentable on the following basis (Pet. 5):

Claims Challenged	35 U.S.C. §	Reference(s)/Basis
1–7, 9, 11–17, 19, 21, 23, 25, 27	103(a) ²	Lahetkangas ³

² The Leahy-Smith America Invents Act, Pub. L. No. 112-29, 125 Stat. 284 (2011) (“AIA”), amended several provisions of 35 U.S.C., including § 103. Because the ’440 patent has an effective filing date after the effective date of the applicable AIA amendments, we refer to the post-AIA version of 35 U.S.C. § 103.

³ Patent Cooperation Treaty (PCT) Patent Application Publication No. WO 2013/123961 A1, published Aug. 29, 2013 (Ex. 1011, “Lahetkangas”).

Claims Challenged	35 U.S.C. §	Reference(s)/Basis
1–7, 9, 11–17, 19, 21, 23, 25, 27	103(a)	Lahetkangas, LTE TS 36.213 ⁴
8, 18	103(a)	Lahetkangas, Wang ⁵
8, 18	103(a)	Lahetkangas, LTE TS 36.213, Wang

II. ANALYSIS

A. 35 U.S.C. § 325(d)

Patent Owner argues that we should exercise our discretion under 35 U.S.C. § 325(d) to deny institution because Lahetkangas was previously considered during prosecution of the patent application that resulted in the ’440 patent. Prelim. Resp. 2. For the reasons discussed below, we decline to exercise such discretion.

1. Legal Framework

Under 35 U.S.C. § 325(d), “the Director may take into account whether, and reject the petition or request because, the same or substantially the same prior art or arguments previously were presented to the Office.” 35 U.S.C. § 325(d). The Board uses a two-part framework in determining whether to exercise its discretion under § 325(d), specifically:

- (1) whether the same or substantially the same art previously was presented to the Office or whether the same or substantially the same arguments previously were presented to the Office;
and
- (2) if either condition of [the] first part of the framework is satisfied, whether the petitioner has demonstrated that the

⁴ “Evolved Universal Terrestrial Radio Access (E-UTRA);” Physical Layer Procedures (3GPP TS 36.213 version 10.3.0 Release 10), published Sept. 25, 2011 (Ex. 1009, “LTE TS 36.213” or “TS 36.213”).

⁵ U.S. Pat. No. US 9,648,601 B2, issued May 9, 2017 (Ex. 1006, “Wang”).

Office erred in a manner material to the patentability of challenged claims.

Advanced Bionics, LLC v. MED-EL Elektromedizinische Geräte GmbH, IPR2019-01469, Paper 6 at 8 (PTAB Feb. 13, 2020) (precedential) (“*Advanced Bionics*”). In applying the two-part framework, we consider the non-exclusive factors set forth in *Becton, Dickinson and Co. v. B. Braun Melsungen AG*, IPR2017-01586, Paper 8 (PTAB Dec. 15, 2017) (precedential in relevant part), which “provide useful insight into how to apply the framework” under § 325(d). *Advanced Bionics*, Paper 6 at 9. Those non-exclusive factors include:

- (a) the similarities and material differences between the asserted art and the prior art involved during examination;
- (b) the cumulative nature of the asserted art and the prior art evaluated during examination;
- (c) the extent to which the asserted art was evaluated during examination, including whether the prior art was the basis for rejection;
- (d) the extent of the overlap between the arguments made during examination and the manner in which Petitioner relies on the prior art or Patent Owner distinguishes the prior art;
- (e) whether Petitioner has pointed out sufficiently how the Examiner erred in its evaluation of the asserted prior art;
- (f) the extent to which additional evidence and facts presented in the Petition warrant reconsideration of the prior art or arguments.

Becton, Dickson, Paper 8 at 17–18. Factors (a), (b), and (d), relate to whether the same or substantially the same art or arguments were previously presented to the Office, and factors (c), (e), and (f) relate to whether the petitioner demonstrates that the Office erred in a manner material to the

patentability of the claims. *Advanced Bionics*, Paper 6 at 9–11. Only if the same or substantially the same art or arguments were previously presented to the Office do we then consider whether the petitioner has demonstrated a material error by the Office. *Id.*

2. Part One of the Advanced Bionics Framework

Patent Owner asserts that “Lahetkangas was provided to the Patent Office during the prosecution of the ’440 patent in an IDS on November 24, 2014” and “the Examiner initialed Lahetkangas as being considered.”

Prelim. Resp. 11 (citing Pet. 17; Ex. 1002, 69; Ex. 1011), 33. We agree that Lahetkangas was previously presented to the Office during prosecution of the ’440 patent. Ex. 1001, code (56); Ex. 1002, 69; *see also* Pet. 17 (Petitioner acknowledging that Lahetkangas was cited in an IDS).

Accordingly, we determine that part one of the *Advanced Bionics* framework is satisfied.

3. Part Two of the Advanced Bionics Framework

Patent Owner asserts that Petitioner has failed to show material error by the Examiner during prosecution. Prelim. Resp. 51. We disagree. As Petitioner points out, although the Examiner considered Lahetkangas in an IDS, Lahetkangas was not discussed in any Office Action or Response. Pet. 17–18. We find that Lahetkangas was not extensively evaluated during examination and was not the basis for a rejection. Petitioner has presented a sufficient showing that the Examiner overlooked disclosures in Lahetkangas that render obvious the challenged claims. *See infra*. We, therefore, agree with Petitioner that the Office erred in a manner material to the patentability of the challenged claims. Pet. 18–19.

4. Conclusion

Having considered the respective arguments and evidence of the parties and the *Advanced Bionics* framework, we decline to exercise our discretion to deny institution under 35 U.S.C. § 325(d).

B. Principles of Law

A claim is unpatentable under 35 U.S.C. § 103(a) if the differences between the claimed subject matter and the prior art are such that the subject matter, as a whole, would have been obvious at the time of the invention to a person having ordinary skill in the art. *KSR Int’l Co. v. Teleflex, Inc.*, 550 U.S. 398, 406 (2007). The question of obviousness is resolved on the basis of underlying factual determinations including (1) the scope and content of the prior art; (2) any differences between the claimed subject matter and the prior art; (3) the level of ordinary skill in the art; and (4) objective evidence of nonobviousness. *Graham v. John Deere Co.*, 383 U.S. 1, 17–18 (1966).

C. Level of Ordinary Skill in the Art

Relying on the testimony of Dr. Apostolos Kakaes, Petitioner offers an assessment as to the level of ordinary skill in the art and the general knowledge of a person of ordinary skill at the time of the ’440 patent. *See* Pet. 3–4 (citing Ex. 1003 ¶ 70). Dr. Kakaes states that a person having ordinary skill in the art (POSITA) “would be someone who had a Master’s degree in Electrical Engineering, Applied Mathematics, Computer Science, Physics or equivalent.” Ex. 1003 ¶ 70. Citing Dr. Kakaes, Petitioner further states that the POSITA would have also had “three to five years of experience working with wireless digital communication systems” and that “[a]dditional education might compensate for less experience, and vice-versa.” *Id.* Patent Owner does not propose an alternative assessment. *See*

generally Prelim. Resp. We adopt Petitioner’s definition of the level of skill for purposes of this Decision.

D. Claim Construction

In *inter partes* review, we construe claims using the same claim construction standard that would be used to construe the claims in a civil action under 35 U.S.C. § 282(b), including construing the claim in accordance with the ordinary and customary meaning of such claim as understood by one of ordinary skill in the art and the prosecution history pertaining to the patent. 37 C.F.R. § 42.100(b) (2020).

For purposes of this Decision, we need not expressly construe any claim term. *See Realtime Data, LLC v. Iancu*, 912 F.3d 1368, 1375 (Fed. Cir. 2019) (“The Board is required to construe ‘only those terms . . . that are in controversy, and only to the extent necessary to resolve the controversy.’” (quoting *Vivid Techs., Inc. v. Am. Sci. & Eng’g, Inc.*, 200 F.3d 795, 803 (Fed. Cir. 1999))).

E. Asserted Obviousness of Claims 1–7, 9, 11–17, 19, 21, 23, 25, and 27 over Lahetkangas with or without LTE TS 36.213

Petitioner contends claims 1–7, 9, 11–17, 19, 21, 23, 25, and 27 are unpatentable under 35 U.S.C. § 103(a) as obvious over Lahetkangas or “in the Alternative Lahetkangas in View of LTE TS 36.213.” Pet. 19–65. Specifically, Petitioner asserts, with respect to claim limitation [1.1], “a POSITA would have understood the claimed ‘first table configuration’ is the Table 7.1.7.1-1 provided in TS 36.213 and expressly referenced in Lahetkangas,” but “to the extent Patent Owner contends Lahetkangas does not disclose a first table configuration, Ground 2 is provided relying on TS

36.213.” In support of its showing, Petitioner relies on the declaration of Dr. Kakaes. *Id.* (citing Ex. 1003).

1. Lahetkangas

Lahetkangas relates to “the field of cellular networks, especially to an evolution of LTE networks, and in particular to networks comprising LTE networks and evolved LTE networks.” Ex. 1011, 1:12–14.⁶ In particular, Lahetkangas’s “invention is based on the idea to extend the modulation and coding scheme table to a higher order modulation while remaining backward compatible.” *Id.* at 2:32–33. “The idea of this method is to introduce a higher order modulation while still supporting a modulation and coding scheme (MCS) table being introduced for a lower modulation order.” *Id.* at 3:4–6.

Lahetkangas describes transmission and communication between a base station and UE based on MCS. *Id.* at 11:24–25. The MCS is selectable and based on a first MCS table comprising entries corresponding to a plurality of MCS with a first maximum modulation order or based on a second MCS table comprising entries corresponding to a plurality of MCS with a second maximum modulation order. *Id.* at 11:25–30. “[T]he second maximum modulation is higher (for instance up to 256QAM) than the first maximum modulation order (for instance up to 64 QAM).” *Id.* at 11:30–32. Lahetkangas further describes that “CQI tables may be selected based on the selection of the MCS tables” and “[i]f there is a switch or change from the first MCS table to the second MCS table, there may also be change from the first CQI table to the second CQI table.” *Id.* at 7:5–7. “The UE may thus

⁶ Citations are to the numbers located on the top of the pages.

determine the CQI based on a table which corresponds to the selected MCS table.” *Id.* at 7:7–9.

In one embodiment, Lahetkangas describes that “there may need to be a MCS index area common for both tables, which allows data scheduling also during the time of uncertainty.” *Id.* at 14:26–27. “Additionally, there may be a few common low modulation / TB sizes in the common MCS index area for such situations where extended 256QAM table is in use and channel conditions drop quickly.” *Id.* at 15:1–5. “[S]econd tables for the MCS and CQI index tables may be generated corresponding to 36.213 table 7.1.7-1 but with extension to 256QAM ($Q_m=8$).” *Id.* at 14:11–12.

2. LTE TS 36.213

LTE TS 36.213 describes specifying and establishing “the characteristics of the physical layer procedures in the FDD and TDD modes of E-UTRA.” Ex. 1009, 6.⁷ LTE TS 36.213 includes a standard modulation and coding scheme table, channel quality index table, and transport block size table. *Id.* at 32–39, 64.

3. Discussion

Claim 1 recites “[a] method performed by a radio node of a cellular network” (preamble). Petitioner contends, to the extent the preamble is limiting, that “Lahetkangas discloses a base station (i.e., ‘radio node’) that performs a method of communication between a base station and a UE, and that provides wireless cellular network access to a UE.” Pet. 20 (citing Ex. 1011, 2:20–30, 4:16–23, 8:6–7, Fig. 1; Ex. 1003 ¶ 81).

⁷ Citations are to the numbers located on the top of the pages.

Claim element 1.1 recites “the radio node being operable to apply a first table configuration . . . the first table configuration comprising at least one of a first Modulation and Coding Scheme (MCS) table and a first Channel Quality Indicator (CQI) table.” Petitioner contends that Lahetkangas with or without LTE TS 36.213 teaches element 1.1. *Id.* at 21–27. In particular, Petitioner asserts that Lahetkangas describes a base station (radio node) operable to apply a first table configuration as part of communication control with UEs. *Id.* at 21 (citing Ex. 1011, 7:30–33). Petitioner contends that the base station controls communication with the UE and selects a first MCS table and corresponding first CQI table. *Id.*

Petitioner asserts that Lahetkangas teaches the “first configuration table,” which is the MCS table contemplated by LTE TS 36.213, Table 7.1.7.1-1. *Id.* (citing Ex. 1011, 14:11–15, Table 1). Petitioner contends that “Lahetkangas explains the LTE standard includes an MCS index table and a CQI table that are used to determine and select the desired modulation and coding schemes for communication between a BS and a UE.” *Id.* at 21–22 (citing Ex. 1011, 2:1–3, 14:11–12 (referring to LTE TS 36.213 table 7.1.7.1-1); Ex. 1003 ¶ 83). Petitioner provides reasons why a POSITA would have understood that Lahetkangas uses the first table configuration of LTE TS 36.213. *Id.* at 22–24 (citing Ex. 1011, 1:32–2:6, 2:32–36, 3:14–19, 11:16–19, 14:11–15; Ex. 1003 ¶¶ 83, 83.A, 85; Ex. 1009, Table 7.1.7.1-1).

Petitioner alternatively argues that “[t]o the extent Patent Owner contends a POSITA would not have understood Lahetkangas teaches the first table configuration as Table 7.1.7.1-1 from TS 36.213 as provided for Ground 1, Element [1.1], Petitioner submits Ground 2 further relying on Ex. 1009, LTE TS 36.213.” *Id.* at 25. Petitioner contends that TS 36.213 discloses a first MCS table and a first CQI table. *Id.* at 25–26 (citing

Ex. 1009, Table 7.1.7.1-1, 33, Table 7.2.3-1, 64; Ex. 1003 ¶ 83B). Petitioner argues that “[a] POSITA would have found it obvious and been motivated to use the configuration tables from TS 36.213 in combination with Lahetkangas because that specific table of TS 36.213 is expressly referenced in Lahetkangas, and its implementation details were well-known in the art.” *Id.* at 26 (citing Ex. 1003 ¶ 84). Petitioner provides additional reasons for combining Lahetkangas and TS 36.213. *Id.* at 26–27.

For claim element 1.2 (“wherein the at least one of the first MCS table and the first CQI table support a certain maximum modulation order”), Petitioner contends that Lahetkangas describes the first MCS table (referring to TS 36.213 table 7.1.7-1) “supports a maximum modulation order of 64QAM (i.e., when $Q_m = 6$).” *Id.* at 27–28 (citing Ex. 1011, code (57), 1:32–35, 14:11–59, 11:25–32; Ex. 1003 ¶ 87). Petitioner further contends that Lahetkangas meets claim element 1.3 (“detecting that a higher modulation order, which is higher than the maximum modulation order of the first table configuration, is potentially possible . . .”), because Lahetkangas describes the base station determining the actual channel conditions between it and the UE to determine a “‘maximum supported modulation order’ (up to 256 QAM) for communications.” *Id.* at 28–29 (citing Ex. 1011, 4:16–23, 11:30–12:7, 19:19–23, Fig. 4; Ex. 1003 ¶ 88).

Claim element 1.4 recites

instructing the first UE to apply a second table configuration in the radio communication, the second table configuration comprising at least one of a second MCS table and a second CQI table, wherein the at least one of the second MCS table and the second CQI table support the higher modulation order

Petitioner contends that Lahetkangas teaches that the base station decides when the first UE is to use the second configuration table (256QAM) and then instructs the UE to apply a second table configuration as claimed. *Id.* at 29–31 (citing Ex. 1011, 11:30–32, 12:1–7, 13:20–25, 14:11–15, 17:2–3, 19:19–29, Fig. 4; Ex. 1003 ¶¶ 89–91).

Claim element 1.5 recites

wherein at least one entry for at least one modulation order in the at least one of the first MCS table and the first CQI table is maintained in the at least one of the second MCS table and the second CQI table as a fallback in case it is desirable to use the at least one modulation order in the at least one of the first MCS table and the first CQI table when the second table configuration is applied

Petitioner contends that Lahetkangas teaches the first and second table configurations have an “index area common for both tables.” *Id.* at 31 (citing Ex. 1011, 14:22–36). Petitioner asserts that “Lahetkangas teaches that 23 entries from the first MCS table are common to or maintained in the second MCS table (note that Element [1.5] only requires one common entry).” *Id.* at 31–32 (citing Ex. 1011, Table 1, 15:1–4, 15:30–32; Ex. 1003 ¶ 92). Petitioner contends that Lahetkangas “teaches that at least some of the entries in the second MCS table can be used if channel conditions drop quickly and it is desirable to use the less aggressive, lower order modulation entries carried over from the first table configuration to the second table configuration as a fallback.” *Id.* at 32–33 (citing Ex. 1011, 7:11–13, 13:33–36, 14:26–27, 17:2–3; Ex. 1003 ¶ 93).

For claim element 1.6 (“wherein the at least one modulation order ... comprises a lowest modulation order of the first table configuration”), Petitioner asserts that “Lahetkangas teaches that modulation order $Q_m=2$ in the first MCS table (identified in Lahetkangas’s reference to LTE TS 36.213

Table 7.1.7-1) comprises the lowest modulation order of the first table configuration.” *Id.* at 33–34 (citing Ex. 1011, 2:1–2, 14:11–15, Table 1; Ex. 1009, Table 7.1.7-1, Table 7.2.3-1).

At this juncture of the proceeding, Patent Owner does not dispute Petitioner’s showing with respect to the above claim 1 limitations.

See generally Prelim. Resp.

Claim element 1.7 recites

wherein the first entry for the lowest modulation order in the first MCS table is maintained in the second MCS table as the fallback, and an entry for the lowest coding rate of the lowest modulation order in the first CQI table is maintained in the second CQI table as the fallback.

Petitioner contends that Lahetkangas “teaches MCS Index 0, which is the first entry for the lowest modulation order (modulation order 2) in the first MCS table (identified in Lahetkangas’s reference to LTE TS 36.213, Table 7.1.7-1), is maintained in the second MCS table (Lahetkangas, Table 1).” Pet. 34–35 (citing Ex. 1011, Table 1, 14:11–15; Ex. 1003 ¶¶ 95–97).

Petitioner further contends that the first entry for the lowest modulation order from the common area in the second table can be used if channel conditions drop and it is desirable to use a lower order legacy entry as a fallback. *Id.* at 35–36 (citing Ex. 1011, 13:32–36, 14:26–27; Ex. 1003 ¶¶ 96–98).

Petitioner further argues “Lahetkangas teaches that a CQI Index corresponding to MCS Index 0 (i.e., the lowest coding rate of the lowest modulation order) is maintained from a first CQI table to a second CQI table.” *Id.* at 36 (citing Ex. 1003 ¶ 99). Petitioner contends that Lahetkangas teaches applying the same technique performed on the MCS table to the CQI table, such that “the second CQI table would maintain

common legacy entries from the first CQI table consistent with the implementation of the MCS table.” *Id.* at 36–37 (citing Ex. 1011, 2:1–6, 7:5–9, 7:26–28, 12:33–35, 13:19–30, 17:2–3; Ex. 1003 ¶ 99).

Patent Owner argues that Lahetkangas teaches, “at best, ‘a few common’ modulation settings in the ‘common MCS index area from the low range of the modulation set’ that could be used if ‘channel conditions drop quickly.’” Prelim. Resp. 57. Patent Owner argues, however, that “the ‘low range of the modulation set’ is undefined and could include QPSK ($Q_m=2$), 16QAM, ($Q_m=4$), or 64QAM ($Q_m=6$), as shown in Table 1,” and that nothing in Lahetkangas “suggests that the lowest modulation order (QPSK), ***much less the first entry for the lowest modulation order in the first MCS table***, is used as a fallback.” *Id.* (citing Ex. 1011, 13:32–37, 16, Table 1), 58 (Lahetkangas does not suggest or require a shift to the first entry, or the lowest MCS entry in the second table). Patent Owner further argues that “the term ‘fallback’ is never used in the specification of Lahetkangas.” *Id.* at 26. Patent Owner concludes that there is no suggestion in Lahetkangas that “the first entry for the lowest modulation order in the first MCS table is maintained in the second MCS table as the fallback” as claimed. *Id.* at 57–58.

At this juncture of the proceeding, we determine that Patent Owner’s arguments do not undermine Petitioner’s showing because such arguments are not commensurate in scope with the claim language. Claim 1 does not require that the first entry for the lowest modulation order in the first MCS table *be used* in the second MCS table as the fallback as Patent Owner argues. *Id.* at 57; *see also id.* at 58 (arguing that Lahetkangas does not suggest or require *a shift* to the first entry, or the lowest MCS entry in the second table, when the claims do not require shifting to a first entry). The

claims require that “the first entry for the lowest modulation order in the first MCS table *is maintained* in the second MCS table as the fallback,” not that the lowest modulation order is ultimately used.

“[T]he first and second MCS tables disclosed by Lahetkangas” are reproduced below. Ex. 1003 ¶ 96; *see also* Pet. 34–35.

Table 7.1.7.1-1: Modulation and TBS index table for PDSCH

MCS Index I_{MCS}	Modulation Order Q_m	TBS Index I_{TBS}
0	2	0
1	2	1
2	2	2
3	2	3
4	2	4
5	2	5
6	2	6
7	2	7
8	2	8
9	2	9
10	4	9
11	4	10
12	4	11
13	4	12
14	4	13
15	4	14
16	4	15
17	6	15
18	6	16
19	6	17
20	6	18
21	6	19
22	6	20
23	6	21
24	6	22
25	6	23
26	6	24
27	6	25
28	6	26
29	2	reserved
30	4	
31	6	

MCS Index I_{MCS}	Modulation Order Q_m	TBS Index I_{TBS}
0	2	0
1	8	26
2	8	27
3	8	28
4	8	29
5	2	5
6	8	30
7	8	31
8	8	32
9	8	33
10	4	9
11	8	reserved
12	4	11
13	4	12
14	4	13
15	4	14
16	4	15
17	6	15
18	6	16
19	6	17
20	6	18
21	6	19
22	6	20
23	6	21
24	6	22
25	6	23
26	6	24
27	6	25
28	6	26
29	2	reserved
30	4	
31	6	

Table 1: Example for a MCS index table

Table 7.1.7.1-1 from LTE TS 36.213 (Ex. 1009, 33) with first entry highlighted in red added by Petitioner (Pet. 35) and Table 1 from Lahetkangas (Ex. 1011, 16) with first entry highlighted in red added by Petitioner (Pet. 35).

Dr. Kakaes testifies, with reference to the two tables above, “Lahetkangas teaches that the lower order entries, including the first entry corresponding to the lowest modulation order [shown in red above], are maintained in both the first and second table and can be used if channel

conditions deteriorate such that their use is desirable as a fallback.”

Ex. 1003 ¶ 96 (citing Ex. 1011, 13:32–36, 14:26–27, 15:1–3). Patent Owner does not discuss the entries in the two tables above in any way. At this juncture of the proceeding, we give substantial weight to Dr. Kakaes’s testimony that Lahetkangas teaches or suggests that “the first entry for the lowest modulation order in the first MCS table is maintained in the second MCS table as the fallback,” because his testimony is supported by record evidence. *Id.*

To the extent the disputed limitation should be construed as Patent Owner implicitly contends (Prelim. Resp. 57–58), we determine, at this juncture of the proceeding that Petitioner has sufficiently shown that it would have been obvious to a POSITA *to use* Lahetkangas’s lowest modulation order from the second MCS table. Pet. 36 (citing Ex. 1011, 13:32–36, 14:26–27; Ex. 1003 ¶¶ 96–98). In particular Petitioner contends, and we preliminarily agree, that Lahetkangas “teaches that the first entry for the lowest modulation order from the common area in the second table (entries common to both the first table and second table) can be used if channel conditions drop quickly and it is desirable to use a lower order legacy entry as a fallback.” *Id.* In support of the contention, Dr. Kakaes testifies that a POSITA would have understood that when channel conditions deteriorate, it would be desirable to change to one of the lower modulation orders. Ex. 1003 ¶¶ 96, 98. At this juncture of the proceeding, we give substantial weight to his testimony, because Lahetkangas Table 1 reproduced above shows maintaining the lowest modulation order (first entry in red box) that can be used in “situations where extended 256QAM table *is in use* and channel conditions drop quickly.” Ex. 1011, 13:34–36 (emphasis added). Dr. Kakaes also testifies that “retaining MCS index

0/modulation order 2 in the second table would offer the ability to transition to the lowest modulation order to maintain communications in the broadest range of channel deterioration conditions” and that “a POSITA would have understood switching to such a lower modulation order to be a desirable way to retain communications between a base station and a UE in deteriorating channel conditions.” Ex. 1003 ¶ 98. Based on the current record, we determine Dr. Kakaes’s reasons for why a POSITA would use the lowest modulation order are reasonable. Patent Owner argues that Petitioner’s “expert never opines that Lahetkangas suggests or requires a shift to the first entry, or the lowest MCS entry in the second table, if channel conditions deteriorate.” Prelim. Resp. 58. This argument does not undermine Petitioner’s showing. Again, Lahetkangas Table 1 shows maintaining the lowest MCS entry in the second table for potential use and we preliminarily agree with Petitioner that it would have been obvious to use it. Pet. 36.

Next, Patent Owner argues that Lahetkangas does not disclose or suggest that “an entry for the lowest coding rate of the lowest modulation order in the first CQI table is maintained in the second CQI table as the fallback.” Prelim. Resp. 59–62. Patent Owner’s attorney arguments do not undermine Petitioner’s supported assertions that “Lahetkangas teaches applying the same technique performed on the MCS table (described above) to the CQI table” and that “the invention of Lahetkangas is directed to adding a 256QAM extension to *both the MCS table and CQI table* defined in the LTE standard.” Pet. 36–37 (citing Ex. 1011, 2:1–6, 12:33–35, 13:19–30, 17:2–3; Ex. 1003 ¶ 99). Based on Lahetkangas’s descriptions, we agree with Petitioner that “Lahetkangas teaches that the second CQI table would maintain common legacy entries from the first CQI table consistent with the implementation of the MCS table.” *Id.* at 37 (citing Ex. 1003 ¶ 99). Patent

Owner’s argument (Prelim. Resp. 59–60) that “Lahetkangas fails to disclose *any* embodiments of a modified [CQI] table” that corresponds to the modified MCS table are misplaced as Lahetkangas does teach embodiments of a modified CQI table that corresponds to the modified MCS table. Ex. 1011, 7:5–9 (explaining that a change in MCS tables results in a corresponding change to CQI tables since the UE may “determine the CQI based on a table which corresponds to the selected MCS table.”), 13:20–25 (“additional new MCS and CQI index tables with extension to 256QAM ($Q_m=8$) may be generated”), 13:32–37 (“the MCS/CQI index table with 256QAM extension is formed . . . there may be a few common modulation / TB sizes in the common MCS index area from the low range of the modulation set for such situations where extended 256QAM table is in use and channel conditions drop quickly”), 14:11–12 (“[t]he herein described second tables for the MCS and CQI index tables may be generated corresponding to 36.213 table 7.1.1-1 but with extension to 256QAM ($Q_m=8$)”), 17:1–3 (“[s]imilarly to the MCS index table, a new CQI index table with 256QAM extension and with common index area be used”). Moreover, and based on the current record before us, we determine that a POSITA would have understood “an MCS table change to result in a corresponding CQI table change” such that “the second CQI table would maintain common lower modulation order legacy entries from the first CQI table in the same manner that legacy entries were maintained in the MCS table . . . because of the correlation between the MCS table and the CQI table.” Ex. 1003 ¶¶ 99–100.

Patent Owner’s additional arguments regarding Marinier (Ex. 2001) are misplaced and not particularly relevant to *the teachings of Lahetkangas*. Prelim. Resp. 61. That Marinier does not disclose “that the CQI values in

the second CQI table correlate directly to the CQI values in the first CQI table,” does not undermine Petitioner’s showing that Lahetkangas teaches a correlation *between the MCS table and the CQI table* as explained by Dr. Kakaes. Ex. 1003 ¶¶ 99–100.

We have reviewed Petitioner’s showing for independent claims 11, 21, 23, 25, and 27 along with dependent claims 2–7, 9, 12–17, and 19 and find such showing sufficiently persuasive at this stage of the proceeding. Pet. 38–47. At this juncture of the proceeding, Patent Owner does not make separate arguments for these claims. Prelim. Resp. 62–63. Based on the current record, we determine the information presented shows a reasonable likelihood that Petitioner would prevail in establishing that at least one of the challenged claims 1–7, 9, 11–17, 19, 21, 23, 25, and 27 would have been obvious over Lahetkangas with or without LTE TS 36.213.

F. Asserted Obviousness of Claims 8 and 18 over Lahetkangas and Wang with or without LTE TS 36.213

Petitioner contends that claims 8 and 9 are unpatentable under 35 U.S.C. § 103(a) as obvious over Lahetkangas and Wang with or without LTE TS 36.213. Pet. 65–70. In support of its showing, Petitioner relies upon the Kakaes declaration. *Id.* (citing Ex. 1003).

1. Wang

Wang describes a parameter table configuration method in the communication field. Ex. 1006, 1:9–10. The method includes “configuring a parameter table in a wireless communication system” by “defining at both the base station and the user equipment a parameter table which includes whole entries of a legacy parameter table and extended entries.” *Id.* at code (57). In one embodiment, the method includes “defining at both the eNode

B and the UE a parameter table which includes whole entries of a legacy parameter table and extended entries” and then “transmitting from the eNode B to the UE a bitmap indication which indicates a sub-table selected from the parameter table” where the number of entries in the sub-table is the same as in the legacy parameter table. *Id.* at 4:53–58.

2. Discussion

Claim 8 depends from claim 1 and recites

wherein the at least one of the second MCS table and the second CQI table is a modification of the at least one of the first MCS table and the first CQI table, respectively, where all entries of the at least one of the first MCS table and the first CQI table have been maintained in the at least one of the second MCS table and the second CQI table and a set of entries for the higher modulation order have been added.

Claim 18 depends from claim 11 and includes a similar limitation.

Petitioner provides reasons for employing Wang’s “extended or aggressive MCS table (i.e., a second MCS table).” Pet. 65–70. We have reviewed Petitioner’s showing for dependent claims 8 and 18 and find such showing sufficiently persuasive at this stage of the proceeding. *Id.* Patent Owner does not contest claims 8 and 18 separately. Prelim. Resp. 63–64.

We conclude that, based on the totality of the arguments and evidence currently in the record, Petitioner has sufficiently shown, for purposes of institution, that Lahetkangas and Wang with or without LTE TS 36.213 teach or suggest the limitations of claims 8 and 18, and that a person of ordinary skill in the art would have had reason to combine the references in the manner Petitioner proposes. Accordingly, we determine the information presented shows a reasonable likelihood that Petitioner would prevail in

establishing that challenged claims 8 and 18 would have been obvious over Lahetkangas and Wang with or without LTE TS 36.213.

III. CONCLUSION

For the foregoing reasons, we determine that the information presented establishes a reasonable likelihood that Petitioner would prevail in showing at least one of claims 1–9, 11–19, 21, 23, 25, and 27 of the '440 patent is unpatentable.

IV. ORDER

Accordingly, it is:

ORDERED that pursuant to 35 U.S.C. § 314(a), an *inter partes* review is hereby instituted as to claims 1–9, 11–19, 21, 23, 25, and 27 of the '440 patent on the grounds set forth in the Petition; and

FURTHER ORDERED that pursuant to 35 U.S.C. § 314(c) and 37 C.F.R. § 42.4, notice is hereby given of the institution of a trial; the trial will commence on the entry date of this decision.

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