

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

TESLA, INC.,
Petitioner,

v.

INTELLECTUAL VENTURES II LLC,
Patent Owner.

IPR2025-00217
U.S. Patent No. 10,952,153

**PETITION FOR *INTER PARTES* REVIEW
UNDER 35 U.S.C. § 312 AND 37 C.F.R. § 42.104**

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PETITIONER’S EXHIBIT LIST

Ex.1001	U.S. Patent No. 10,952,153 to Anderson (“’153 Patent”)
Ex.1002	Prosecution File History of U.S. Patent Application No. 16/410,614 (“’614 Application”) issued as the ’153 Patent
Ex.1003	Declaration of Michael Kotzin under 37 C.F.R. § 1.68
Ex.1004	U.S. Patent No. 6,600,772 to Zeira et al. (“Zeira”)
Ex.1005	U.S. Patent Application Publication No. 2004/0190485 by Khan (“Khan”)
Ex.1006	U.S. Patent No. 7,493,133 to Krishnan et al. (“Krishnan”)
Ex.1007	U.S. Patent No. 6,529,741 to Tong et al. (“Tong”)
Ex.1008	U.S. Patent Application Publication No. 2004/0077370 by Dick et al. (“Dick”)
Ex.1009	U.S. Patent No. 6,334,047 to Andersson et al. (“Andersson”)
Ex.1010	U.S. Patent Application Publication No. 2001/0036238 by Baker et al. (“Baker”)
Ex.1011	Prosecution File History of U.S. Patent Application No. 10/917,968 (“’968 Application”) issued as U.S. Patent No. 8,897,828 to Anderson (“’828 Patent”)
Ex.1012	Harri Holma & Antti Toskala, WCDMA for UMTS: Radio Access for Third Generation Mobile Communications (2d ed. 2002)
Ex.1013	Reserved
Ex.1014	<i>Curriculum Vitae</i> of Michael Kotzin
Ex.1015	IV’s Preliminary Infringement Contentions, <i>Intellectual Ventures II, LLC v. Tesla, Inc.</i> , No. 6:24-cv-188-ADA (WDTX)
Ex.1016	Shin & Zeira et al., “Pathloss-Aided Closed Loop Transmit Power Control for 3G UTRA TDD,” IEEE (2003)

Ex.1017	IV's Complaint, <i>Intellectual Ventures II, LLC v. Tesla, Inc.</i> , No. 6:24-cv-188-ADA (WDTX)
Ex.1018	Proposed Scheduling Order, <i>Intellectual Ventures II, LLC v. Tesla, Inc.</i> , No. 6:24-cv-188-ADA (WDTX)
Ex.1019	Statistics on District Court Timing
Ex.1020	Interim Procedure for Discretionary Denials in AIA Parallel District Court Litigation, June 21, 2022
Ex.1021	Prosecution File History of U.S. Patent Application No. 13/727,153 issued as U.S. Patent No. 9,055,586 to Anderson
Ex.1022	Prosecution File History of U.S. Patent Application No. 14/713,719 issued as U.S. Patent No. 9,414,326 to Anderson
Ex.1023	Prosecution File History of U.S. Patent Application No. 15/229,906 issued as U.S. Patent No. 9,706,500 to Anderson
Ex.1024	Prosecution File History of U.S. Patent Application No. 15/645,523 issued as U.S. Patent No. 10,292,113 to Anderson
Ex.1025	Andrew S. Tanenbaum, "Computer Networks," 4th ed. (2002)
Ex.1026	United States Copyright Office Catalog Record for Andrew S. Tanenbaum, Computer Networks, 4th ed. (Ex.1025)
Ex.1027	Behrouz A. Forouzan, "Data Communications and Networking," (3 rd ed. 2003)
Ex.1028	Copyright registration record for Forouzan (Ex.1027)
Ex.1029	Prabhakar Chitrapu, et al., "Wideband TDD: WCDMA for the Unpaired Spectrum," (2004)
Ex. 1030	U.S. Patent No. 7,519,390 (the "'390 patent")
Ex. 1031	U.S. Patent No. 6,351,460 (the "'460 patent")

I. INTRODUCTION

Issued almost 17 years after its first family member was filed, U.S. Patent No. 10,952,153 (the “’153 patent,” Ex.1001) contains claims no longer directed to the allegedly novel technique described in the specification. The specification describes combined open and closed loop power control in a wireless communication system. The claims, however, recite a collection of known power control techniques mentioned only briefly (or not at all) in the specification. For example, the recited transmit power control (TPC) command was a well-known way to control transmit power. Similarly, the recited “*indication*” of TPC command accumulation—while not described in the specification—was well described in the art. Indeed, the Board agreed these recited features were likely unpatentable when instituting three previous IPRs challenging an ancestor of the ’153 patent.

Accordingly, pursuant to 35 U.S.C. §§311, 314(a), and 37 C.F.R. §42.100, Tesla, Inc. (“Petitioner”) respectfully requests that the Board review and find unpatentable claims 1-5, 10-15, and 20 (the “Challenged Claims”) of the ’153 patent.

II. GROUNDS FOR STANDING

Petitioner certifies that the ’153 patent is eligible for IPR and that Petitioner is not barred or estopped from requesting IPR challenging the patent claims. 37

C.F.R. §42.104(a).

III. NOTE

Petitioner cites to exhibits' original page numbers, unless noted otherwise.

Emphasis in quoted material has been added. Claim terms are presented in *italics*.

IV. THE '153 PATENT

A. Technological Background

The '153 patent relates to power control techniques that were well-known as of the earliest claimed priority date. Dr. Kotzin's declaration describes the relevant background technology predating the '153 patent, which is cited as appropriate below. *See* Ex.1003, ¶¶37-45; Exs.1025, 1027, 1029.

B. Overview

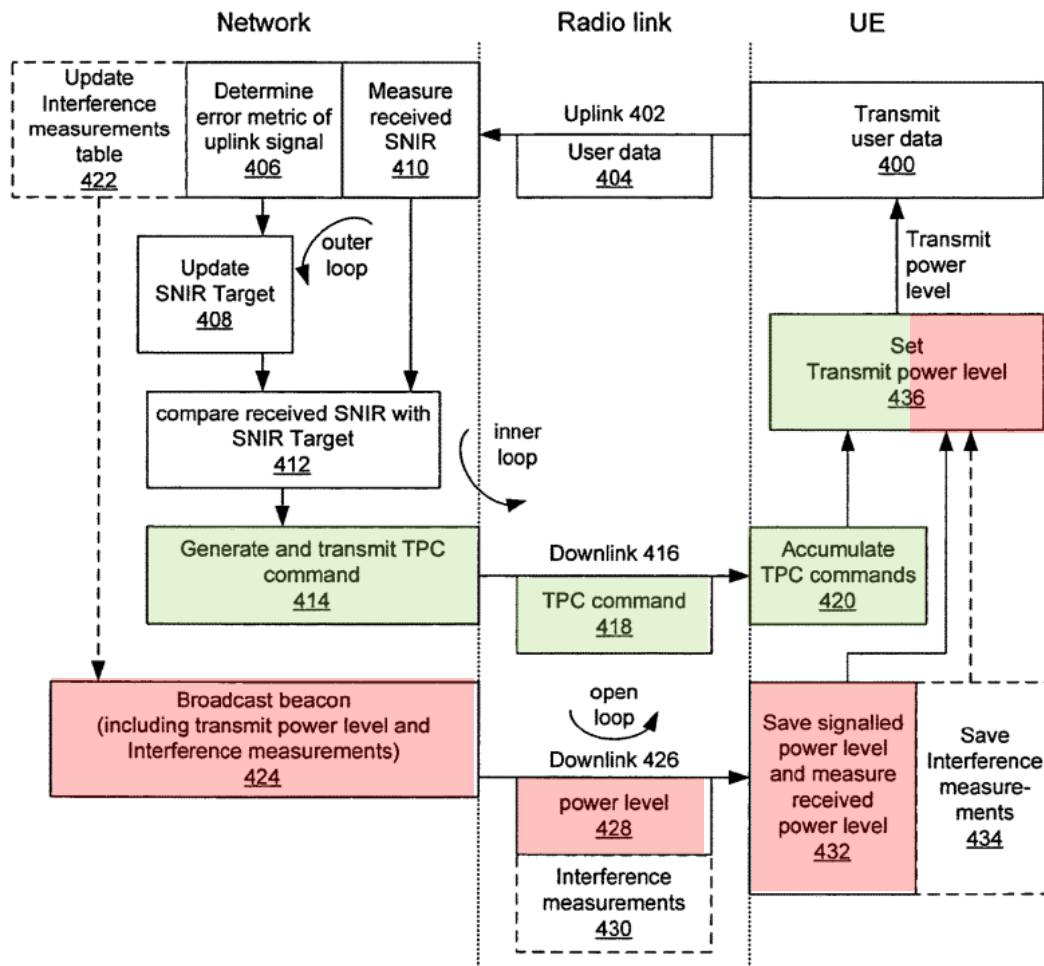
The '153 patent is directed to uplink power control in a wireless communication system. Ex.1001, Abstract, 1:28-31. A wireless communication system generally involves a mobile radio (abbreviated as "UE" or user equipment) and a base station. *Id.*, 1:58-67. The '153 patent background acknowledges the two well-known power control modes, "open loop" and "closed loop." *Id.*, 1:58-60.

"Open loop" power control involves a UE measuring a received signal strength to set its transmission power based on "path loss." *Id.*, 2:24-35. Path loss is the "difference between the actual transmit power level and the received signal power level." *Id.*, 5:9-13. "Closed loop" power control involves the base station

issuing transmit power control (TPC) commands to the UE to increase or decrease the UE's current transmit power—where the UE's current transmit power was previously adjusted by the previously-received TPC command. *Id.*, 2:36-44. The process of iteratively adjusting the UE's transmit power with each received TPC command is called “accumulation” of TPC commands. *Id.*, 10:9-30; Ex.1003, ¶47. In some cases, “[b]inary signalling may be used, such that the TPC command indicates a change in transmission power by a fixed amount either up or down.” Ex.1001, 9:15-17. The '153 patent notes, without further explanation, that “[a]lternately, a multi-level TPC command may be used.”¹ *Id.*, 9:17-18.

The '153 patent's purported novelty lies in a power control method in which “aspects of both an open loop scheme and a closed loop scheme are strategically combined to form a power control method.” Ex.1001, 8:24-26. This purported novelty is illustrated by, for example, Fig. 4 below, with open loop aspects highlighted in red and closed loop aspects highlighted in green. Ex.1001, 9:43-45.

¹ During prosecution of a family member application, Applicant stated “a multi-level TPC command may have either at least two amounts/levels up or two amounts/levels down.” Ex.1023, 49.



Ex.1001, Fig. 4 (annotated); Ex.1003, ¶48.

As seen above in Fig. 4, the “network generates and transmits 414 a TPC command” and “downlink signal 416 carries the TPC command 418 over the radio link.” *Id.*, Fig. 4, 10:10-14. The UE uses both a path loss calculation and “accumulates 420 the TPC commands and uses the accumulated TPC commands ... to set 436 the transmit power for future uplink transmissions 400.” *Id.*, Fig. 4, 10:14-17, 10:31-35.

The ’153 patent explains that in its system “a new physical channel on the

downlink may be used to carry fast allocation and scheduling information to a user, thereby informing the UE of the uplink resources that it may use.” Ex.1001, 12:66-13:2. This new physical channel may also “carry TPC commands.” *Id.*, 13:4-6.

Despite the specification describing the above combined open loop and closed loop power control scheme, the claims of the ’153 patent do not. The claims instead recite a collection of well-known and conventional UE power control elements: (i) receiving an indication that TPC accumulation is enabled; (ii) receiving scheduling information and a multi-level TPC command on a single physical channel; and (iii) transmitting an uplink signal based on (ii).

V. PROSECUTION HISTORY

A. Prosecution history of the ’153 patent

The ’153 patent issued on March 16, 2021, from an application filed on May 13, 2019. The ’153 patent claims priority through a line of continuations to Application No. 10/917,968 (the “’968 application” filed on Aug. 12, 2004, issuing as U.S. Patent No. 8,897,828 (the “’828 patent”)).

The prosecution history of the ’153 patent includes only two office actions, with no prior art-based rejections. In the first Office Action, the Examiner rejected as-filed claims 1-8 for double patenting over the immediate parent patent (U.S. 10,292,113). Ex.1002, 155-158. In response, the Applicant canceled all claims and added 20 new claims. In the second Office Action, the Examiner rejected the new

claims for double patenting over the immediate parent patent or another family member (U.S. 9,414,326). Ex.1002, 72-81. The Applicant filed a terminal disclaimer to overcome the rejection, after which the pending claims were allowed. Ex.1002, 54-55, 36.

B. Prosecution and IPR history of the ancestor '828 patent

The first application filed in the '153 patent family was the '968 application that led to the '828 patent. Its prosecution history is addressed here only to the extent relevant to the grounds asserted in this Petition.

The prosecution of the '968 application was lengthy and included a failed appeal. *See generally* Ex.1011 (including 5 office actions and an appeal). The Examiner showed that the basic concept of hybrid open and closed loop power control was anticipated or rendered obvious by the WO version of the Zeira reference cited herein², in combination with other references. Ex.1011, 394-399. After the Board affirmed the Examiner's rejections on appeal, the Applicant canceled all claims and added new claims including limitations requiring receiving *"an indication of whether accumulation of transmit power control (TPC)*

²The Examiner relied on the WO version of Zeira (WO 00/57574), which is substantially identical to its U.S. counterpart (Ex.1004).

commands is enabled”—a limitation also present in the independent claim 1 of the ’153 patent. Ex.1011, 197, 162-172.

The Examiner rejected the new claims under §112 as lacking written description. Ex.1011, 145-147. The Applicant responded to the §112 rejection by identifying a portion of the specification describing a “new parameter” that instructs the UE to enable closed loop power control (via TPC commands), open loop power control (via path loss estimation), or a combined scheme:

...a Node-B or RNC may be implemented with a new parameter, either included in a signaling command or a broadcast message, where the new parameter instructs a UE to enable or disable the setting of uplink transmit power level based on both the path loss estimation and the TPC commands. A parameter may indicate whether a UE is to use open loop power control, closed loop power control or a combined scheme.

Ex.1011, 121-122; *see also id.* at 688-689. Although the Applicant did not explain why this parameter provides §112 support, Dr. Kotzin notes that TPC command accumulation is enabled when closed loop power control is enabled in the system of the ’153 patent. Ex.1003, ¶47 (citing Ex.1001, 7:37-47, 10:4-17)

Consistent with this identification of §112 support, the Zeira grounds in this Petition challenge the “*indication of...accumulation*” limitation with prior art

teaching a parameter that determines whether the UE is to enable closed loop power control (and TPC command accumulation). *See* Ex.1004 (Zeira), 6:1-20, 7:16-22.

After issuance, the '828 patent was challenged in three different IPR proceedings brought by petitioners unrelated to the current petitioner: IPR2018-01641, IPR2018-01694, IPR2018-01773. Each IPR was instituted but then terminated due to settlement. In the institution decisions, the Board determined that Zeira in combination with various references illustrated that there was a reasonable likelihood that the '828 claims were unpatentable. IPR2018-01641, Paper 7 at 14-15 (Mar. 20, 2019); IPR2018-01649, Paper 7 at 15-17 (Mar. 20, 2019); IPR2018-01773, Paper 9 at 15-16 (Apr. 22, 2019).

Importantly, the '828 claims the Board found to be likely unpatentable are *narrower* than the Challenged Claims of the '153 patent. That is, the '828 claims include limitations corresponding to those of the '153 patent claims plus additional limitations, as shown below.

'153 Patent, claim 11	'828 patent, claim 1
11. A method performed by a user equipment (UE) having a transmitter and a receiver, the method comprising: receiving, by the UE, an indication from a network device that transmit power control (TPC) command accumulation is enabled;	1. A method performed by user equipment (UE), the method comprising: receiving, by the UE, an indication of whether accumulation of transmit power control (TPC) commands is enabled; determining, by the UE, a path

receiving, by the UE on a single physical channel from the network device, scheduling information and power control information that includes a multi-level TPC command; and transmitting, by the UE to the network device, an uplink signal based on the received scheduling information and the multi-level TPC command.	loss of a downlink channel; receiving, on a single physical channel by the UE if accumulation is enabled, an allocation of a scheduled uplink resource and a TPC command, wherein the TPC command is accumulated with other received TPC commands; calculating, by the UE if accumulation is enabled, transmit power in association with an uplink communication based on both the path loss and the accumulated TPC commands; and receiving, on the single physical channel by the UE if accumulation is not enabled, an allocation of a scheduled uplink resource to transmit data at a power level calculated by the UE based on the path loss.
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Accordingly, the Challenged Claims were obvious prior to the claimed priority dated, including, in view of the Zeira grounds (Grounds 3 and 4) that are similar to the Zeira grounds the Board found reasonably likely to render obvious the '828 patent.

VI. PRIORITY DATE OF THE '153 PATENT

The earliest possible priority date of the '153 patent is August 12, 2004. Determining whether the '153 patent is entitled to this date is unnecessary in this proceeding as all the relied-upon prior art predates August 12, 2004. Petitioner

does not waive any right or opportunity to dispute the priority date of the '153 patent in this or another forum where the issue is relevant.

VII. LEVEL OF ORDINARY SKILL IN THE ART

A person of ordinary skill in the art (“POSITA”) in August 2004 would have been someone knowledgeable and familiar with the wireless communications systems that are pertinent to the '153 patent. That person would have a bachelor’s degree in electrical engineering, computer engineering, computer science, or equivalent training, and approximately two years of experience working in the field of wireless communication systems or design of similar communication systems. Lack of work experience can be remedied by additional education, and vice versa. Ex.1003, ¶31.

VIII. CLAIM CONSTRUCTION

Claim terms in IPR are construed according to their “ordinary and customary meaning” to those of skill in the art. 37 C.F.R. §42.100(b). Petitioner submits that, for the purposes of this proceeding and the grounds presented herein, no claim term requires express construction.³ *Nidec Motor Corp. v. Zhongshan Broad Ocean Motor Co.*, 868 F.3d 1013, 1017 (Fed. Cir. 2017).

³ Petitioner does not concede that any term in the Challenged Claims meets the statutory requirements of 35 U.S.C. §112.

IX. RELIEF REQUESTED AND THE REASONS FOR THE REQUESTED RELIEF

Petitioner asks that the Board institute IPR and cancel the Challenged Claims in view of the analysis below.

X. IDENTIFICATION OF HOW THE CLAIMS ARE UNPATENTABLE

A. Challenged claims

Petitioner challenges claims 1-5, 10-15, and 20.

B. Statutory grounds for challenges

Grounds	Claims	Basis (pre-AIA)
#1	1-2, 4-5, 11-12, 14-15	35 U.S.C. §103 over Andersson in view of Baker and Khan
#2	3, 13	§103 over Andersson in view of Baker, Khan, and Dick
#3	1-2, 4-5, 10-12, 14-15, 20	§103 over Zeira in view of Baker, Khan, and Tong
#4	3, 13	§103 over Zeira in view of Baker, Khan, Tong, and Dick

U.S. Patent 6,334,047 to **Andersson** et al. issued on December 25, 2001, and is prior art at least under §102(a), (b), and (e).

U.S. Publication 2001/0036238 to **Baker** et al. was filed on March 21, 2001, published on November 1, 2001, and is prior art at least under §102(a), (b), and (e).

U.S. Publication 2004/0190485 to **Khan** was filed on March 24, 2003, published on September 30, 2004, and is prior art at least under §102(e).

U.S. Publication 2004/0077370 to **Dick** et al. was filed on October 16, 2003, published on April 22, 2004, and is prior art at least under §102(a) and (e).

U.S. Patent 6,600,772 to **Zeira** et al. issued on July 29, 2003, and is prior art at least under §102(a), (b), and (e).

U.S. Patent 6,529,741 to **Tong** et al. issued on March 4, 2003, and is prior art at least under §102(a), (b), and (e).

C. Ground 1: Claims 1-2, 4-5, 11-12, and 14-15 are obvious over Andersson in view of Baker and Khan

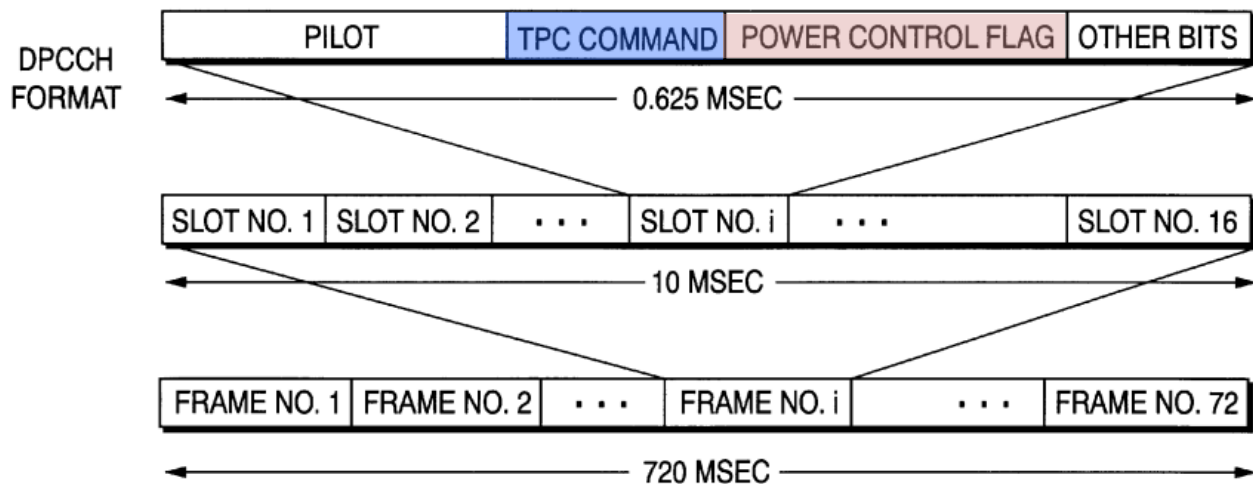
1. Andersson

Like the '153 patent, Andersson generally relates to the field of “radio transmission power control” in a CDMA radio communications system. Ex.1009, 1:6-8. Also like the '153 patent, Andersson recognizes that UE transmit power may be controlled using “open loop power control in combination with a closed loop power control.” Ex.1009, 3:65-67. Andersson improves upon such combined systems with more efficient power control signaling, including the indication of which power control scheme a UE should employ (where a known scheme is TPC command accumulation). Ex.1009, Abstract. Andersson further teaches a UE receiving multi-level TPC commands and controlling uplink transmission power based on such commands. Ex.1009, 9:33-50, 11:26-28.

For example, Andersson teaches using TPC commands with different “bit

patterns” to signal different power control adjustment “step sizes”—where the “first step size might be a typical step size change such as plus or minus 1 dB” and the “second step size might correspond to a larger amount, e.g., 8 dB.” Ex.1009, 9:33-50. Andersson also teaches transmitting to the UE “power control indicator” flag bits along with the TPC command that “indicat[e] which type of power control adjustment should be used by the radio transceiver.” Ex.1009, 5:50-54, 6:21-27.

Andersson’s power control message format is illustrated in Fig. 5, below:



Ex.1009, Fig. 5 (annotated); Ex.1003, ¶58

2. Baker

Like Andersson (and the '153 patent), Baker describes a CDMA communication system in which the base station indicates to a UE which power control scheme to utilize via signaling. Ex.1010, Baker, [0002], [0006]. Specifically, a power control algorithm (PCA) bit received by the UE indicates

whether TPC command accumulation is enabled—i.e., the UE’s transmit power is updated with each received TPC command. Ex.1010, [0021]-[0023]. Ex.1010, [0021]-[0023]. If accumulation is not enabled, the UE will instead analyze the last five TPC commands, and if all five are “1”, transmission power is increased by 1 dB and if all five a “0”, power is decreased by 1. Ex.1010, [0022]-[0023].

3. Reasons to combine Andersson and Baker

For the reasons set forth below, a POSITA would have been motivated to combine the teachings of Andersson with Baker. Ex.1003, ¶¶60-69. In particular, before the priority date of the ’153 patent, it would have been obvious, beneficial, and predictable to utilize in Andersson’s system the technique of Baker of indicting to the UE whether TPC accumulation is enabled. Ex.1003, ¶60. Andersson’s system already contemplates receiving a power control scheme selection flag in addition to a TPC command, and Baker provides a specific implementation of that flag. Ex.1003, ¶60.

a) Analogous art

A POSITA when considering the teachings of Andersson would have naturally considered the teachings of Baker, as Baker is analogous prior art pertaining to the same field of endeavor as both the ’153 patent and Andersson, namely, “mobile radio systems or wireless communication systems.” Ex.1001, 1:28-31; Ex.1009, 1:6-8; Ex.1010, [0001]; Ex.1003, ¶61. Both Andersson and

Baker, like the '153 patent, describe power control of user equipment by a base station in a radio communications system. Ex.1001, Fig.4; Ex.1009, 7:16-18; Ex.1010, [0008]-[0013]. Andersson and Baker are also pertinent to a particular problem of the '153 patent, such as “reducing errors in a received signal while also reducing interference imposed on signals received at other receivers.” Ex.1001, 2:52-57; Ex.1009, 5:35-38; Ex.1010, [0003].

b) Motivation to combine Andersson with Baker

A POSITA would have been motivated to incorporate Baker’s teachings regarding a specific power control algorithm into Andersson’s system due to the compatibility and similarity of their teachings. Ex.1003, ¶¶63-66. Specifically, Baker implements the general framework of Andersson that contemplates the UE receiving a power control flag in addition to the TPC command that selects which power control scheme the UE should utilize. Ex.1003, ¶63. A POSITA would have applied the known technique of Baker to the general system of Andersson to yield predictable results. Ex.1003, ¶63. Also, the technique of Baker is the simple substitution of one known element for another to obtain predictable results. Ex.1003, ¶63.

As discussed above, Andersson describes a general framework for communicating power control adjustments to a UE through a TPC command and a “power control indicator.” Ex.1009, 5:50-54, 9:33-50, Fig. 5. Andersson, however,

describes this power control indicator as a generic indicator that may be utilized to indicate “whether a first type or a second type of power control adjustment should be used.” Ex.1009, 9:9-11. To that end, Baker provides a specific implementation, or alternatively, a simple substitution, for Andersson’s power control indicator—a power control algorithm (PCA) bit received by the UE that indicates whether TPC command accumulation is enabled or disabled. Ex.1010, [0021]-[0023]. Baker’s PCA indicator indicates whether the UE is to (i) iteratively adjust the current transmission power by the most recently received TPC command (i.e., TPC command accumulation) or (ii) analyze the last five TPC commands, and if all five are “1,” increase transmission power by 1 dB, and if all five a “0,” decrease power by 1. Ex.1010, [0022]-[0023]. Baker explains that this second power control scheme effectively emulates the use of a power control step size of approximately 0.2 dB, thereby providing the UE with an alternative and beneficial smaller power adjustment option. Ex.1010, [0023]; Ex.1003, ¶65.

In particular, Baker explains that a step size of less than 1 dB is desirable “[w]hen the channel changes very slowly..., since such values are sufficient to track changes in the channel while giving minimal tracking error.” Ex.1010, [0005]. Andersson similarly explains that “it may be better to use small size power steps” in the case of a “fast moving mobile user.” Ex.1009, 5:10-14. “In that case, a 1 dB power step size may be too large or will only serve to increase power

fluctuations.” Ex.1009, 5:10-14. Thus, a POSITA would have been motivated to incorporate Baker’s non-accumulation scheme that provides a smaller, beneficial power adjustment option into Andersson’s system to improve Andersson “in the same way.” *KSR Int’l v. Teleflex Inc.*, 550 U.S. 398, 417 (2007) (finding obviousness when a known technique “would improve similar devices in the same way”); Ex.1003, ¶¶64-66.

c) Reasonable expectation of success

Not only would utilizing Baker’s Power Control Algorithm (PCA) parameter in Andersson’s system have been advantageous, but a POSITA also would have found the combination predictable and would have had a reasonable expectation of success for several reasons. Ex.1003, ¶¶67-69. First, as discussed above, Baker provides a specific implementation for Andersson’s generic “power control indicator” that “indicat[es] which type of power control adjustment should be used by the radio transceiver.” Ex.1009, 5:50-54. Indeed, Baker is explicit that its technique “is suited for use in a range of other systems” and, in particular, “can be used in any system in which there is a variable power control step size,” such as Andersson’s system. Ex.1010, [0043]; Ex.1003, ¶67. Similarly, Andersson is designed to accommodate different implementations, such as Baker’s. Ex.1009, 5:54-57 (“Depending on a number of indicator bits employed, many different power control adjustments may be employed.”); Ex.1003, ¶67. Thus, the

combination is nothing more than “the predictable use of prior art elements according to their established functions.” *KSR*, 550 U.S. at 417.

Second, Andersson itself contemplates collecting TPC commands over a period of time, like Baker, for reliability purposes. Andersson explains that “to further increase the reliability, TPC bits may be collected over a number of consecutive slots.” Ex.1009, 11:2-4. In the proposed Andersson-Baker combination, when Andersson’s power control indicator (corresponding to Baker’s PCA), indicates that typical TPC command accumulation is not enabled, Andersson will instead collect and compare TPC commands over five time slots rather than adjust the current transmit power by each received TPC command value, just as contemplated by Andersson. Ex.1003, ¶68 (citing Ex.1010, [0023]).

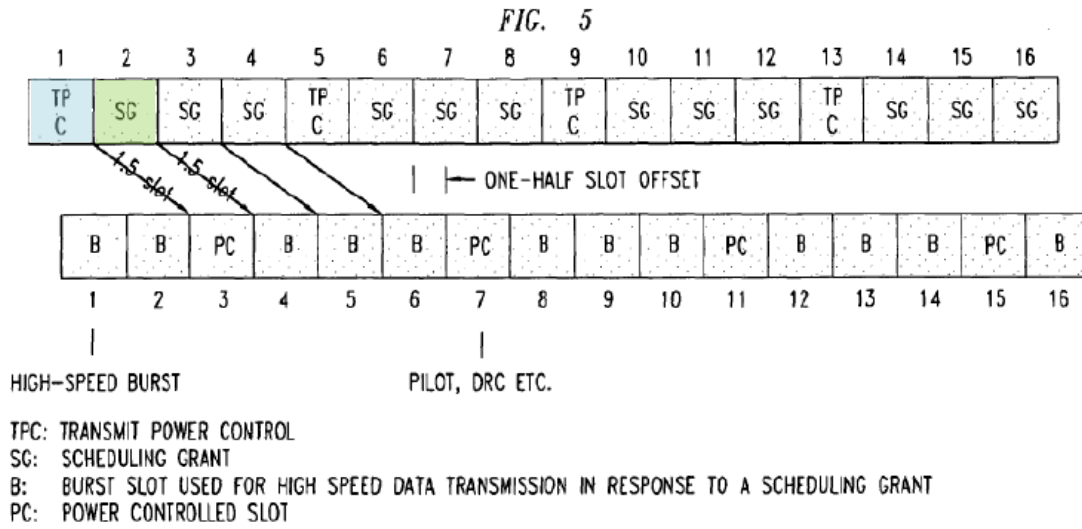
Accordingly, a POSITA would have been motivated and found it predictable to combine Andersson with Baker in the manner proposed. Ex.1003, ¶¶60-69.

4. Khan

Khan discloses, in the context of a CDMA system, a single physical channel over which an allocation of a scheduled uplink resource (i.e., a *scheduling grant*) and a TPC command are transmitted from a base station to a wireless device. *See* Ex.1005, Khan, [0003], [0005], [0043], Fig. 5. Thus, Khan improves on power control and scheduling of UE transmissions by teaching a UE that receives scheduling information and TPC commands on a single physical channel.

Specifically, Khan teaches a method of “transmitting control information for reverse link packet access transmission,” which determines how users (e.g., UEs) use uplink resources. Ex.1005, [0012]; Ex.1003, ¶71. The control information transmitted on the forward link (i.e., the downlink) to control reverse link (i.e., uplink) packet access transmission includes both “scheduling grant(s)” and “transport power control (TPC) information.” Ex.1005, [0043].

Khan discloses that this control information may be transmitted from a base station to a UE over the same Walsh channel, which a POSITA would understand is a physical channel. Ex.1005, [0040], [0047]; Ex.1003, ¶72. Khan explains that channels such as the Forward Medium Access Control Channel (“MAC Channel”), which is a logical channel, “can be composed of Walsh channels that are orthogonally covered and BPSK modulated on a particular phase of the carrier (e.g., either in-phase or quadrature phase).” Ex.1005, [0040]. Khan teaches that “[e]ach Walsh channel is identified by a MACIndex value that is between 0 and 63....” Ex.1005, [0040]. The MACIndex, which identifies the 16 slots in a **single physical channel**, “may, for example, **carry the TPC bits in some slots and the scheduling grant in one or more of the remaining slots**, as shown in FIG. 5.” Ex.1005, [0047]. Khan does this “[i]n order to support both the TPC bits and the scheduling grant dedicated MACIndex transmission simultaneously....” Ex.1005, [0047].



Ex.1005, Fig. 5 (annotated); Ex.1003, ¶72

5. Reasons to combine Andersson and Baker with Khan

a) Analogous art

As an initial matter, a POSITA when considering the teachings of Andersson would have naturally considered the teachings of Khan, as Khan is also analogous prior art pertaining to the same field of endeavor as both the '153 patent and Andersson, namely, “mobile radio system or wireless communication system.” Ex.1001, 1:28-31; Ex.1009, 1:6-8, 1:12-13; Ex.1005, Abstract; Ex.1003, ¶73. Both Andersson and Khan, like the '153 patent, describe TPC commands sent to a mobile station by a base station in a CDMA radio communications system. Ex.1001, Fig.4; Ex.1009, 7:16-18, 7:38-41; Ex.1005, [0012], Fig. 6. Furthermore, Andersson and Khan are reasonably pertinent to the problems that arise “[b]ecause all users of a CDMA communications system transmit information using the same

frequency band at the same time, each user's communication interferes with the communications of the other users." Ex. 1009, 1:62-65. Both Khan and Andersson seek to solve this problem. Ex.1005, [0011]; Ex.1009, 5:28-31; Ex.1003, ¶73.

b) Motivation to combine

A POSITA would have been motivated to transmit on Andersson's "dedicated physical control channel (DPCCH)" both the TPC command and an uplink scheduling grant, as taught by Khan, because it would improve Andersson "in the same way" and require nothing more than "the predictable use of prior art elements according to their established functions." *See KSR*, 550 U.S. at 417; Ex.1003, ¶¶74-75. Andersson discloses both (i) receiving TPC commands from a base station and (ii) transmitting an uplink communication to the base station. Ex.1009, 9:18-24, 7:5-8. This disclosure would have motivated a POSITA to utilize the teachings of Khan, which discloses such signaling techniques used by a base station for allocating uplink resources in a spread-spectrum communication system that similarly transmits TPC commands. Ex.1003, ¶74; Ex.1005, Abstract.

Several benefits may be obtained by transmitting TPC commands and uplink scheduling information over Andersson's "dedicated physical control channel (DPCCH)" (*single physical channel*), including allowing for a larger number of active wireless units. Ex.1005, [0043], [0047]; Ex.1003, ¶75. Further, a POSITA evaluating how Andersson's UE receives uplink scheduling information

would understand that scheduling information is control information and naturally belongs within a control channel, such as Andersson's DPCCH. Ex.1003, ¶75.

Moreover, by combining TPC commands and uplink scheduling information in the same control channel (as opposed to provisioning a separate control channel for the scheduling information) complexity (and thus power usage) is reduced. Ex.1003, ¶75. Latency is similarly reduced because the UE receiving the control information must process fewer protocol layers and channels to obtain needed uplink control information. Ex.1003, ¶75. Thus, a POSITA would have naturally found it obvious to utilize Khan's technique that results in efficient use of channel resources within Andersson's system to achieve the same benefits. *See KSR*, 550 U.S. at 417; Ex.1003, ¶¶74-75.

c) Reasonable expectation of success

Not only would utilizing Khan's technique in Andersson's system have been advantageous, but a POSITA would have also found the combination predictable and would have had a reasonable expectation of success. Ex.1003, ¶76. First, Andersson notes that "detailed descriptions of well-known methods, interfaces, devices, and **signaling techniques** are omitted so as not to obscure the description of the present invention." Ex.1009, 9:18-22, 7:12-15. The details of how Andersson's system signals uplink scheduling grants is one of the well-known techniques not described. A POSITA would have thus naturally expected to be

successful applying well-known signaling techniques such as Khan’s—especially in view of Andersson’s statement that it utilizes “*well-known CDMA techniques* [] to distinguish between the various mobile station and base station communications.” Ex.1009, 7:46-54; Ex.1003, ¶76. For example, with respect to an example implementation of the combination, Andersson recognizes that “other bits” may be transmitted along with the TPC command and power control indicator in the dedicated physical control channel (DPCCH). Ex.1009, 9:14-21. A POSITA would have found it obvious that those other bits may include a scheduling grant as described by Khan. Ex.1003, ¶¶73-76.

6. Claim 1

[1.0] *A user equipment (UE) comprising:*

To the extent the preamble is limiting, Andersson discloses or renders it obvious. Specifically, Andersson discloses a “mobile radio cellular communications system 10” that includes “mobile stations” (*user equipment*) in communication with base stations, as illustrated in Fig. 1. Ex.1009, 7:16-17, 7:38-41, Fig. 1.

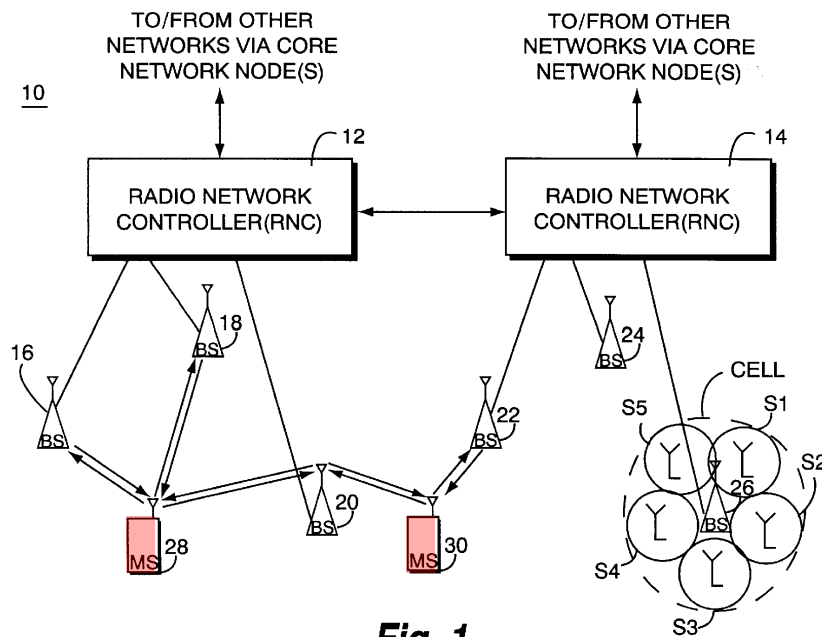


Fig. 1

Ex.1009, Fig. 1 (annotated); Ex.1003, ¶¶77

The '153 patent recognizes that a “**mobile radio** ... may also be referred to as a ... *user equipment (UE)*.” Ex.1001, 1:63-65. Ex.1003, ¶¶77-78.

[1.1] a transmitter; a receiver; a processor operatively coupled to the transmitter and the receiver,

As illustrated in Fig. 3, annotated below, Andersson teaches that its *UE* includes a *transmitter* 90 (red), a *RAKE receiver* 82 (green), and a controller 80 (*processor*) (blue). Ex.1009, 8:23-28. The controller 80 is “**connected to**” the *RAKE receiver* 82, and the *transmitter* 90.” Ex.1009, 8:23-26.

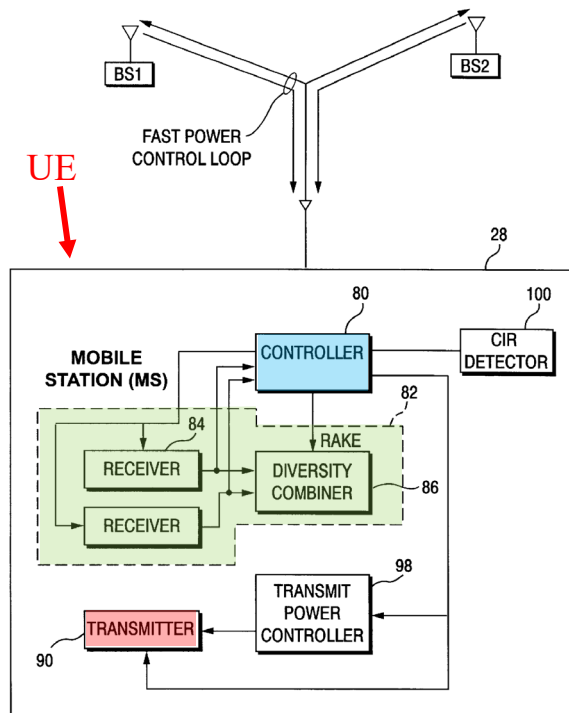


Fig. 3

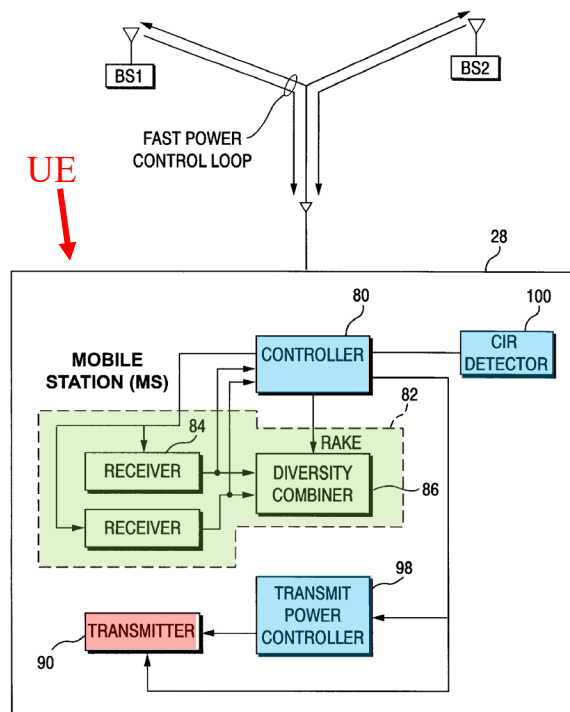
Ex.1009, Fig. 3 (annotated); Ex.1003, ¶79

With respect to the controller 80 (*processor*), Andersson explains that a controller is so-named because it controls the overall operation of wireless equipment, including the establishment and release of radio connections. *See* Ex.1009, 8:6-8 (describing that the purpose of the equivalent “controller” of the base station is to “control[] the overall operation of the base station as well as the establishment, maintenance, and release of radio connections”); *see also* Ex.1031 (’460 patent), 7:17-18 (UE’s controller controls the transmitter and receiver). Accordingly, a POSITA would have at least found it obvious that the controller 80 meets the claimed *processor* because the only claimed requirement of the

processor is “to cause” the receiver and transmitter to take various actions.⁴

Ex.1003, ¶¶79-80.

In addition to the above, a POSITA would have found it obvious that the controller 80, CIR detector 100, and transmit power controller 98 together form a baseband *processor* (in blue). Ex.1003, ¶¶81-87.

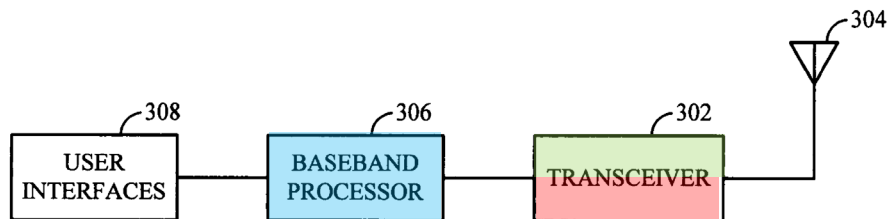


Ex.1009, Fig. 3 (annotated); Ex.1003, ¶81

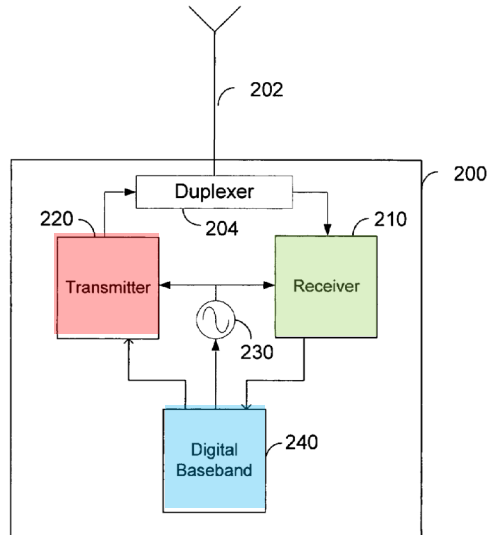
It was well known in the art that a standard UE (like Andersson’s) includes a baseband processor to process the signals received and transmitted via the receiver

⁴ This is especially true given that the ’153 specification does not describe or even mention a “processor.”

and transmitter, as explained by Dr. Kotzin and illustrated in contemporaneous literature. Krishnan, 6:1-2 (received and transmitted signals “processed” by the baseband processor); Ex.1030 (’390 patent), 7:1-20 (same). Ex.1003, ¶¶81-87.



Ex.1006, Fig. 3 (annotated); Ex.1003, ¶82



Ex.1030, Fig. 2 (annotated), Ex.1003, ¶82

A baseband processor typically includes multiple functional elements, like Andersson’s, that are implemented as hardware or software with microprocessors and/or digital signal processors to carry out the various signaling processing. Ex.1003, ¶83 (citing Ex.1006, 5:34-55; Ex.1030, 4:28-31, 15:35-38).

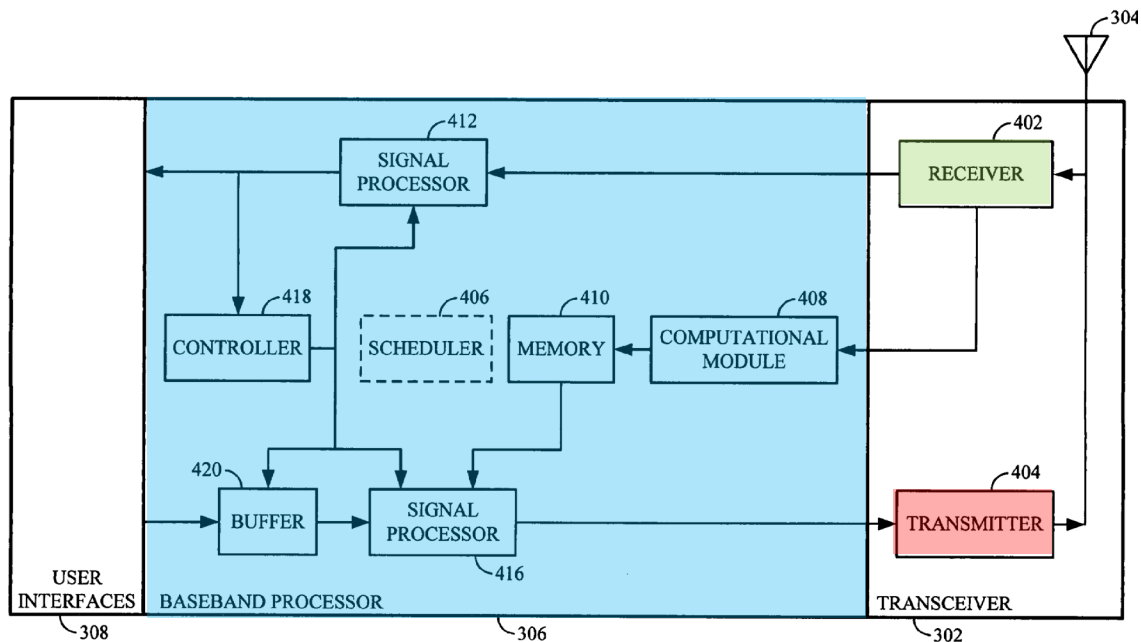


FIG. 5

Ex.1006, Fig. 5 (annotated); Ex.1003, ¶83

Andersson's controller 80, CIR detector 100 and transmit power controller 98 together process the signals received from the RAKE receiver 82 and transmitted by the transmitter 90 in the manner recited in the remaining limitations of claim 1. *See, infra*, elements [1.2]-[1.4]. Accordingly, consistent with the well-understood configuration of a UE, Andersson's controller 80 and/or controller 80, CIR detector 100 and transmit power controller 98 render obvious the recited processor. Ex.1003, ¶¶81-87.

Thus, Andersson renders obvious a transmitter (transmitter 90), a receiver (receiver 82), and a processor (controller 80, etc.) connected (operatively coupled) to the transmitter and the receiver. Ex.1003, ¶¶79-87.

[1.2] wherein the processor is configured to cause: the receiver to receive, from a network device, an indication that transmit power control (TPC) command accumulation is enabled,

The combination of Andersson and Baker renders obvious [1.2]. Ex.1003, ¶¶88-93. As discussed in [1.1], Andersson’s controller 80 (*processor*) controls the receiver 82. Ex.1009, 8:6-8; Ex.1003, ¶88.

With respect to the claimed *TPC command accumulation*, Andersson teaches that its “mobile station receives and detects the TPC command and power control indicator and **makes the appropriate adjustment to its transmit power based thereon,**” where the adjustment is “to **either raise, lower, or make no change to the transceiver’s current transmit power.**” Ex.1009, 12:45-48, 9:4-6. That is, each received TPC command iteratively “adjust[s]” the “current transmit power”—i.e., TPC command accumulation. Ex.1009, 9:4-6, 9:18-24, 3:39-56; Ex.1003, ¶89.

Further, the “power control indicator” sent with the TPC command may “indicate[] whether a first type or a second type of power control adjustment should be used depending upon the difference” in a “desired signal quality parameter.” Ex.1009, 9:1-11. And the power control indicator may be communicated through one or more flag bits, allowing two or more power control schemes to be implemented. Ex.1009, 9:6-7, 10:58-61. Consequently, the power control indicator instructs a mobile station to *enable* one of two or more types of

power control adjustment. Ex.1003, ¶90. In other words, the power control “indicator” is an *indication* that a particular type of power control adjustment is *enabled*. Ex.1003, ¶90. And, a well-known type of power control adjustment before the ’153 patent was TPC accumulation. Ex.1003, ¶¶46-47, 90.

To the extent Andersson does not explicitly teach “*transmit power control (TPC) command accumulation*” as a “type of power control adjustment” that may be indicated by Andersson’s power control indicator, doing so would have been obvious in view of Baker, as described above in Section X.C.3. Ex.1003, ¶¶91-93.

Baker describes a “Power Control Algorithm (PCA)” parameter communicated to the UE that determines which of two power control schemes is used by the UE. Ex.1010, [0021]-[0023]. Specifically, when PCA is 1, TPC command accumulation is enabled because transmission power is updated by the TPC step size (Δ_{TPC}) upon each received TPC command:

When the value of PCA is 1, Δ_{TPC} can take a value of 1 or 2. If a received TPC command is “0” then the MS 110 reduces its transmission power by Δ_{TPC} dB, while if the received command is “1” the MS 110 increases its transmission power by Δ_{TPC} dB.

Ex.1010, [0022] (emphasis added). When PCA is 2, however, **TPC command accumulation is not enabled** because the UE will not iteratively update the transmission power based on each TPC command. Instead, the UE will compare

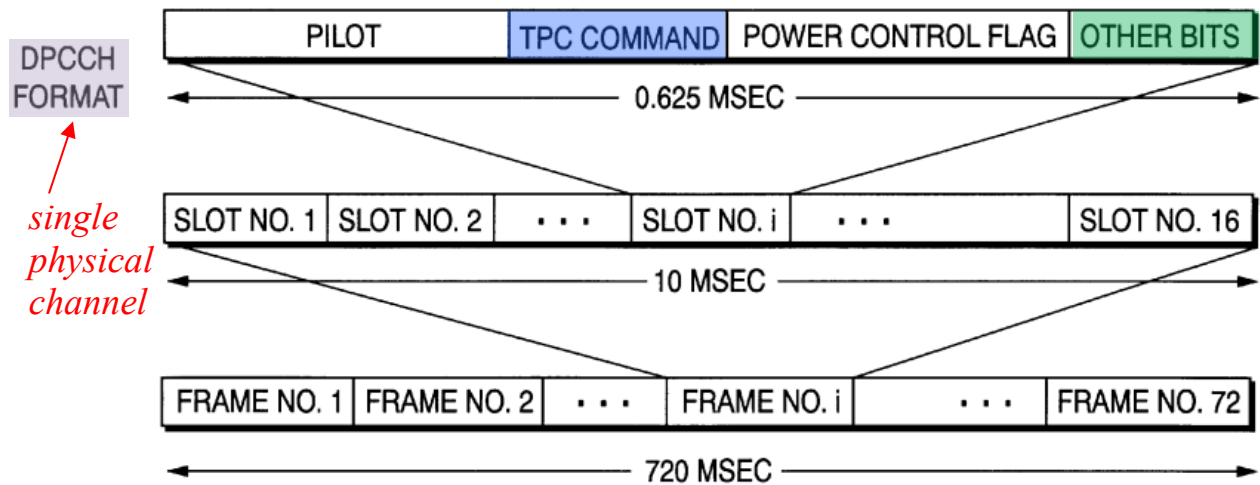
the last five TPC commands, and if all five are “1”, transmission power is increased by 1 dB and if all five a “0”, power is decreased by 1. Ex.1010, [0023]. Accordingly, Baker’s PCA flag received by the UE from the network device is “*an indication that transmit power control (TPC) command accumulation is enabled,*” and a POSITA would have been motivated to utilize such a flag as Andersson’s “power control indicator,” as discussed above in Section X.C.3. Ex.1003, ¶¶91-92.

Thus, the combination of Andersson and Baker renders obvious “*wherein the processor is configured to cause: the receiver to receive, from a network device, an indication that transmit power control (TPC) command accumulation is enabled.*” Ex.1003, ¶¶88-93.

[1.3] *wherein the processor is configured to cause: ... the receiver to receive, from the network device, on a single physical channel, scheduling information and power control information that includes a multi-level TPC command, and*

The combination of Andersson and Khan renders obvious [1.3]. Ex.1003, ¶¶94-103. As discussed in [1.1], Andersson’s controller 80 (*processor*) controls the receiver 84. Ex.1009, 8:6-8; Ex.1003, ¶94.

Andersson’s Fig. 5 (below) illustrates that its UE receives a “**dedicated physical control channel (DPCCH)**” (*single physical channel*) that includes “a **traffic power control (TPC) command** which may include a command to increase, decrease, or maintain transmit power, a power control indicator or flag, **and other bits.**” Ex.1009, 9:14-24, Fig. 5.



Ex.1009, Fig. 5 (annotated); Ex.1003, ¶95

Andersson explains that the receivers within the RAKE receiver 82 receive “transmissions from base stations” (such as the DPCCH). Ex.1009, 8:31-34.

Andersson teaches that the “TPC commands may include one or more bits which indicate a desired increase in transmit power, a desired decrease in transmit power, or in some cases no change in transmit power.” Ex.1009, 8:45-48. In one embodiment, the TPC command is a *multi-level TPC command* with different “bit patterns” to signal different power control adjustment “step sizes.” Ex.1009, 9:33-50. For example, the “first step size might be a typical step size change such as plus or minus 1 dB” and the “second step size might correspond to a larger amount, e.g., 8 dB.” Ex.1009, 9:33-50. Andersson’s Table 1 illustrates the difference between this type of variable step size scheme (“Second Scheme”) and a fixed scheme in which “the power adjustment is a change of 1 dB each time slot”

(“First Scheme”). Ex.1009, Table 1, 10:40-57.

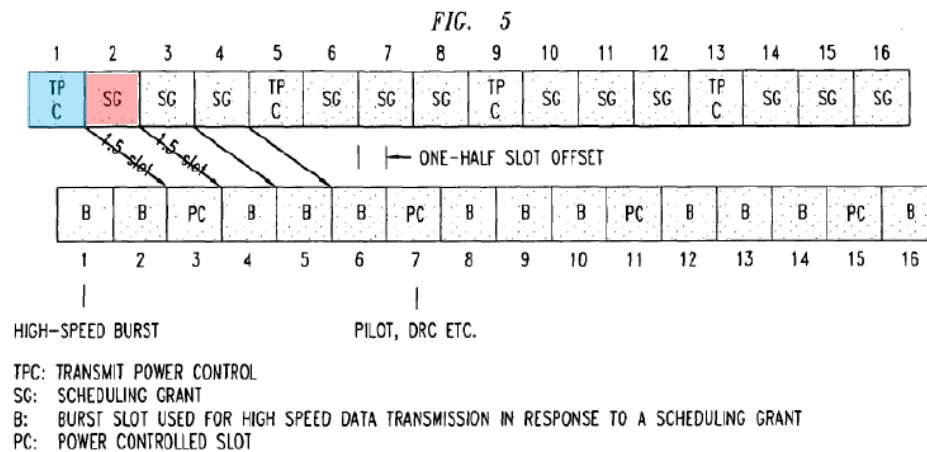
Power control scheme	Slot 1	Slot 2	Slot 3	Slot 4	Slot 5	Slot 6	Slot 7	Slot 8
First scheme	1 dB	1 dB	1 dB	1 dB	1 dB	1 dB	1 dB	1 dB
Second scheme	2 dB	2 db	4 db	4 db	8 dB	8 dB	4 dB	4 dB

Ex.1009, Table 1.

Accordingly, Andersson’s multi-bit TPC command—with different bit patterns indicating different power step sizes—is at least an example of the recited *multi-level TPC command* for multiple reasons, at least including that (i) the multi-bit command indicates more than a binary change (up or down), (ii) the indicated power step size is not fixed, and (iii) the step size may be greater than 1 dB. *See* Ex.1001, 9:17-18 (stating only that a multi-level TPC command can be an alternative to “[b]inary signalling...such that TPC command indicates a change in transmission power by a fixed amount either up or down”); Ex.1023, 49; Ex.1003, ¶¶96-98.

Thus, Andersson’s teaching of its UE receiving from the base station on the DPCCH a multi-level TPC command teaches “*wherein the processor is configured to cause: ... the receiver to receive, from the network device, on a single physical channel, ... and power control information that includes a multi-level TPC command.*” Ex.1003, ¶¶94-99.

To the extent Andersson does not explicitly teach receiving “*scheduling information*” on the same single physical channel as its multi-level TPC command, it would have been obvious to a POSITA for Andersson’s “other bits” in the DPCCH (*single physical channel*) to include scheduling information, as discussed above in Section X.C.5. Ex.1003, ¶95 (citing Ex.1009, 9:18-24, Fig. 5). Indeed, these aspects were well known to POSITAs as illustrated by Khan, for example. See Ex.1005, Fig. 5. Khan’s Fig. 5, reproduced below, shows scheduling grants (“SG”; example annotated in red) multiplexed on the same Walsh channel (physical channel) as TPC bits (“TPC”; example annotated in blue).



Ex.1005, Fig. 5 (annotated); Ex.1003, ¶100

In more detail, Khan discloses “a method for transmitting control information, **including [] at least one scheduling grant(s), and/or transmit power control (‘TPC’) information**, for reverse link [uplink] packet transmission....” Ex.1005, [0043], [0003], [0032]. A POSITA would recognize

that “scheduling grants” are the claimed *scheduling information* because they designate a particular time or rate at which a UE may transmit on the uplink. Ex.1005, [0033], [0035]. Ex.1003, ¶¶100-101.

Khan further illustrates that it was known for scheduling grants for uplink resources and TPC commands to be sent to the UE on the same *single physical channel*. Specifically, Khan discloses, in the context of a Walsh channel (physical channel), that a “MACIndex may, for example, **carry the TPC bit in some slots and the scheduling grant in one or more of the remaining slots**, as shown in FIG. 5.” Ex.1005, [0047] (“In order to support both the TPC bits and the scheduling grant dedicated MACIndex transmission simultaneously, orthogonal Walsh covers may be needed. However, it may also be possible to time-multiplex the TPC bits and the scheduling grant MACIndex....”); Ex.1003, ¶102. As explained above in Section X.C.5, it would have been obvious to similarly transmit Andersson’s multi-level TPC command and a scheduling grant on Andersson’s DPCCH (*single physical channel*). Ex.1003, ¶102.

Thus, Andersson’s teaching of its UE receiving from the base station on the DPCCH (*single physical channel*) a *multi-level TPC command* and other bits in view of Khan’s teaching of its UE receiving a scheduling grant (*scheduling information*) and TPC command on a single physical channel, renders obvious “*the receiver to receive, from the network device, on a single physical channel,*

scheduling information and power control information that includes a multi-level TPC command.” Ex.1003, ¶¶94-103.

[1.4] wherein the processor is configured to cause: ... the transmitter to transmit, to the network device, an uplink signal based on the received scheduling information and the multi-level TPC command.

The combination of Andersson and Khan renders obvious [1.4]. Ex.1003, ¶¶104-107. As discussed in [1.1], Andersson’s controller 80 (*processor*) controls the transmitter 90. Ex.1009, 8:6-8; Ex.1003, ¶104.

Andersson describes “controlling the transmit power level of a mobile station transmitting in the uplink direction.” Ex.1009, 11:26-28. Specifically, the mobile station receives and detects the TPC command and power control indicator **and makes the appropriate adjustment to its transmit power based thereon.”** Ex.1009, 12:45-48. The controller in the mobile station makes this adjustment: “wherein the controller is configured to adjust the transmit power level of the transmitter.” Ex.1009, 14:56-57.

Further, Andersson’s mobile stations would transmit *an uplink signal based on the received scheduling information* because “[i]n a cellular communications system, a mobile radio station communicates over an *assigned* radio channel with a radio base station.” Ex.1009, 1:12-14. Indeed, these aspects were well known to POSITAs as taught by Khan, for example. Khan describes “a wireless unit transmit[ting] a packet in the R-SCH frame on the RL [(reverse link)],” where “the

transmission of the packet is performed in response to a scheduling grant message on the FL [(forward link)].” Ex.1005, [0036], [0003].

Thus, Andersson’s teaching of transmitting an uplink signal over an assigned radio channel based on the multi-level TPC command in view of Khan’s teaching of transmitting an uplink signal based on the received scheduling grant renders obvious “*the transmitter to transmit, to the network device, an uplink signal based on the received scheduling information and the multi-level TPC command.*” Ex.1003, ¶¶104-107.

7. Claim 11

[11.0] *A method performed by a user equipment (UE) having a transmitter and a receiver, the method comprising:*

Claim 11 is a substantially similar method version of claim 1. This limitation is substantially similar to [1.0]-[1.1], and for the same reasons, the prior art renders this limitation obvious. Ex.1003, ¶111.

[11.1] *receiving, by the UE, an indication from a network device that transmit power control (TPC) command accumulation is enabled;*

This limitation is substantially similar to [1.2], and for the same reasons, the prior art renders this limitation obvious. Ex.1003, ¶112.

[11.2] *receiving, by the UE on a single physical channel from the network device, scheduling information and power control information that includes a multi-level TPC command;*

This limitation is substantially similar to [1.3], and for the same reasons, the

prior art renders this limitation obvious. Ex.1003, ¶113.

[11.3] transmitting, by the UE to the network device, an uplink signal based on the received scheduling information and the multi-level TPC command.

This limitation is substantially similar to [1.4], and for the same reasons, the prior art renders this limitation obvious. Ex.1003, ¶114.

8. Claims 2 and 12

The [UE of claim 1]/[method of claim 11], wherein the multi-level TPC command includes a value selected from a plurality of pre-defined values.

As described above in [1.3], Andersson teaches a multi-level TPC command with “different power control command bit patterns” that correspond to pre-defined step sizes: “[t]he first step size might be a typical step size change such as plus or minus 1 dB. The second step size might correspond to a larger amount, e.g., 8 dB.” Ex.1009, 9:33-50. Andersson further teaches that the “base station” selects one of these values to indicate a “desired” power change. Ex.1009, 8:42-48; 9:50-54 (a mobile station may be “commanded to change its transmit power by the larger step size amount”); Ex.1003, ¶¶108, 115.

9. Claims 4 and 14

The [UE of claim 1]/[method of claim 11], wherein the network device is one of a Node-B or base station.

Andersson discloses “plurality of base stations 16, 18, and 20” in communication with a UE. Ex.1009, 7:16-36, Fig. 1. Ex.1003, ¶¶109, 116.

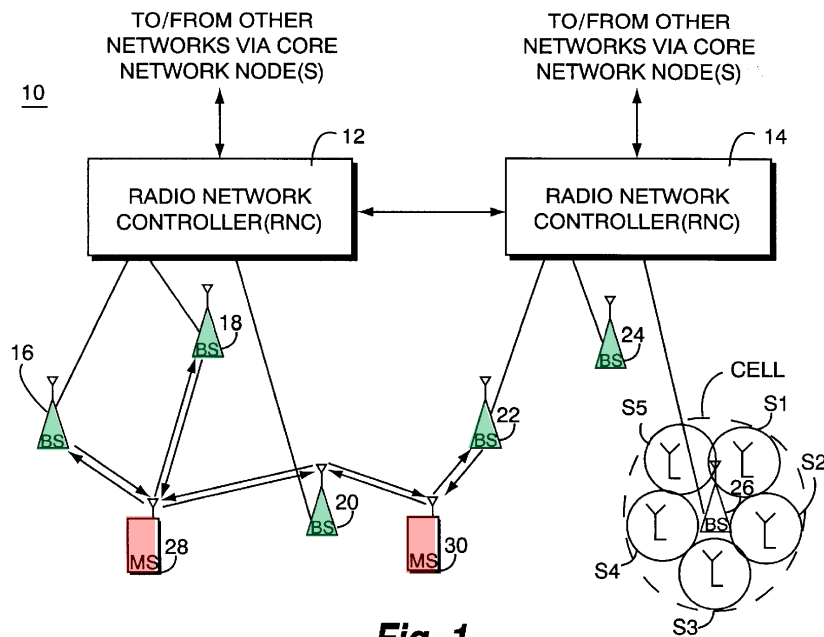


Fig. 1

Ex.1009, Fig. 1 (annotated); Ex.1003, ¶109

10. Claims 5 and 15

The [UE of claim 1]/[method of claim 11], wherein the multi-level TPC command includes a set of values that includes at least two values up or at least two values down.

As described above in [1.3], Andersson teaches a multi-level TPC command with bit patterns corresponding to *at least two values up and at least two values down*: “plus or minus 1 dB” and plus or minus “8 dB.” Ex.1009, 9:33-50; Ex.1003, ¶¶110, 117.

D. Ground 2: Claims 3 and 13 are obvious over Andersson in view of Baker, Khan, and Dick

1. Dick

Like the '153 patent and Andersson, Dick is directed to UE power control in

wireless communication systems. Ex.1008, Abstract, [0002], [0049]-[0050], [0059], [0070]-[0073]; Ex.1001, Fig. 4; Ex.1009, 1:6-8, 7:16-18, 7:38-41.

Dick describes the common 3GPP scenario of a user equipment (UE) transmitting uplink signals on an **uplink shared channel** (e.g., UL HS-SICH), where the power of that uplink signal is controlled. Ex.1008, [0011]-[0013], [0059], [0070]-[0073], Claim 26.

2. Reasons to combine Andersson, Baker, Khan, and Dick

One of ordinary skill in the art when considering the teachings of Andersson would have naturally considered the teachings of Dick, as Dick is also analogous prior art pertaining to the same field of endeavor as both Andersson and the '153 patent, namely, “mobile radio system or wireless communication system.” Ex.1001, 1:28-31; Ex.1009, 1:6-8; Ex.1008, [0002]; Ex.1003, ¶¶120-121. A POSITA would have been motivated to combine the teachings of Dick with Andersson, as modified by Baker and Khan. Ex.1003, ¶¶120-121. In particular, before the priority date of the '153 patent, it would have been obvious and predictable for Andersson's UE to transmit uplink data on an uplink shared channel, as Dick explains is common in the 3GPP standard. Ex.1003, ¶¶119-120 (citing Ex.1008, [0012]-[0013], [0059]). Using the standard 3GPP uplink shared channel in Andersson's 3GPP system is nothing more than “the predictable use of prior art elements according to their established functions.” *KSR*, 550 U.S. at 417;

Ex.1003, ¶120.

Andersson explains that its system “control[s] the transmit power of mobile station transmissions on uplink/reverse direction radio channels,” but does not explicitly describe transmitting the uplink signal over an uplink shared channel. Ex.1009, 7:38-39, 7:5-8. Dick, however, teaches that its system “provides controlled transmitter power in a wireless communication system in which both dedicated and *shared channels* are utilized.” Ex.1008, [0019]. Dick further explains that power control on uplink shared channels is especially important because “different WTRUs [UEs] can use the same channel and channel use by a particular WTRU can be sporadic.” Ex.1008, [0012]. Thus, “it is desirable to... control[] the power of shared channels where there may be sporadic use of such channels by WTRUs.” Ex.1008, [0012]. Accordingly, a POSITA would have been motivated to ensure Andersson’s system similarly controls the power of its UE’s uplink transmission on uplink shared channels, including a standard 3GPP uplink shared channel (e.g., UL HS-SICH). Ex.1003, ¶121; *see KSR*, 550 U.S. at 417 (obviousness based on the use of known technique to improve similar devices in the same way). A POSITA would have had a reasonable expectation of success in incorporating Dick’s teachings into Andersson’s because they are both directed to standardized wireless communication systems. Ex.1009, 1:6-15, 7:16-20; Ex.1008, [0011], [0013], [0032], [0039]-[0040]; Ex.1003, ¶121.

3. Claim 3

The UE of claim 1, wherein the transmitter is further configured to transmit the uplink signal on an uplink shared channel.

As discussed in [1.4], Andersson teaches “controlling the transmit power level of a mobile station transmitting in the **uplink** direction.” Ex.1009, 11:26-28. Dick further teaches the well-known concept of a UE transmitting uplink signals on an “UL shared channel, such as the HS-SICH,” where “the UL HS-SICH data signal is provided with a desired power level.” Ex.1008, [0012], [0013], [0059], [0070]-[0073], Claim 26. Thus, as explained in Section X.D.2, it would have been obvious for Andersson’s transmitter to *transmit the uplink signal* (“UL HS-SICH data signal”) on a standard *uplink shared channel* (“UL HS-SICH”), as taught by Dick. Ex.1003, ¶122.

4. Claim 13

The method of claim 11, wherein transmitting the uplink signal includes transmitting the uplink signal on an uplink shared channel.

This claim is substantially similar to claim 3, and for the same reasons, the prior art renders this limitation obvious. Ex.1003, ¶123.

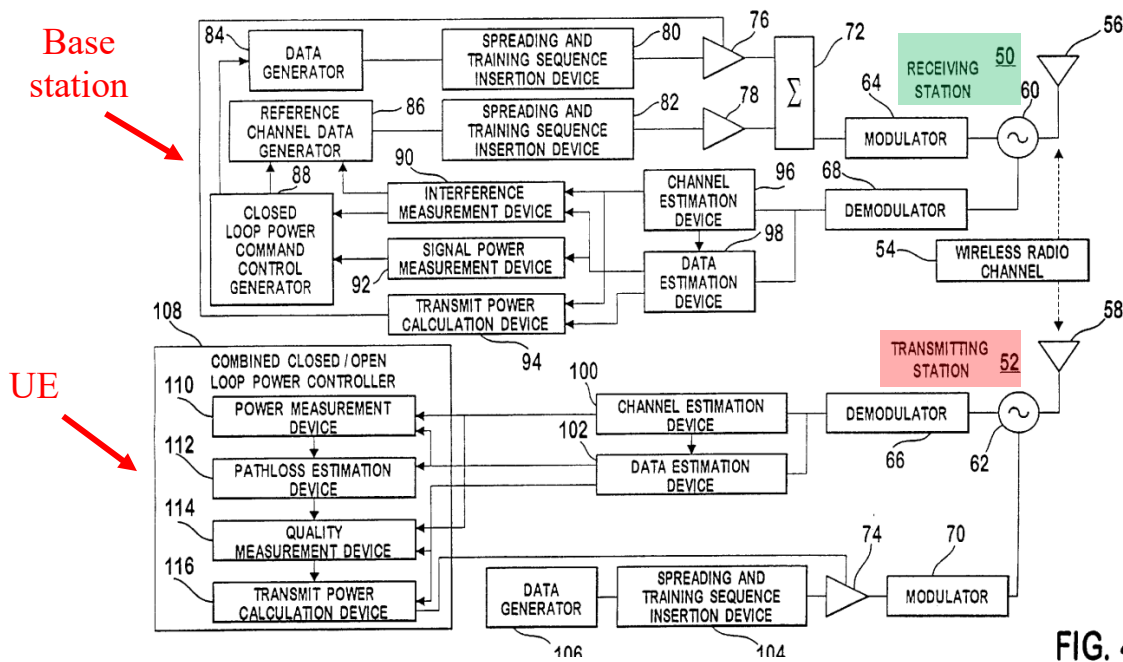
E. Ground 3: Claims 1-2, 4-5, 10-12, 14-15, and 20 are obvious over Zeira in view of Baker, Khan and Tong

1. Zeira

Like the ’153 patent, Zeira discloses a combined closed/open loop power control system. Ex.1004, Abstract. Zeira improves on power control of UE

transmissions by teaching a UE that receives an indication that TPC command accumulation is enabled, receives a TPC command on a dedicated physical channel, and transmits an uplink signal based on the TPC command. Ex.1003, ¶124.

Specifically, Figure 4 of Zeira, below, illustrates a receiving station 50 (base station) controlling the uplink transmit power of a transmitting station 52 (UE) using a combined scheme:



Ex.1004, Fig. 4 (annotated); Ex.1003, ¶125

For open loop power control, the transmitting station 52 (UE) includes, for example, pathloss estimation device 112 to estimate pathloss. Ex.1004, 5:28-32. For closed power control, the receiving station 50 (base station) generates and sends a transmit power control command, b_{TPC} , to the UE “in a dedicated

channel.” Ex.1004, 1:64-2:6, 4:27-30. Zeira describes combining these aspects of open loop power control and closed loop power control: **“Using the closed loop power command, b_{TPC} , and the weighted path loss, the transmit power calculation device 116 sets the transmit power level of the receiving station 50....”** Ex.1004, 5:62-65. When operating in a purely closed loop or combined closed loop/open loop manner, accumulation of TPC commands is enabled because a new TPC command is applied to the UE’s prior calculation of transmit power, which was based on previous TPC commands. *See* Ex.1004, 6:1-20 (Equations 4 and 6); Ex.1003, ¶126. When operating in a purely open loop manner, TPC commands are not used and thus not accumulated. Ex.1004, 1:51-63 (transmit power based only on pathloss).

Zeira further discloses using a **weighting factor, α , (i.e., an “indicator”)** set by a **“network operator”** to determine whether the UE uses purely closed loop power control (where accumulation is enabled). Ex.1004, 7:16-22. (“Under certain conditions, **the network operator may desire to use solely open loop or solely closed loop power control.** For example, the operator may use solely closed loop power control by setting α to zero.”).

2. Tong

Like the ’153 patent, Tong is directed to uplink power control of a UE in a wireless communication system. Ex.1007, Abstract. Tong improves on power

control of UE transmissions by teaching a UE receiving a multi-level TPC command.

Specifically, as shown in the Table reproduced below, Tong discloses using more than one power control bit in the TPC command allows for additional step sizes (i.e., multi-level TPC commands):

One Step Size		Two Step Size	
{I,Q}b ₁ b ₀		{I,Q}b ₁ b ₀	
Increase by ΔP_1	+1, +1	Increase by ΔP_1	+1, +1
Decrease by ΔP_1	-1, -1	Decrease by ΔP_1	-1, -1
		Increase by ΔP_2	-1, +1
		Decrease by ΔP_2	+1, -1

Ex.1007, 5:15-32.

The combination of Tong and Zeira is discussed in the mapping below.

3. Claim 1

[1.0] A user equipment (UE) comprising:

To the extent the preamble is deemed limiting, Zeira discloses “user equipments (UEs) 32₁–32₃” in a “wireless spread spectrum time division duplex (TDD) communication system.” Ex.1004, 1:12-15, Fig. 1. Zeira explains that “the communications station having its transmitter’s power controlled is referred to as the transmitting station 52 and the communications station receiving power controlled communications is referred to as the receiving station 50.” Ex.1004,

3:28-33. Accordingly, Zeira discloses that transmitting station 52 may be a UE 32₁, and the receiving station may be a base station 30₁. Ex.1003, ¶130.

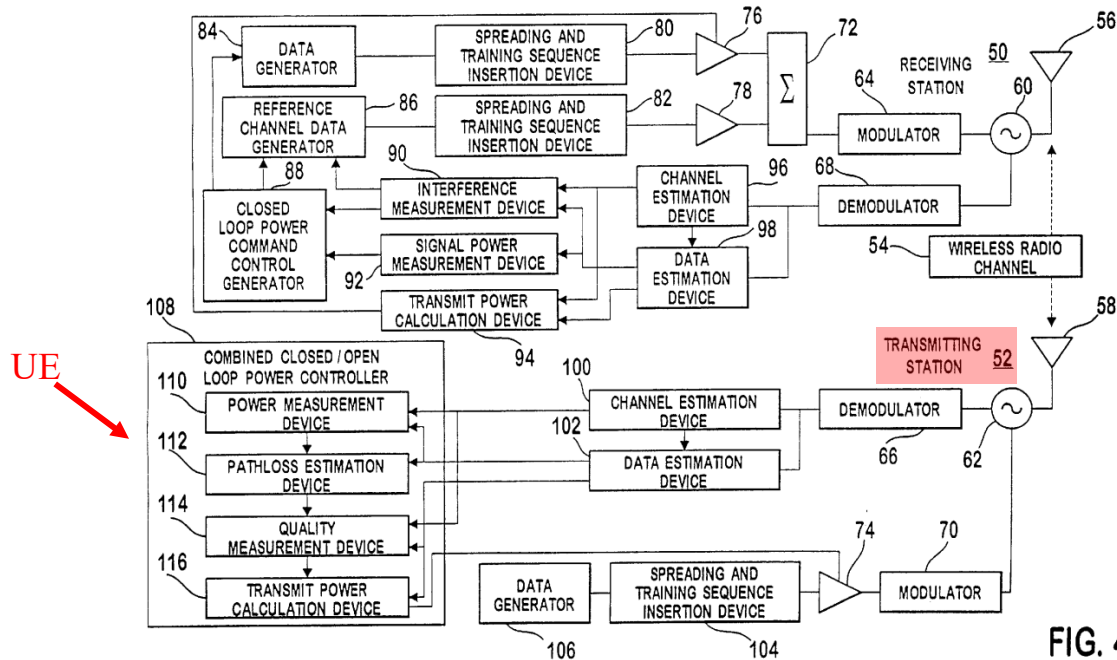


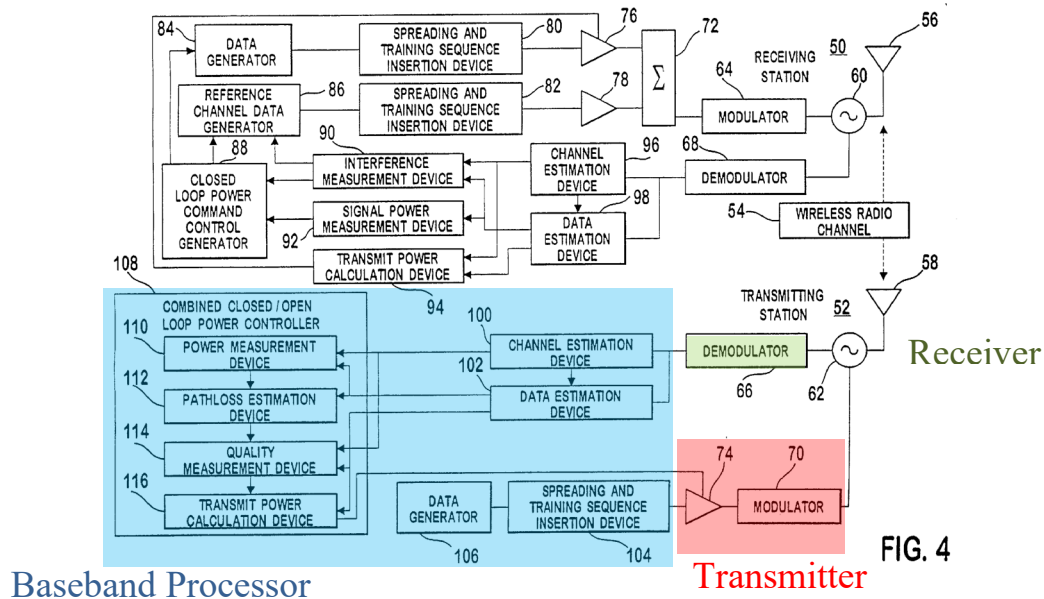
FIG. 4

Ex.1004, Fig. 4 (annotated); Ex.1003, ¶130

[1.1] *a transmitter; a receiver; a processor operatively coupled to the transmitter and the receiver,*

First, with respect to the *transmitter*, Zeira teaches that its UE (transmitting station 52) includes a “transmitter.” Ex.1004, 3:29-31 (“the communication station having its **transmitter’s** power controlled is referred to as the transmitting station 52”). As illustrated in Fig. 4 below, the UE’s transmitter (in red) includes at least an “amplifier 74” and “modulator 70.” See Ex.1004, Fig. 4 (annotated in red below), 7:1-5, 6:59-67 (“Data to be transmitted in a communication from the transmitting station 52” is “amplified by the amplifier 74 and modulated by the

modulator to radio frequency.”); Ex.1003, ¶131. Alternatively, the *transmitter* may further include isolator 62 and antenna 58. Ex.1003, ¶131.



Ex.1004, Fig. 4 (annotated); Ex.1003, ¶131

Second, with respect to the *receiver*, Zeira teaches a “demodulator 66” in transmitting station 52 (*UE*). See Ex.1004, Fig. 4 (green), 5:6-11. Zeira describes that “[t]he transmitting station 52 receives various radio frequency signals” through an antenna 58, where the “received signals are passed through an isolator 62 to a demodulator 66 to produce a baseband signal.” Ex.1004, 4:54-57. Zeira also teaches that “an automatic gain control device or amplifier” may also be used to process the received signals. Ex.1004, 5:6-11. Thus, demodulator 66 of Zeira teaches a *receiver* because it prepares the baseband signal to be processed by the processor. Ex.1003, ¶132. Alternatively, the *receiver* may further include isolator

62 and antenna 58. Ex.1003, ¶132.

Third, with respect to the *processor*, Zeira's UE, as was typical, includes a baseband *processor* (blue in Fig. 4, above) coupled to its receiver and transmitter that includes combined closed/open loop power controller 108, channel estimation device 100, data estimation device 102, data generator 106, and spreading and training sequence insertion device 104 (collectively, a baseband *processor*).

Ex.1004, Fig. 4; Ex.1003, ¶133. As discussed in §X.C.6, a baseband processor is the collection of components (typically implemented as software on a microprocessor) that process the signals received by the receiver and transmitted by the transmitter. Ex.1003, ¶¶80-86 (citing Ex.1006, 5:34-55, 6:1-2; Ex.1030, 7:1-20, 4:28-31). Consistent with that conventional understanding, Zeira describes signal processing tasks carried out by the elements of its baseband *processor*. Ex.1004, 4:57-59 (“[t]he baseband signal is **processed**, such as by a channel estimation device 100 and a data estimation device 102”), 4:57-59 (“the data estimation device 102 **interprets** the closed loop power command, b_{TPC} ”), 5:61-62 (“combined closed loop/open loop power controller 108 **controls** the gain of the amplifier 74 to achieve the determined transmit power level, P_{TS} , for the communication”), 7:1-5.

Thus, Zeira renders obvious [1.1]. Ex.1003, ¶¶131-134.

[1.2] *wherein the processor is configured to cause: the receiver to receive, from a*

network device, an indication that transmit power control (TPC) command accumulation is enabled,

Zeira alone or Zeira in view of Baker renders obvious this limitation.

Ex.1003, ¶¶135-142. First, by processing the received baseband signal with the appropriate codes, the elements in Zeira's UE's baseband *processor* cause the receiver to receive intelligible data (such as *an indication that transmit power control (TPC) command accumulation is enabled*) from the receiving station 50 (*network device*). Ex.1004, 4:57-61 ("The baseband signal is processed, such as by a channel estimation device 100 and a data estimation device 102, in the time slots and with the appropriate codes assigned to the communication burst of the receiving station 50."); Ex.1003, ¶135. More generally, a POSITA would find it obvious that the hardware (e.g., microprocessor) with which the baseband processor is implemented controls the operation of the UE's receiver and transmitter. Ex.1003, ¶¶80-86, 135 (citing Ex.1031, 7:17-18; Ex.1009, 8:6-8).

a) Zeira's UE receives an indication that TPC command accumulation is enabled

Zeira renders obvious a UE receiving an indication that TPC command accumulation is enabled because it discloses a network operator controlling whether closed loop power control, which includes TPC command accumulation, is enabled in the UE. *See* Ex.1011 ('828 patent file history), 121-122 (Applicant pointing to parameter that enables closed loop power control as §112 support for

the “*indication of...accumulation*” limitation), Ex.1003, ¶¶136-140.

In more detail, during Zeira’s closed loop power control mode and combined closed/open loop mode, accumulation of TPC commands is enabled. *See* Ex.1004, 6:1-20; Ex.1003, ¶137. Specifically, the TPC commands are “accumulated” because Zeira teaches an iterative algorithm, shown in the equations below, in which the TPC command to adjust transmit power is applied to the UE’s prior calculation of transmit power, which would have also been calculated based on previous TPC commands. *See* Ex.1004, 6:1-20; Ex.1003, ¶137. This is illustrated in Equations 4 and 6 (below), where P_{TS} is the UE’s transmit power (purple), $G(n)$ is the closed loop power control factor (blue), $G(n - 1)$ is the previous closed loop power control factor (blue), b_{TPC} is the TPC command (blue), L is path loss (green):

$$P_{TS} = P_0 + G(n) + \alpha L \quad \text{Equation 4}$$

$$G(n) = G(n-1) + b_{TPC} \Delta_{TPC} \quad \text{Equation 6}$$

Ex.1004, 6:1-20. The TPC command (b_{TPC}) causes an increase or decrease in transmit power by “+1 or -1.” *Id.* at 6:29-31. A POSITA would have understood that the closed loop control factor $G(n)$ is a function of previous closed loop control factors $G(n-1)$ (and therefore previous TPC commands), which results in successive TPC commands being “accumulated” with previous commands in the

calculation of transmit power P_{TS} —i.e., transmit power is iteratively updated by each TPC command. Ex.1003, ¶137.

Zeira also discloses a conventional open loop scheme, in which accumulation of power control commands is not enabled. Ex.1004, 1:51-63. In open loop mode, the UE calculates transmission power based on path loss and does not use TPC commands. *Id.* at 1:56-59 (“To determine a transmission power for the uplink, the downlink pathloss is added to a desired received power level at the base station.”).

Zeira teaches the recited *indication that TPC command accumulation is enabled* in the form of a weighting factor α —set via the network—that determines whether the UE uses purely open loop (where accumulation is not enabled), purely closed loop (where accumulation is enabled), or the combined scheme (where accumulation is enabled). Ex.1004, 7:16-22. In the example Equation 4, annotated below, the weighting factor α is applied to the open loop path loss variable, and setting it to zero would disable open loop mode and enable closed loop mode (thereby enabling TPC command accumulation):

$$P_{TS}=P_0+G(n)+\alpha L$$

Equation 4

Ex.1004, 6:1-20, 7:16-22; Ex.1003, ¶139. As another example, Zeira explains that the weighting factor α “may be applied to the closed loop factor” $G(n)$. Ex.1004,

7:16-22. In that example, if the weighting factor was set any value other than zero, closed loop mode would be enabled and TPC accumulation would also be enabled. Ex.1003, ¶139.

Zeira further explains that the UE receives the weighting factor α (*indication of...accumulation*) from a “network operator.” Ex.1004, 7:16-22. Specifically, the network operator sets α within the UE to control which power control technique the UE utilizes. Ex.1004, 7:16-22 (“Under certain conditions, the **network operator may desire to use solely open loop or solely closed loop power control**. For example, **the operator may use solely closed loop power control by setting α to zero.**”). Accordingly, Zeira’s UE receiving from the network operator the weighting factor α indicating that closed loop power control (and thus TPC command accumulation) is enabled, renders obvious “*receive, from a network device, an indication that transmit power control (TPC) command accumulation is enabled.*” Ex.1003, ¶¶136-140.

This description in Zeira is analogous to the description in the ’153 patent specification Patent Owner pointed to during prosecution of the ancestor ’828 patent as written description support for the “*indication*” limitation. *See* Ex.1011, 121-122 (pointing to a “parameter [that] may indicate whether a UE is to use open loop power control, closed loop power control or a combined scheme”). Similarly, the Board agreed that the Zeira’s α factor disclosed the ’828 patent’s similar

“*indication*” limitation when instituting IPR. *See* IPR2018-01773, Paper 9 at 14 (“We determine that Petitioner has shown adequately, for purposes of institution, that Zeira teaches using its α parameter to selectively control operation in open-loop or closed-loop power control (and whether TPC commands are accumulated)”).

b) Baker illustrates it was known for a UE to receive power control parameters from a network device

To the extent Zeira does not explicitly describe its UE receiving from the network operator the α parameter to indicate which power control mode is enabled, such communication between a base station and UE was well known and conventional in wireless communications, and thus obvious. Ex.1003, ¶¶141-142. Specifically, whether a patent claim would have been obvious in light of prior art references is determined from the perspective of a POSITA. *See KSR*, 550 U.S. at 420. Here, the perspective of a POSITA is informed by the basic understanding of how wireless communication systems operate. *See id.* at 418 (“Often it will be necessary for a court to look to...the background knowledge possessed by a person having ordinary skill in the art”).

In that regard, Baker explains that “[t]here are two basic types of communication required between a Base Station (BS) and a Mobile Station (MS) in a radio communication system.” Ex.1010, [0002]. “The first is user traffic, for

example speech or packet data. The **second is control information, required to set and monitor various parameters** of the transmission channel to enable the BS and MS to exchange the required user traffic.” *Id.* One of the functions of such control information “is **to enable power control.**” Ex.1010, [0003]. Consistent with this conventional understanding, in Baker’s method of “adjusting power control parameters” the “**BS 100 transmits power control commands...to the MS 110.**” Ex.1010, [0019], [0043]; *see also id.* at [0037] (“The BS 100 then, at step 406, determines...appropriate settings for the PCA and Δ_{TPC} parameters, which settings are communicated to the MS 110...”). Accordingly, a UE receiving power control parameters from a base station is a “basic” type of communication, and thus well understood by a POSITA reading Zeira. Ex.1003, ¶141.

A POSITA therefore would have found it obvious, in view of this conventional understanding, that Zeira’s “network operator” sets the α power control parameter on a UE by transmitting an indication of the desired setting from a network device (e.g., base station) to the UE. Ex.1003, ¶¶140, 142, (citing Ex.1004, 7:16-22); *see also Koninklijke Philips v. Google, LLC*, 948 F.3d 1330, 1337-39 (Fed. Cir. 2020) (obviousness “necessarily depends” on a skilled artisan’s knowledge).

Thus, Zeira alone or Zeira in view of Baker renders obvious “*wherein the processor is configured to cause: the receiver to receive, from a network device, an*

indication that transmit power control (TPC) command accumulation is enabled.”

Ex.1003, ¶¶136-142.

[1.3] *the receiver to receive, from the network device, on a single physical channel, scheduling information and power control information that includes a multi-level TPC command,*

a) Zeira and Tong render obvious receiving “a multi-level TPC command”

As discussed above in association with [1.1]-[1.2], Zeira’s user equipment receives a *TPC command*: “a closed loop power command ... b_{TPC} , such as a power command bit, b_{TPC} .” Ex.1004, 4:6-7, Fig. 3, 2:57-63, 2:2-6. Zeira describes that the step size “ Δ_{TPC} is the change in power level,” appearing in Equations 6 and 10, and “the change in power level is typically 1dB ***although other values may be used.***” Ex.1004, 6:26-28. Because Zeira’s TPC command may indicate a change in transmission power by different amounts (i.e., not by a fixed amount, and/or by an amount other than 1 dB), it is at least an example of a *multi-level TPC command*. Ex.1001, 9:17-18; Ex.1003, ¶143.

To the extent it is argued that Zeira does not explicitly teach a multi-level TPC command, such a command would in any event be obvious to a POSITA in view of Tong. Ex.1003, ¶¶144-149. Tong discloses an uplink power control method in which more than one power control bit (PCB) may be used for a TPC command, where different bit patterns correspond with different power step sizes

(i.e., multi-level TPC commands). Ex.1007, 5:16-32, 4:54-65 (“FIG. 4b illustrates that a second PCB can be employed to indicate that the remote user should increase or decrease the transmission power by **a larger step size.**”). As shown in the table below, Tong describes the configurations of two TPC bits, b_0 and b_1 , selected to cause changes in transmission power associated with two different step sizes, ΔP_1 and ΔP_2 . Ex.1007, 5:16-32 (“each bit has been provided with a specific meaning (i.e. +1, +1 increase by $\Delta P_1 \dots$)”).

One Step Size		Two Step Size	
	$\{I,Q\}b_1b_0$		$\{I,Q\}b_1b_0$
Increase by ΔP_1	+1, +1	Increase by ΔP_1	+1, +1
Decrease by ΔP_1	-1, -1	Decrease by ΔP_1	-1, -1
		Increase by ΔP_2	-1, +1
		Decrease by ΔP_2	+1, -1

Ex.1007, 5:16-25 (annotated); Ex.1003, 145

Accordingly, Tong’s multi-bit TPC command—with different bit patterns indicating different power step sizes—is at least an example of the recited *multi-level TPC command* for multiple reasons, at least including that (i) the multi-bit command indicates more than a binary change (up or down), and (ii) the indicated power step size is not fixed, and (iii) the step size may be greater than 1 dB. See Ex.1001, 9:17-18; Ex.1023, 49; Ex.1003, ¶146.

A POSITA would have been motivated to combine Zeira with Tong to include multi-level capability to TPC commands. Ex.1003, ¶¶146-149. Specifically, a POSITA would have been motivated by Zeira’s teaching with respect to TPC commands that “[t]he change in power level is typically 1 dB *although other values may be used.*” Ex.1003, ¶143 (citing Ex.1004, 6:26-28). Tong expressly teaches multiple and variable TPC command step size values. Ex.1007, 4:54-65. Moreover, Tong teaches the benefits of additional step sizes, such as minimizing power overshoot caused by power control command transmission delay, which a POSITA would have been motivated to include in Zeira’s system. Ex.1003, ¶147 (citing Ex.1007, 2:13-42, 2:53-67). Zeira recognizes that, in dynamic environments, quick efficient adaptation is needed. Ex.1003, ¶147 (quoting Ex.1004, 2:42-50). For example, it was well known that “[a] variable step size also addresses problems related to rapid fading of a radio channel where a mobile is traveling at high speed.” Ex.1009, 5:5-7. The benefit of power control in dynamic environments without delay would have motivated a POSITA to implement Tong’s teachings regarding multi-level TPC commands in Zeira’s system. Ex.1003, ¶148; *see also KSR*, 550 U.S. at 417 (finding obviousness when a known technique “would improve similar devices in the same way”).

Further, a POSITA would have had a reasonable expectation to success in combining these interrelated teachings, as the combined system would have

predictably resulted in the ability to send multi-level TPC commands, just as described in Tong. Ex.1003, ¶149. Tong’s techniques would have predictably enabled a POSITA to minimize power overshoot and compensate for deep fading, as taught by Tong. Ex.1003, ¶149. Thus, the use of multi-level TPC commands in Zeira’s system would have been nothing more than “the predictable use of prior art elements according to their established functions.” *KSR*, 550 U.S. at 417.

b) Zeira renders obvious receiving a TPC command and information on a “single physical channel”

Zeira discloses that “[t]he closed loop power control command, b_{TPC} , is typically sent in a *dedicated channel*.” Ex.1004, 4:27-30. “The dedicated channel is dedicated to the communication between the receiving station 50 and transmitting station 52, step 40.” *Id.* A POSITA would have understood that the “dedicated channel” described by Zeira used for transmitting to the UE is the claimed “*single physical channel*.” Ex.1003, ¶150. A POSITA would have understood the teachings of Zeira to be applicable to 3GPP UTRA embodiments. Ex.1003, ¶150 (citing Ex.1016 to note that hybrid control schemes were known to be implementable in UTRA TDD, supporting the applicability of the teachings of Zeira to UTRA). The UTRA TDD specifications describe that there is a single dedicated channel (DCH) is mapped onto a single dedicated physical channel (DPCH), as shown in the following diagram:

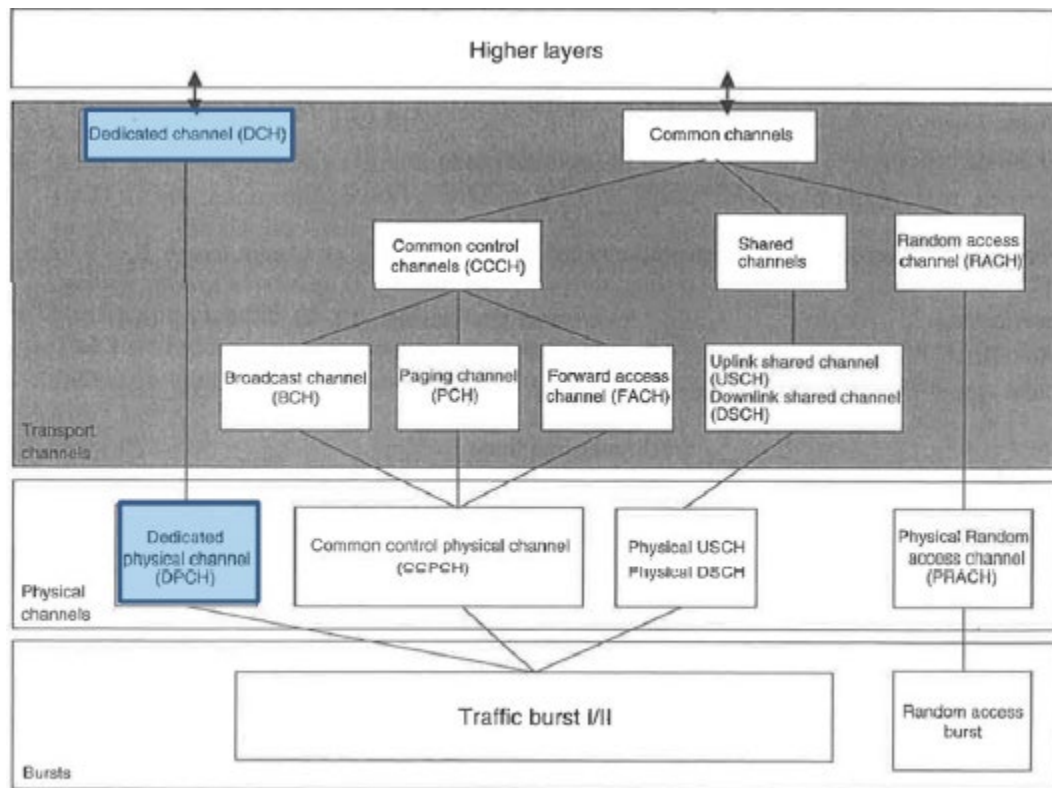


Figure 13.2. Mapping of the UTRA TDD transport channels to physical channels

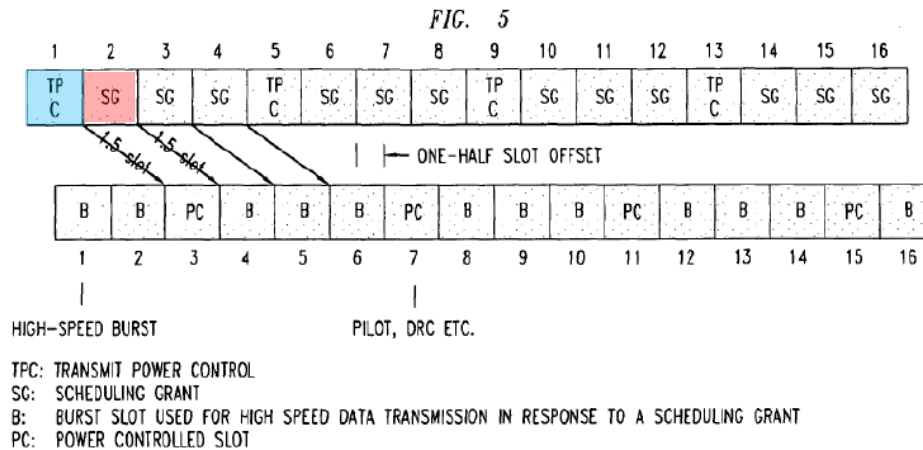
Ex.1012, at 354 (annotated), Fig. 13.2 (“Each of these transport channels is then mapped to the corresponding physical channel.”); Ex.1003, ¶150. Accordingly, Zeira’s UE receives the TPC command over a dedicated *single physical channel*. Ex.1003, ¶150. To the extent Zeira does not expressly disclose also receiving *scheduling information* over this dedicated *single physical channel*, doing so was well known as discussed below.

c) Zeira and Khan render obvious receiving scheduling information and TPC command on a *single physical channel*

As discussed above in Section X.C.4, and as illustrated in Khan’s Fig. 5, it was well known to POSITAs that scheduling grants (“SG”; red) may be

multiplexed on the same physical channel as a TPC command (“TPC”; blue).

Ex.1003, ¶¶151-155.



Ex.1005, Fig. 5 (annotated); Ex.1003, ¶151

Khan accordingly discloses a wireless unit (e.g., UE) receiving, over a single physical channel (e.g., Walsh channel, as identified by MACIndex value), both an allocation of a scheduled uplink resource (e.g., scheduling grant) and a TPC command (e.g., TPC bit). Ex.1005, [0043]; Ex.1003, ¶152.

A POSITA would have been motivated and found it obvious to combine Khan’s teaching of a dedicated channel (*single physical channel*) carrying both an allocation of a scheduled uplink resource and TPC commands with the combined power control system of Zeira because it would require nothing more than “the predictable use of prior art elements according to their established functions.” *See KSR Int’l*, 550 U.S. at 417; Ex.1003, ¶¶153-155. Zeira discloses both that it receives TPC commands from a receiving station (e.g., base station) and that it

transmits an uplink communication to the receiving station “in the appropriate time slots and codes of the assigned resource units” (Ex.1004, 2:62-63, 6:63-65), but does not specify how such resource units are assigned to it. Zeira’s reference to “assigned resource units” would indicate to a POSITA that Zeira contemplates some scheduling function located at the receiving station that allocates such resources for uplink transmission. Ex.1003, ¶153. This would have motivated POSITA to seek out Khan, which discloses such a scheduling function in a base station for allocating uplink resources in a spread-spectrum communication system that similarly transmits TPC commands. Ex.1003, ¶153; Ex.1005, Abstract.

A POSITA would have been motivated to transmit on Zeira’s “dedicated channel” both the TPC command and an uplink scheduling grant, as taught by Khan, because it would improve Zeira’s system “in the same way.” *KSR*, 550 U.S. at 417; Ex.1003, ¶154. As explained in Section X.C.5, there are several advantages of combining TPC commands and uplink scheduling information in the same control channel (as opposed to provisioning a separate control channel for the scheduling information), including reduced complexity and latency. Ex.1003, ¶¶75, 154.

Accordingly, POSITA would recognize that combining Khan’s scheduling grant technique with Zeira’s system is nothing more than combining prior art elements according to known methods to yield predictable results—particularly

given that Zeira's disclosure is not limited to transmission of TPC commands over any particular channel. Ex.1003, ¶155 (citing Ex.1004, 4:27-30). A POSITA would have had a reasonable expectation of success in making the combination given the close overlap between the systems and methods of both Zeira and Khan. Ex.1003, ¶155. Khan's technique was specifically meant to be implemented in wireless communication systems such as Zeira's. Ex.1003, ¶155.

[1.4] *the transmitter to transmit, to the network device, an uplink signal based on the received scheduling information and the multi-level TPC command.*

Zeira in view of Khan and Tong render obvious this limitation. Ex.1003, ¶¶156-160.

As discussed above in [1.1], Zeira teaches that the transmitting station's (UE's) transmitter transmits uplink data to the receiving station (*network device*). Ex.1004, 3:29-31, 6:59-7:4, Fig. 4. Zeira's baseband *processor* determines the power level of the uplink transmission and also the transmission time slot, and causes the transmitter to transmit at that power level. Ex.1004, 4:56-61, 5:52-65, 7:1-4; Ex.1003, ¶157.

First, Zeira teaches that the transmission power of the uplink signal is based upon the received TPC command. For example, the power level, " P_{TS} ," at which the transmitting station transmits signals to the receiving station is calculated "[u]sing the closed loop power command, b_{TPC} " by the "transmit power

calculation device 116” of the transmitting station.⁵ Ex.1004, 5:62-65. Then, “[t]he combined closed loop/open loop power controller 108 **controls the gain of the amplifier 74** to achieve the determined transmit power level, P_{TS} , for the communication.” Ex.1004, 7:1-4. And, as discussed above in [1.3], it would have been obvious to utilize a multi-level TPC command, such as taught by Tong, in Zeira’s system. When doing so, Zeira’s uplink signal would be transmitted based on the multi-level TPC command. Ex.1003, ¶158.

Second, Zeira’s uplink signal is transmitted in “appropriate **time slots**.” Ex.1004, 6:61-63. As is well-known, the particular time slot is based upon a received scheduling grant, as discussed above with respect to Khan in [1.3]. Ex.1003, ¶¶151-155,159. For example, Khan describes “transmitting a packet in response to receiving at least one scheduling grant.” Ex.1005, [0015].

Thus, Zeira’s teaching of its UE transmitting an uplink signal to the base station in time slots at a power level based on a TPC command in view of Tong’s teaching of a multi-level TPC command, and further in view of Khan’s teaching of

⁵ Zeira’s specification erroneously refers to the “receiving station 50” in this sentence. Ex.1004, 5:64-65. Figs. 3 and 4 make clear that the transmit power calculation device 116 sets the transmission power level of the transmitting station 52.

transmitting an uplink signal based on the received scheduling grant renders obvious “*the transmitter to transmit, to the network device, an uplink signal based on the received scheduling information and the multi-level TPC command.*”

Ex.1003, ¶¶156-160.

4. Claim 11

[11.0] *A method performed by a user equipment (UE) having a transmitter and a receiver, the method comprising:*

Claim 11 is a substantially similar method version of claim 1. This limitation is substantially similar to [1.0]-[1.1], and for the same reasons, the prior art renders this limitation obvious. Ex.1003, ¶165.

[11.1] *receiving, by the UE, an indication from a network device that transmit power control (TPC) command accumulation is enabled;*

This limitation is substantially similar to [1.2], and for the same reasons, the prior art renders this limitation obvious. Ex.1003, ¶166.

[11.2] *receiving, by the UE on a single physical channel from the network device, scheduling information and power control information that includes a multi-level TPC command;*

This limitation is substantially similar to [1.3], and for the same reasons, the prior art renders this limitation obvious. Ex.1003, ¶167.

[11.3] *transmitting, by the UE to the network device, an uplink signal based on the received scheduling information and the multi-level TPC command.*

This limitation is substantially similar to [1.4], and for the same reasons, the prior art renders this limitation obvious. Ex.1003, ¶168.

5. Claims 2 and 12

The [UE of claim 1]/[method of claim 11], wherein the multi-level TPC command includes a value selected from a plurality of pre-defined values.

As described above in [1.3], Tong describes a multi-level TPC command that includes two bits, where each configuration of the bits, e.g., {1,1}, {-1,-1}, {-1,1}, and {1,-1}, indicates a different pre-defined change in the transmission power ($+\Delta P_1$, $+\Delta P_2$, $-\Delta P_1$, or $-\Delta P_2$), as illustrated in Tong’s table below.

Ex.1007, 5:16-32. Ex.1003, ¶¶161, 169. The base station uses rules to select “step size the base station will request.” Ex.1007, 4:66-67.

One Step Size		Two Step Size	
{I,Q}b ₁ b ₀		{I,Q}b ₁ b ₀	
Increase by ΔP_1	+1, +1	Increase by ΔP_1	+1, +1
Decrease by ΔP_1	-1, -1	Decrease by ΔP_1	-1, -1
		Increase by ΔP_2	-1, +1
		Decrease by ΔP_2	+1, -1

Ex.1007, 5:16-25

6. Claims 4 and 14

The [UE of claim 1]/[method of claim 11], wherein the network device is one of a Node-B or base station.

See [1.0], above. Zeira discloses a receiving station 50 (*base station*) in communication with a *UE*. Ex.1004, 3:28-33, Fig. 1. Ex.1003, ¶¶162, 170.

7. Claims 5 and 15

The [UE of claim 1]/[method of claim 11], wherein the multi-level TPC command includes a set of values that includes at least two values up or at least two values down.

As described in [1.3], Tong's two-bit multi-level TPC command includes two values up, $+\Delta P_1$, $+\Delta P_2$, and two values down, $-\Delta P_1$, $-\Delta P_2$. Ex.1007, 5:16-25; Ex.1003, ¶¶163, 171.

8. Claim 10

The UE of claim 1, wherein the processor is further configured to cause the receiver to receive an indication of a beacon power level from the network device.

Zeira describes "reference channel data" that includes a "**transmitted power level, T_{RS}** ," that is transmitted "via the broadcast channel (BCH) from the base station 30₁" to the "transmitting station," i.e., the UE. Ex.1004, 4:19-27, 5:18-32. Furthermore, Zeira describes that reference channel data is received at the UE's "antenna 58" where it is processed by the "demodulator 66 to produce a baseband signal." Ex.1004, 4:54-57. Thus, Zeira discloses a *receiver* (demodulator 66) that receives a *beacon power level* (transmitted power level, T_{RS}) from the *network device* (base station). Ex.1003, ¶164.

9. Claim 20

The method of claim 11, further comprising: receiving, by the UE, an indication of a beacon power level from the network device.

This claim is substantially similar to claim 10, and for the same reasons, the

prior art renders this limitation obvious. Ex.1003, ¶172.

F. Ground 4: Claims 3 and 13 are obvious over Zeira in view of Baker, Khan, Tong, and Dick

1. Reasons to combine Zeira, Baker, Khan, Tong, and Dick

A POSITA when considering the teachings of Zeira would have naturally considered the teachings of Dick, as Dick is also analogous prior art pertaining to the same field of endeavor as both Zeira and the '153 patent, namely, “mobile radio system or wireless communication system.” Ex.1001, 1:28-31; Ex.1004, 1:7-13; Ex.1008, [0002]; Ex.1003, ¶174.

A POSITA would have been motivated to combine the teachings of Zeira with Dick, as modified by Baker, Khan, and Tong. Ex.1003, ¶¶173-175. In particular, before the priority date of the '153 patent, it would have been obvious and predictable for Zeira's UE to transmit uplink data on an uplink shared channel, as Dick explains is common in the 3GPP standard. Ex.1003, ¶174 (citing Ex.1008, [0012]-[0013], [0059]). Using the standard 3GPP uplink shared channel in Zeira's 3GPP system is nothing more than “the predictable use of prior art elements according to their established functions.” *KSR*, 550 U.S. at 417; Ex.1003, ¶174.

Zeira explains that in its UE “[t]he power controlled communication is passed through the isolator 62 and radiated by the antenna 58,” thus the UE transmits an uplink signal to the base station. Zeira, 7:4-5. Zeira does not explicitly

describe transmitting the uplink signal over an uplink shared channel. Dick, however, teaches that its system “provides controlled transmitter power in a wireless communication system in which both dedicated and *shared channels* are utilized.” Ex.1008, [0019]. Dick further explains that power control on uplink shared channels is important because “different WTRUs [UEs] can use the same channel and channel use by a particular WTRU can be sporadic.” Ex.1008, [0012]. Thus, “it is desirable to... control[] the power of shared channels where there may be sporadic use of such channels by WTRUs.” Ex.1008, [0012]. Accordingly, a POSITA would have been motivated and found it obvious for Zeira’s UE to similarly controls the power of its uplink transmission on uplink shared channels, including a standard 3GPP uplink shared channel (UL HS-SICH). Ex.1003, ¶175; *see KSR*, 550 U.S. at 417 (obviousness based on the use of known technique to improve similar devices in the same way). A POSITA would have had a reasonable expectation of success in incorporating Dick’s teachings into Zeira’s because they are both directed to standardized power-controlled wireless communication systems. Ex.1004, 1:7-20, 1:36-38, 4:14-16, 5:40-43, 6:25-27; Ex.1008, [0011], [0013], [0032], [0039]-[0040]; Ex.1003, ¶175.

2. Claim 3

The UE of claim 1, wherein the transmitter is further configured to transmit the uplink signal on an uplink shared channel.

As discussed in [1.4], Zeira teaches the UE transmitting uplink data to a base station, where a baseband processor in the UE determines the power level of the uplink transmission. Ex.1004, 6:59-7:4, 4:56-61, 5:52-65. Dick further teaches the well-known concept of a UE transmitting uplink signals on an “UL shared channel, such as the HS-SICH,” where “the UL HS-SICH data signal is provided with a desired power level.” Ex.1008, [0012], [0013], [0059], [0070]-[0073], Claim 26. Thus, as explained in Section X.F.1, it would have been obvious for Zeira’s transmitter to *transmit the uplink signal* (“UL HS-SICH data signal”) on a standard *uplink shared channel* (“UL HS-SICH”), as taught by Dick. Ex.1003, ¶176.

3. Claim 13

The method of claim 11, wherein transmitting the uplink signal includes transmitting the uplink signal on an uplink shared channel.

This claim is substantially similar to claim 3, and for the same reasons, the prior art renders this limitation obvious. Ex.1003, ¶177.

XI. DISCRETIONARY DENIAL IS INAPPROPRIATE

A. No basis for §325(d) denial

The grounds presented in this Petition have not previously been presented to the Office with respect to the Challenged Claims of the ’153 patent. Although Andersson, Baker, Zeira, Khan, and Tong are listed on the face of the ’153 patent, none were relied upon during prosecution to reject the Challenged Claims. Indeed,

as noted in Section V.A above, the Examiner made no prior art rejections. Other than initialing an Information Disclosure Statement (*see* Ex.1002, 14, 90), there is no evidence that the Examiner substantively considered these references with respect to the Challenged Claims. To the extent the Examiner considered these references with respect to the Challenged Claims, it was material error for the Examiner to have allowed the Challenged Claims for the reasons presented in the Grounds above. *Advanced Bionics, LLC v. Med-El Elektromedizinische Geräte GmbH*, IPR2019-01469, Paper 6 at 8 (Feb. 13, 2020) (precedential).

Although combinations based on Zeira (or a version of Zeira) were considered during the prosecution of ancestor patents, Andersson was never used in a rejection of any pending claim in an ancestor of the '153 patent. *See generally* Ex.1002, Ex.1011, Ex.1021-1024 (containing no rejection based on Andersson). And to the extent Zeira was applied in various ancestor prosecutions, the instant grounds apply Zeira in a manner consistent with the Office's previous consideration—which does not raise §325(d) concerns. Indeed, in the previous IPRs against the '828 patent, the Board found the Examiner's previous consideration of Zeira insufficient to deny Zeira-based challenges. *See* IPR2018-01641, Paper 7 at 4-8 (Mar. 20, 2019); IPR2018-01694, Paper 7 at 5-7 (Mar. 20, 2019); IPR2018-01773, Paper 9 at 5-8 (Apr. 22, 2019).

The instant grounds similarly apply Zeira in a manner consistent with the instituted grounds in the previous '828 IPRs, thus denial in view of these previous IPRs is similarly inappropriate.

B. No basis for *Fintiv* denial

The Board balances six factors in considering denial under §314. *Apple Inc. v. Fintiv, Inc.*, IPR2020-00019, Paper 11 (Mar. 20, 2020) (precedential). These factors strongly favor institution. The district court case is in its very early stages. Patent Owner filed its complaint on April 12, 2024 (Ex.1017) and trial is not scheduled to start until May 14, 2026. Ex.1018 (proposed scheduling order). Petitioner has worked diligently to prepare this Petition, which is being filed well within the one-year timeframe allowed by Congress.

1. No evidence regarding a stay

No motion to stay has been filed, so the Board should not infer the outcome of such a motion. *Sand Revolution II, LLC v. Continental Intermodal Group – Trucking LLC*, IPR2019-01393, Paper 24 at 7 (June 16, 2020) (informative). Thus, this factor is neutral on discretionary denial.

2. Parallel proceeding trial date

This factor weighs against discretionary denial because the projected trial date—based on median time-to-trial statistics—is in January of 2027⁶, which is well after the projected date for the Board to issue a Final Written Decision in May 2026. While trial is currently proposed⁷ for May 14, 2026 (Ex.1018, 4), the Board recognizes “that scheduled trial dates are unreliable and often change.” *See* Director’s Memorandum (Ex.1020), 8. As such, this factor heavily weighs against discretionary denial.

3. Investment in the parallel proceeding

The investment in the co-pending litigation has been minimal. A claim construction hearing has not yet occurred, fact discovery is not proposed to open until April 11, 2025, and expert discovery is not proposed to open until November 20, 2025. Ex.1018, 2-3. This lack of investment favors institution.

Moreover, Petitioner only learned which claims were being asserted in August 2024. *See* Preliminary Infringement Contentions, Ex.1015. Since then, Petitioner has worked expeditiously to file this petition within four months. And,

⁶ The current average time-to-trial for the district court hearing the co-pending litigation is 32.7 months. *See* Ex.1019, 5.

⁷ The district court has not entered an order scheduling a trial date.

as of this filing, Patent Owner has not yet served its final infringement contentions. Under *Fintiv*, Petitioner’s prompt filing “weigh[s] against exercising the authority to deny institution.” *Fintiv*, Paper 11 at 11.

4. Overlapping issues with the parallel proceeding

The co-pending litigation is in its early stages. Petitioner served its preliminary invalidity contentions on October 24, 2024. However, Petitioner will not serve its final invalidity contentions until May 22, 2025, well after the Board would issue an institution decision in this case. Ex.1018, 3. The extent of overlap is thus speculative at this point in time.

5. Petitioner is a defendant

Petitioner is a defendant in the co-pending litigation. That is true of most Petitioners in IPR proceedings, making this factor neutral.

6. Other circumstances

Here, the Petition—along with Dr. Kotzin’s expert testimony—presents compelling evidence that the ’153 patent claims no more than well-known subject matter. Indeed, the Board already instituted three IPRs on the ***narrower*** claims of the ancestor ’828 patent. This Petition presents grounds (3, 4) similar to those instituted, ***along with additional independent grounds*** (1, 2) further establishing unpatentability. This compelling evidence of unpatentability renders the other *Fintiv* factors moot. Ex.1020, 9.

Because the *Fintiv* factors are either neutral or weigh against discretionary denial, institution should not be denied on discretionary factors.

XII. CONCLUSION

Petitioner has established a reasonable likelihood that the Challenged Claims are unpatentable.

Respectfully submitted,

Dated: November 26, 2024
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Lead Counsel for Petitioner
Registration No. 70,297

XIII. MANDATORY NOTICES

A. Real party-in-interest

Pursuant to 37 C.F.R. § 42.8(b)(1), Petitioner certifies that the real party-in-interest is Tesla, Inc.

B. Related matters

Pursuant to 37 C.F.R. § 42.8(b)(2), to the best knowledge of the Petitioner, the '153 patent is or was involved in the following cases:

Case Caption	Number	Court	Filed	Status
<i>Intellectual Ventures II LLC v. Tesla, Inc.</i>	1-24-cv-00390	W.D. Tex.	04-11-2024	Terminated
<i>Intellectual Ventures II LLC v. Tesla, Inc.</i>	6-24-cv-00188	W.D. Tex.	04-12-2024	Transferred
<i>Intellectual Ventures II LLC v. Tesla, Inc.</i>	1-24-cv-00884	W.D. Tex.	04-12-2024	Pending

C. Lead and back-up counsel and service information

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Please address all correspondence in this proceeding to lead and back-up counsel. Petitioner consents to service in this proceeding by email at the addresses above.

CERTIFICATE OF WORD COUNT

Pursuant to 37 C.F.R. § 42.24(d), Petitioner hereby certifies, in accordance with and reliance on the word count provided by the word-processing system used to prepare this Petition, that the number of words in this paper is 13,921. Pursuant to 37 C.F.R. § 42.24(d), this word count excludes the table of contents, table of authorities, mandatory notices under § 42.8, certificate of service, certificate of word count, appendix of exhibits, and any claim listing.

Dated: November 26, 2024

/Scott T. Jarratt/
Scott T. Jarratt
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CERTIFICATE OF SERVICE

The undersigned certifies that, in accordance with 37 C.F.R. § 42.6(e) and 37 C.F.R. § 42.105, service was made on Patent Owner as detailed below.

Date of service November 26, 2024

Manner of service FEDERAL EXPRESS

Documents served Petition for *Inter Partes* Review Under 35 U.S.C. § 312 and 37 C.F.R. § 42.104 of U.S. 10,952,153;
Petitioner's Power of Attorney;
Petitioner's Exhibit List; and
Exhibits 1001-1012 and 1014-1031.

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