

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

TESLA INC.,
Petitioner,

v.

INTELLECTUAL VENTURES II LLC,
Patent Owner.

IPR2025-00221
U.S. Patent No. 11,664,889

**DECLARATION OF MICHAEL D. KOTZIN, PH.D
UNDER 37 C.F.R. § 1.68 IN SUPPORT OF PETITION FOR
INTER PARTES REVIEW**

TABLE OF CONTENTS

I.	Introduction.....	4
II.	Qualifications and Professional Experience	6
III.	Level of Ordinary Skill in the Art	14
IV.	Relevant Legal Standards	16
V.	Background.....	17
A.	Multiple Access Protocol for Enhanced Cellular Communication: Code Division Multiple Access (CDMA).....	17
B.	Third Generation (3G) Cellular: Universal Mobile Telecommunications System (UMTS) and UMTS Terrestrial Radio Access Network (UTRAN).....	21
C.	Transmission Power Control.....	22
VI.	Overview of the '889 Patent.....	25
A.	Summary of the '889 Patent.....	25
B.	Prosecution History	29
VII.	Claim Construction.....	30
VIII.	Identification of how the Claims are Unpatentable.....	30
A.	Ground 1: Claims 1, 2, 5, and 6 are obvious under 35 U.S.C. § 103 over Dateki.	31
1.	Summary of Dateki.....	31
2.	Claim 1	34
3.	Claim 2.....	53
4.	Claim 5.....	55
5.	Claim 6.....	57

B.	Ground 2: Claims 3 and 7 are obvious over Dateki in view of Mate.....	57
1.	Mate	57
2.	Reasons to Combine Dateki and Mate	59
3.	Claim 3.....	61
4.	Claim 7.....	68
C.	Ground 3: Claims 4 and 8 are obvious over Dateki in view of Chitrapu	68
1.	Technology Background – Connection States and Random Access.....	68
2.	Chitrapu	72
3.	Reasons to Combine Dateki and Chitrapu.....	73
4.	Claim 4.....	76
5.	Claim 8.....	81
IX.	Conclusion	81

I, Michael D. Kotzin, do hereby declare as follows:

I. INTRODUCTION

1. I am making this declaration at the request of Tesla Inc. in the matter of the *Inter Partes* Review of U.S. Patent No. 11,664,889 (“the ’889 patent”) to Howard.

2. I am also being reimbursed for reasonable and customary expenses associated with my work and testimony in this investigation. My compensation is not contingent on the outcome of this matter or the specifics of my testimony, and I have no other interest in this case or the parties thereto.

3. I have been asked to provide my opinions regarding whether claims 1-8 (“the Challenged Claims”) of the ’889 patent are unpatentable as they would have been obvious to a person having ordinary skill in the art (“POSITA”) at the time of the alleged invention, in light of the prior art. It is my opinion that all of the limitations of the challenged claims would have been obvious to a POSITA.

4. In the preparation of this declaration, I have studied:

- a. U.S. Patent No. 11,664,889 to Howard (“the ’889 patent”), Ex.1001;
- b. the prosecution history of the ’889 patent (“’889 File History”), Ex.1002;
- c. U.S. Patent No. 8,072,916 to Dateki (“Dateki”), Ex.1005;

- d. The prosecution history of U.S. Patent No. 8,811,356 (U.S. Application No. 13/176,298), Ex.1006;
 - e. U.S. Patent Publication No. 2002/0141331 to Mate et al. (“Mate”), Ex.1009;
 - f. Prabhakar Chitrapu, et al., “Wideband TDD: WCDMA for the Unpaired Spectrum,” (2004) (“Chitrapu”), Ex.1008.
5. In forming the opinions expressed below, I have considered:
- a. the documents listed above;
 - b. 3GPP Standard, TS 25.302, v.6.3.0, Ex.1007;
 - c. Andrew S. Tanenbaum, “Computer Networks,” 4th ed. (2002) (“Tanenbaum”); Ex.1011;
 - d. Behrouz A. Forouzan, “Data Communications and Networking,” (3rd ed. 2003) (“Forouzan”), Ex.1013;
 - e. U.S. Patent. No. 7,821,913 to Malladi et al. (“Malladi”), Ex.1021;
 - f. 3GPP R1-031073 (referenced in Ex.1021), Ex.1022;
 - g. 3GPP Standard, TS 25.899 v. 6.0.0, Ex.1023;
 - h. U.S. Patent Publication No. 2006/0141933 to Smee, et al. (“Smee”), Ex.1026;
 - i. U.S. Patent Publication No. 2006/002515 to LeBlanc, et al. (“LeBlanc”), Ex.1027;

- j. U.S. Patent Publication No. 2005/0105487 to Rudolph, et al.
("Rudolph"), Ex.1028;
- k. U.S. Patent Publication No. 2005/0152265 to Denk ("Denk"),
Ex.1031;
- l. U.S. Patent Publication No. 2005/0265279 to Markovic, et al.
("Markovic"), Ex.1032;
- m. U.S. Patent Publication No. 20030219037 to Toskala et al.
("Toskala"), Ex.1033;
- n. U.S. Patent No. 7,493,133 to Krishnan et al. ("Krishnan"), Ex.1035;
- o. the relevant legal standards, including the standard for obviousness,
and any additional authoritative documents as cited in the body of this
declaration; and
- p. my own knowledge and experience based upon my work in the field
of networking as described below, as well as the following materials.

6. Unless otherwise noted, all emphasis in any quoted material has been added.

II. QUALIFICATIONS AND PROFESSIONAL EXPERIENCE

7. My complete qualifications and professional experience are described in my *Curriculum Vitae*, a copy of which can be found in Exhibit 1004, which lists my publication record in archival journals, international conferences, and

workshops and further includes a list of granted patents. The following is a brief summary of my relevant qualifications and professional experience.

8. My academic and professional background is in electrical engineering and computer science, and I have been working in those fields since the completion of my B.S. in electrical engineering almost 50 years ago. The following is a brief summary of my relevant qualifications and professional experience.

9. In 1975, I received a Bachelor of Science in Electrical Engineering and a Bachelor of Science in Chemistry from the University of Illinois at Urbana. In 1977, I received a Masters of Science in Electrical Engineering from Northwestern University in Evanston, Illinois. My master's project was entitled "Digital Filter Implementation Using Cascaded Microprocessors." At the time, microprocessors were a nascent technology and there was great interest in using them to perform useful digital signal processing operations especially those useful for wireless communications such as digital filtering. Practical speeds of single microprocessors were very limited, and there was great interest utilizing multiple devices simultaneously to collaboratively perform processing functions. My project demonstrated a design and hardware prototype for digital filtering of a signal utilizing three Motorola MC6800 microprocessors simultaneously to take advantage of a nearly three-fold increase in processing speed.

10. In 1981, I received a Ph.D. in Electrical Engineering and Computer

Science from Northwestern University in Evanston, Illinois. My dissertation was entitled "Short Range Communication Using Diffusely Scattered Infrared Radiation." This research was related to the use of infrared light to provide communication within an enclosed area. While I focused on communicating speech, the method is also applicable for data communications, for example, as a wireless local area network. The research included a study of scattered light propagation, as well as circuit and system techniques for providing speech supporting multiple simultaneous users. A time division multiple access (TDMA) system with four timeslots was prototyped, providing the capability for two full duplex speech channels.

11. My professional experience begins immediately after I earn my undergraduate degrees in 1975. At Motorola, I spent the first 15 years working in various research labs as a bench engineer. Almost all of my work during this time period focused on innovating and inventing new technology relating to or using radiocommunication systems, including cellular, public safety and private mobile systems. Throughout this period, I was involved in what might be termed the transition of analog land mobile radio systems to digital technology. I was researching new systems including new radio access and modulation technologies. Several proposals were designed and prototyped for use with private land mobile radio. These proposals were contemporary with the initial investigations which

were a precursor of the first digital cellular system standard occurring in Europe, namely GSM.

12. A key objective of my projects during this period was to provide new radio systems having an extremely high degree of spectrum efficiency. In other words, it was desired to serve the largest population of mobile users using as little spectrum as possible. Since reuse of existing spectrum allocations was necessary, maintaining the existing channel spacing that had already been deployed was a critical design factor. Our proposed solutions to addressing these issues involved the use of digital speech coding, both constant envelope and linear modulation techniques and, again, TDMA. I was actively involved in the design and building of several of these prototype systems. Ultimately, this early work evolved into what became Motorola's successful proprietary dispatch and telephone system called iDEN, which was widely deployed by Nextel.

13. In 1989, I joined the Cellular Infrastructure and Networks Business of Motorola. In this capacity, I was responsible for ensuring the highest level of performance of Motorola's cellular infrastructure deployments. The first two years here were directed specifically to addressing unique technology issues facing the GSM product development communities. While I was in the infrastructure group, this team embraced a much broader systems view and thus addressed problems that would also be of significance to the group developing the mobile devices as well.

Activities undertaken were often relevant to both the infrastructure and mobile development camps. For example, my participation in the channel equalizer activities provided results which were utilized in both base and mobile stations equipment.

14. Following the GSM activity, I became involved in numerous other digital cellular systems throughout the remainder of my career at Motorola. These include USDC (IS-54 and IS-136), CDMA (IS-95), W-CDMA (also known as 3G or UMTS) as well as LTE (Long Term Evolution also known as eUTRA [evolved UMTS Terrestrial Radio Access] and often characterized as 4G). From time to time either I, or engineers reporting to me, participated in various standards activities, both domestic and international.

15. This work transitioned in the early 1990s to digital cellular applied research and development on cellular infrastructure and mobile devices. As a senior technologist and leader, first in the cellular infrastructure division and subsequently the mobile device division at Motorola, I was a significant participant and contributor to the development of new and evolving digital systems. Some of these evolutions included the adoption of functional improvements, continuing quality improvements, system generation advancement, etc.

16. As a senior level technologist, I was personally working on technology to advance, evolve, and improve the various digital cellular systems

deployed throughout the world. I was also directing several worldwide research organizations working on digital cellular technology to create novel and enhanced cellular communications products and techniques. In 1997, I became the Vice President of Technical Staff and Director of Research and Advanced Technology in Motorola's Cellular Infrastructure and Networks division.

17. In 1998, I transferred organizations at Motorola to become Vice President of the Technical Staff, Office of the Chief Technology Officer, in the mobile devices business. In this role, I provided leadership and strategic directions for the adoption and creation of new technology for handheld devices. In this position, in addition to providing ongoing technology proposals for advancing and improving digital cellular performance and functionality, I formulated strategy for the creation and adoption of new technologies relevant to mobile devices and wireless systems generally. I directly supervised and worked with engineers in the United States and Europe in developing technology focused on radio layer and signaling protocols. As part of this work, we developed and provided technical contributions to industry standards organizations.

18. In 2006, I accepted a position at Motorola as Vice President of the Technical Staff, Corporate Law Department, Patent Operations. In this role, my responsibilities included working with technology teams throughout Motorola to create, manage and maintain strategically important technology, patent portfolios

and patent review committees. This included responsibility for decision making on patent filings, annuities, acquisitions and divestitures; formulating technology patent portfolio strategy; and continuing to oversee the protection of intellectual property across all Motorola's business entities. In this role, I created technology portfolio strategy across businesses including quantitative goals for new and retained intellectual property assets. I also managed processes and corporate-wide teams related to creating and maintaining patent portfolios. I served in this position until I left Motorola in 2009.

19. As part of my activities over the years at Motorola, I served as a chairman or member of several patent review committees. Patent committees are groups of the most senior technologists from within an organization or technology area. These committees are charged with the responsibility to evaluate patentable ideas submitted from all engineers and make recommendations about whether the idea warrants the large investment for it to be pursued to obtain a patent. While at many times during my Motorola career I was responsible for supervising other engineers, my key responsibilities were always more technology-related than managerial. My primary responsibilities were always to be actively engaged in technological innovation and, as possible, to provide technical leadership for those individuals I supervised.

20. I received several awards and recognitions within Motorola. I was

designated an Associate of the Science Advisory Board in 1982. In 1990, I was recognized as a Dan Noble Fellow, which is the highest recognition given by Motorola to a technologist. I received the Distinguished Innovator Award, Master Innovator Award, a Special Intellectual Property Award for Defensive Contributions, and several "Patent of the Year" awards. "Patent of the Year" awards are presented to Motorola inventors whose patents are demonstrated to have had significant business impact, such as resulting in significant patent licensing revenue or a major business impacting product improvement.

21. At various times during my Motorola employment, I was also an active TIA and 3GPP standards organization participant representing Motorola. I received several standards impact awards. I created MDK Consulting, Inc. in 2009 when I left Motorola. As President of MDK Consulting, Inc., I serve as a consultant and expert regarding intellectual property analysis, portfolio management and technology strategy relating to aspects of wireless communications technology including systems and products. In addition to my consulting activities, I have served as an expert for a variety of patent-related litigations and arbitrations relating to various aspects of wireless communications technology.

22. I have been a member of the Institute of Electrical and Electronics Engineers (IEEE) for 43 years. In 1995, I received the IEEE Vehicular

Technology Society's "Avant Garde" recognition "for pioneering leadership and continuing contributions in promoting new technology in the field of vehicular communications and electronics." In 2005, I was designated a Fellow of the IEEE "for contributions to cellular mobile radio communications." I am also a member of the Eta Kappa Nu and Tau Beta Pi engineering honors societies. In addition to my industry experience, I have taught electrical engineering courses at Northwestern University as an Adjunct Professor in various wireless technologies.

23. I am a listed inventor on approximately 134 issued U.S. patents and over 500 issued patents worldwide in areas including signal processing, data compression, communications, and wireless systems. I have also authored published articles and presented at several public conferences. My technical background has addressed private/public wireless systems, base/mobile hardware and software, algorithms, networking and protocols, signal processing, software/hardware design methodologies, antennas and cybersecurity. Based on my experience and education, I consider myself to be an expert at least in the fields of telecommunications, cellular networking, infrastructure, and mobile devices. As of the earliest priority date of the '889 patent, I was at least a person of ordinary skill in the art, and I had personal knowledge of the technologies utilized therein.

III. LEVEL OF ORDINARY SKILL IN THE ART

24. I understand there are multiple factors relevant to determining the

level of ordinary skill in the pertinent art, including (1) the levels of education and experience of persons working in the field at the time of the invention; (2) the sophistication of the technology; (3) the types of problems encountered in the field; and (4) the prior art solutions to those problems.

25. It is my understanding that the earliest possible priority date for the '889 patent is October 13, 2006. A person of ordinary skill in the art ("POSITA") in the field of the '889 patent, as of October 13, 2006, would have been someone knowledgeable and familiar with the wireless communications systems that are pertinent to the '889 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. For the purposes of this Declaration, in general, and unless otherwise noted, my statements and opinions, such as those regarding my experience and the understanding of a POSITA generally (and specifically related to the references I consulted herein), reflect the knowledge that existed in the field as of the alleged priority date of the '889 patent (i.e., October 13, 2006). Unless otherwise stated, when I provide my understanding and analysis below, it is consistent with the level of a POSITA as of the alleged priority date of the '889 patent.

IV. RELEVANT LEGAL STANDARDS

26. I am not an attorney. In preparing and expressing my opinions and considering the subject matter of the '889 patent, I am relying on certain basic legal principles that counsel have explained to me. These principles are discussed below.

27. I understand that prior art to the '889 patent includes patents and printed publications in the relevant art that predate the priority date of the alleged invention recited in the '889 patent.

28. I have been informed that a claimed invention is unpatentable under 35 U.S.C. § 103 if the differences between the invention and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which the subject matter pertains. I have also been informed by counsel that the obviousness analysis takes into account factual inquiries including the level of ordinary skill in the art, the scope and content of the prior art, and the differences between the prior art and the claimed subject matter.

29. I have been informed by counsel that the Supreme Court has recognized several rationales for combining references or modifying a reference to show obviousness of claimed subject matter. Some of these rationales include the following: (a) combining prior art elements according to known methods to yield

predictable results; (b) simple substitution of one known element for another to obtain predictable results; (c) use of a known technique to improve a similar device (method, or product) in the same way; (d) applying a known technique to a known device (method, or product) ready for improvement to yield predictable results; (e) choosing from a finite number of identified, predictable solutions, with a reasonable expectation of success; and (f) some teaching, suggestion, or motivation in the prior art that would have led one of ordinary skill to modify the prior art reference or to combine prior art reference teachings to arrive at the claimed invention.

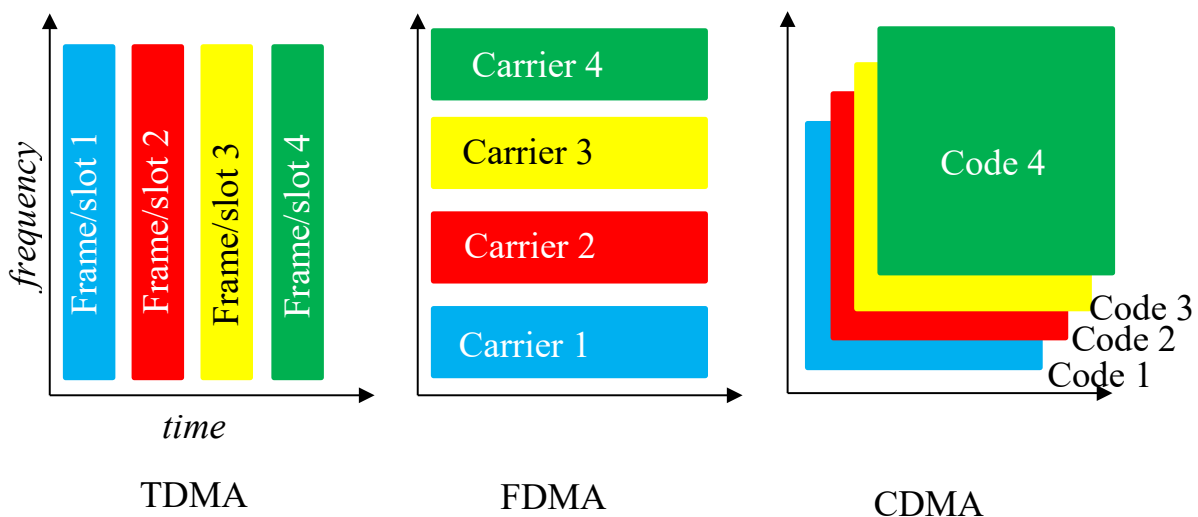
V. BACKGROUND

A. Multiple Access Protocol for Enhanced Cellular Communication: Code Division Multiple Access (CDMA)

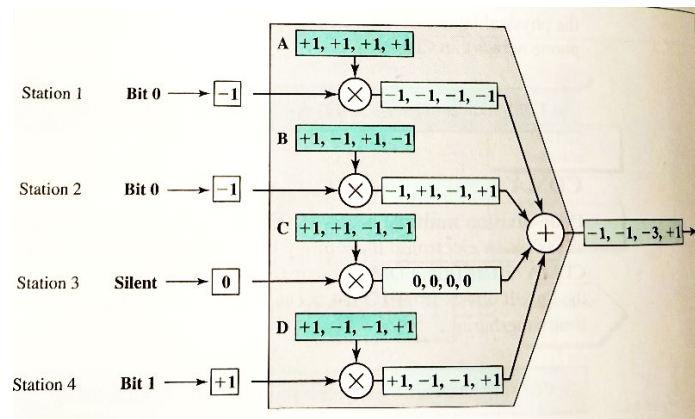
30. Multiple mobile devices (e.g., cell phones) typically need to communicate through the same medium (air space) to the same node (base station on a cell tower). With many devices sharing one communication medium, it is important to prevent and/or correct for interference from other mobile devices trying to communicate at the same time. A “multiple access” protocol provides a way for those mobile devices to receive and transmit data on the same medium while keeping collisions and interference to a minimum. Tanenbaum, 247-251 (explaining challenges with providing multiple users access to a common link, and summarizing different types of multiple access solutions); Forouzan, 311-313

(same).

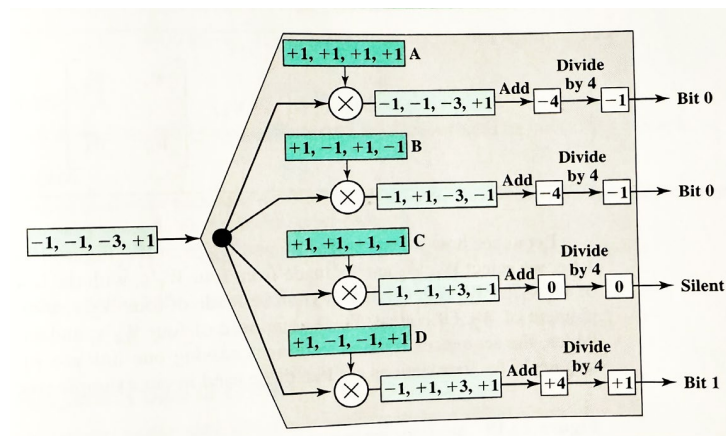
31. The multiple access protocol underlying Third Generation (3G) cellular communications is called Code Division Multiple Access (CDMA). Tanenbaum, 162, 166-167; Forouzan, 419-420. CDMA is different from other multiple access protocols which simply assign different time and/or frequency resources to different users. For instance, Time Division Multiple Access (TDMA) allocates separate time periods (e.g., time frames, slots), and Frequency Division Multiple Access (FDMA) allocates separate frequency resources (carriers). Tanenbaum, 162; Forouzan, 321. But CDMA allows multiple wireless devices to communicate in the same frequency band and at the same time by using unique codes. Tanenbaum, 162-165; Forouzan, 321-324. The figure below illustrates how TDMA, FDMA, and CDMA use time division, frequency division, or code division to allow multiple UEs (blue, red, yellow, and green) to communicate with a base station on a cell tower.



32. In CDMA, each user's signal is encoded with a unique spreading code, which includes a series of code bits or "chips." This code spreads the signal across a wide bandwidth. The receiver (base station on the cell tower) uses the same code to decode the signals and associate the decoded signals with each corresponding user. Tanenbaum, 162-163; Forouzan, 321-323 (explaining that both the transmitting device and receiving device use code sequence to transmit and receive data on CDMA channels). Example CDMA encoding (multiplexing) and decoding (demultiplexing) processes for information bits from four mobile stations (Stations 1-4) are illustrated below.



CDMA multiplexing



CDMA demultiplexing

Forouzan, FIGS. 13.16, 13.17.

33. This CDMA coding scheme is what allows multiple devices to communicate with the network concurrently without interfering with one another. Because each user's signal is spread over the same frequency spectrum and across time, CDMA increases spectrum efficiency, making it particularly useful in environments with many simultaneous users, such as mobile networks.

Tanenbaum, 165-167 (explaining advantages of CDMA and its eventual adoption

into 3G networks). Its interference mitigation and capacity for handling multiple signals efficiently made CDMA a desirable choice for 3G cellular providers attempting to deliver more advanced services in rapidly growing networks.

B. Third Generation (3G) Cellular: Universal Mobile Telecommunications System (UMTS) and UMTS Terrestrial Radio Access Network (UTRAN)

34. CDMA is¹ the multiple access technology on which 3G cellular communication technologies are built. Two competing 3G systems were deployed by different providers in the United States: the Universal Mobile Telecommunications System (UMTS), and CDMA2000. Tanenbaum, 167; Chitrapu, 3-4. Both systems are based on CDMA.

35. UMTS, which became the more widely deployed 3G technology compared to CDMA2000, provides high-speed voice, data, and multimedia services. Tanenbaum, 167-168. The UMTS Terrestrial Radio Access Network (UTRAN) is the radio access network component of UMTS. Chitrapu, 5. UTRAN is responsible for connecting mobile devices to the core network, managing communications between mobile devices (cell phones) and the UMTS core

¹ Many of the technologies described in this section are still in use today, and would have been well-known to a POSITA before the priority date of the '889 patent.

network, and handling both the radio transmissions and resource allocation.

Chitrapu, 5, 6.

36. UMTS allows for two CDMA duplexing methods. The first, Wideband CDMA (W-CDMA), uses separate frequency bands for uplink and downlink (Frequency Division Duplex) and is used for voice and balanced data services. W-CDMA is the dominant UMTS standard globally. The second duplexing method was Time Division CDMA (TD-CDMA), which uses the same frequency band for both uplink and downlink (Time Division Duplex), but the uplink and downlink signals are transmitted in different time slots. TD-CDMA had more specific use cases and was not as widely adopted as the W-CDMA version of UMTS. Although not identical, W-CDMA and TD-CDMA share many underlying CDMA-based mechanisms, including power control and random access methods for initial access. *See, e.g.,* '889 patent, 4:4-12 (referring to several 3GPP standards for UMTS).

37. Several enhancements to W-CDMA were developed over the years, including High-Speed Downlink Packet Access (HSDPA), and Wideband Time Domain Duplexing (TDD) W-CDMA. Chitrapu, 3-4; 3GPP TS 25.899, 1, 6.

C. Transmission Power Control

38. In 3G cellular networks, power control is important for managing interference and ensuring efficient use of the shared spectrum in CDMA systems.

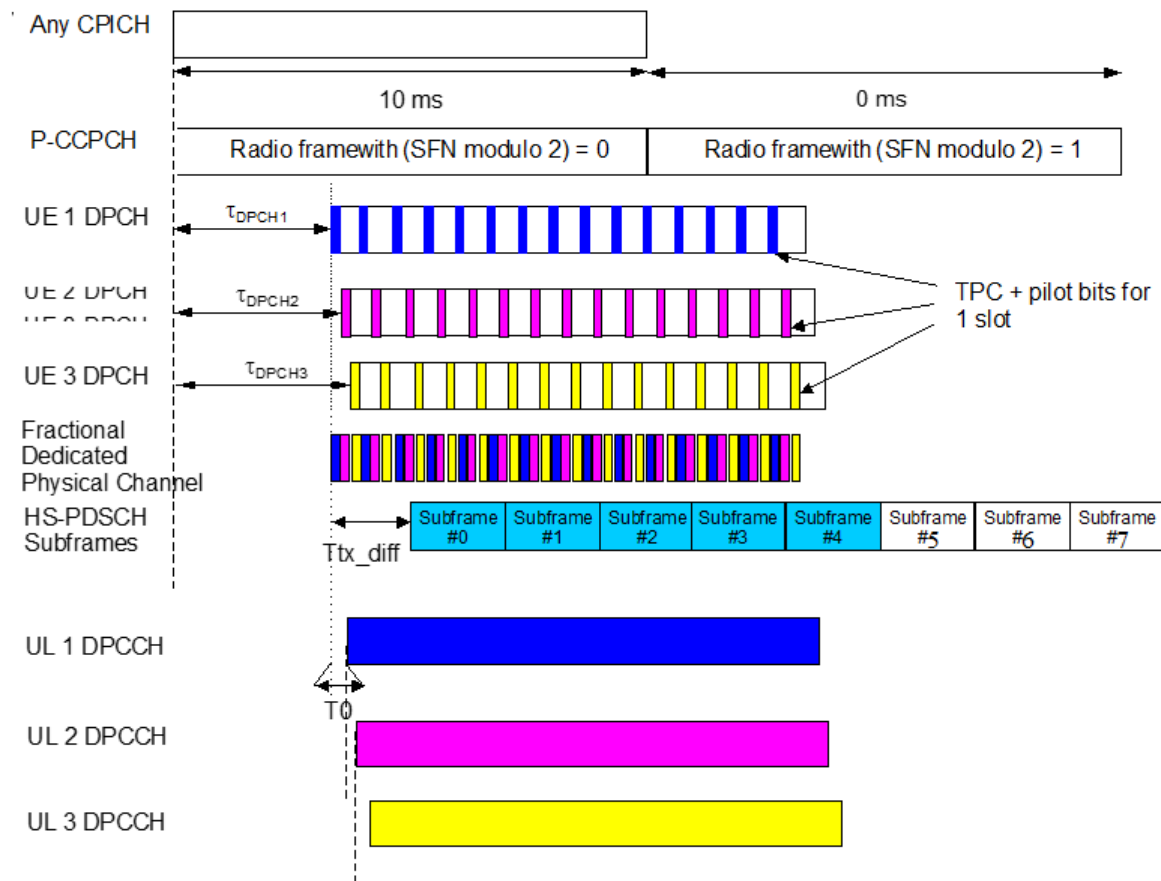
The goal of power control is that each device transmits at a power level high enough to maintain a strong connection, but not too high that it interferes with other users.

39. CDMA systems like UMTS rely on a Transmission Power Control (TPC) mechanism. Chitrapu, 114-118. Power control is used to adjust and regulate the transmission power of both the network device (base station on a cell tower), and the user equipment (UE), which may be a cell phone. For transmission power from the mobile device to the network device (referred to as “uplink”), the base station continuously monitors signals transmitted by the mobile device and assesses quality. Chitrapu, 117-118. Based on this evaluation, the base station sends TPC commands that instruct the mobile device to either increase or decrease its transmission power by discrete, incremental amounts. This is referred to as “closed loop” power control.

40. This closed loop feedback mechanism provided real-time transmission power optimization to increase the reliability of communications, reduce interference, and reduce unnecessary power consumption.

41. One improvement to W-CDMA that came with High-Speed Downlink Packet Access (HSDPA) was the introduction of a new dedicated channel for power control that would be shared by multiple UEs. This channel was called the Fractional Dedicated Physical Channel (F-DPCH). 3GPP R1-031073, 4:9-11;

Dateki, 4:15-22, 5:4-7. F-DPCH allowed TPC commands for multiple UEs to be transmitted in a single downlink channel, reducing the overhead associated with the traditional dedicated control channels in W-CDMA. 3GPP R1-031073, 4:9-11; Dateki, 4:15-22, 5:4-7. The figure below from one of the initial proposals for F-DPCH illustrates how TPC control bits for three different UEs (illustrated by blue, magenta, and yellow boxes) are combined and time-multiplexed within the same slots.



3GPP R1-031073, 2.

42. This Fractional Dedicated Physical Channel (F-DPCH) was proposed in October 2003 and was first adopted by 3GPP in June 2004. 3GPP R1-031073, 1, 2 (proposing F-DPCH); TS 25.899, 1, 6 (release date and purpose of TS 25.899 standard), 47-48 (describing F-DPCH). Similar proposals were made for other cellular protocols, such as the “Physical Layer Control Channel (PLCCH)” described in the ’889 patent and proposed in TD-CDMA. ’889 patent, 5:22-23.

VI. OVERVIEW OF THE ’889 PATENT

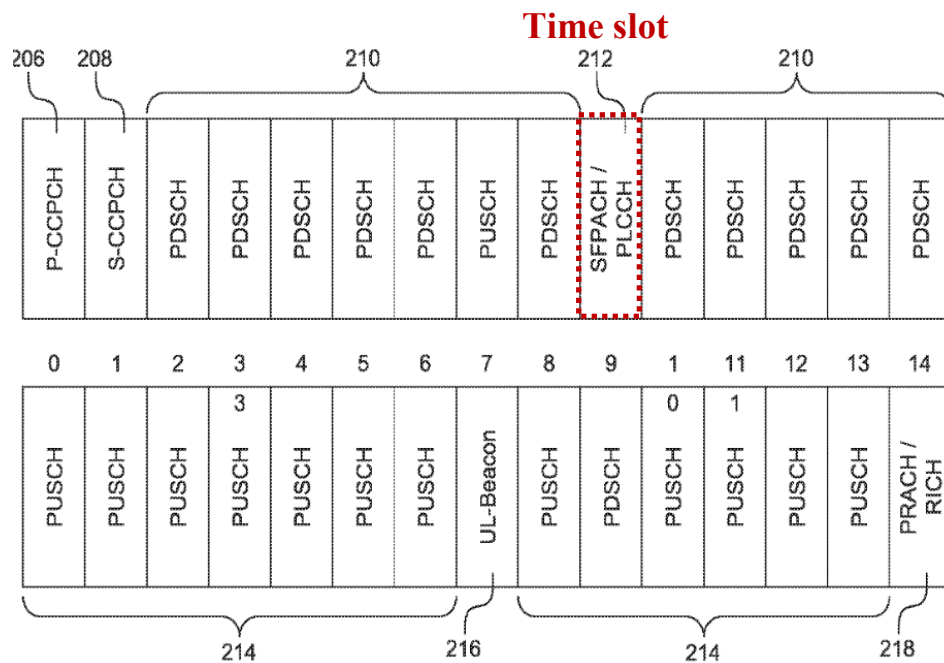
A. Summary of the ’889 Patent

43. The ’889 patent relates to “closed loop” power control in a mobile terminal in the context of UMTS and CDMA communication protocols. ’889 patent, 2:44-46, 2:62-64, 4:4-12; 5:9-14. Using closed loop power control, a “base station detects the received power and/or other channel information from [an uplink signal], and sends controlling commands back to each terminal,” such as power control commands. ’889 patent, 5:9-14. Power control commands allow a mobile terminal (also known as a User Equipment or UE) to “transmit at the correct power” by indicating “whether terminal power should be increased or decreased.” ’889 patent, 4:67-5:1, 5:19-21.

44. The ’889 patent explains that the base station transmits power control information for multiple UEs on a single downlink channel, and each UE “extract[s] the relevant feedback field.” ’889 patent, 5:15-29. The ’889 patent

refers to this single downlink channel as a “Physical Layer Control Channel (PLCCH).” ’889 patent, 5:22-23. Thus, power control commands for multiple terminals may be transmitted on a shared downlink control channel.

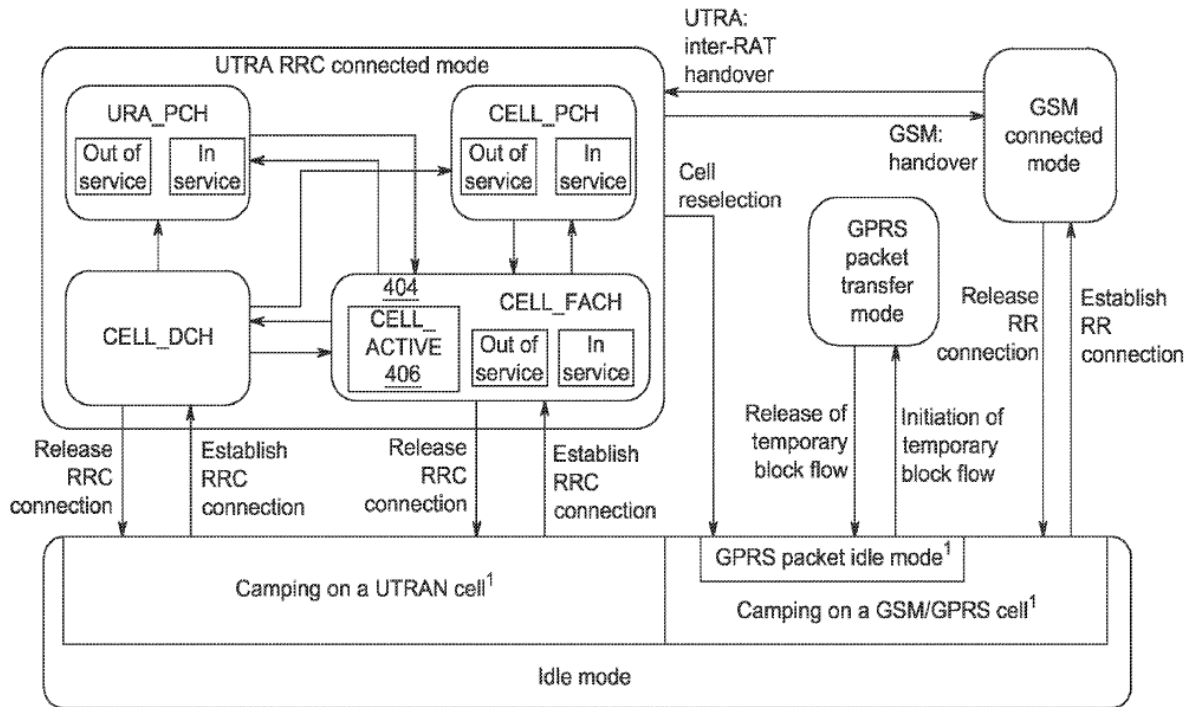
45. Further, the ’889 patent explains that the control channel carrying the power control information “can share a timeslot with other physical channels.” ’889 patent, 2:61-64. FIG. 2 illustrates a control channel (PLCCH) sharing a downlink (DL) timeslot (ref. 212) with another channel (SFPACH).



’889 patent, FIG. 2

46. The ’889 patent also describes procedures to change between RRC connected and disconnected states, such as CELL_DCH, and CELL_FACH, and Idle. ’889 patent, 7:4-16. The ’889 patent acknowledges that many of these states

were known and relate to the UMTS/UTRAN standards. '889 patent, 7:4-11. This is consistent with the W-CDMA standards. *See infra*, § VIII.C.1. FIG. 4 of the '889 patent illustrates those various states and the random access procedures to move between them.



'889 Patent, FIG. 4

47. The '889 patent explains that when a UE is determined to be out-of-synchronization, the UE must move out of the RRC-connected states:

Note that UEs in CELL_ACTIVE state have their transmitters active, therefore it is necessary for these UEs to monitor the status of the downlink and automatically **come out of CELL_ACTIVE state if the downlink is deemed to be out-of-synchronization** (for example, very high downlink errors or low received signal strength)

'889 patent, 7:38-43.

48. The '889 patent's description of the UE moving out of an RRC connected state when it loses synchronization is consistent with 3G cellular technologies at the time. *See infra*, § VIII.C.1.

49. The independent claims of the '889 patent are directed to a power control mechanism where power control information for multiple UEs are transmitted in a same control message. The independent claims can be summarized with three parts:

1. A first UE receives “*a control message over a physical control channel in a first time slot,*” where the “*control message has **power control bits for a plurality of UEs***” (limitations [1.2], [1.4]);
2. The “*first time slot*” during which the control message is received also includes a “*downlink shared channel*” (limitation [1.3]); and
3. The first UE “*extract[s] power control information for the first UE*” and “*transmit[s] a signal over a physical control channel to a base station in a second time slot at a transmission power level based on the extracted power control information.*” (limitations [1.5] and [1.6]).

50. The prior art cited in this Petition confirms the unpatentability of claim 1 and the other Challenged Claims.

B. Prosecution History

51. The '889 patent was allowed six months after its filing date with one amendment made during that time. '889 File History, 137. In response to an office action indicating that dependent claim 2 was allowable, the Patent Owner amended the independent claims to incorporate the features of claim 2. '889 File History, 58-60, 125-134. The added language incorporated from dependent claim 2 recites *“wherein the first time slot also includes a downlink shared channel.”* '889 File History, 126. The application was subsequently allowed based on those amendments. '889 File History, 125-134, 137, 141.

52. Although the earliest patent to which the '889 patent claims priority was filed on December 27, 2006 ('889 File History, 41-42), the earliest possible priority date of the '889 patent is October 13, 2006. This date is based on a Declaration filed by Patent Owner in a parent case, which referred to an email exchange between the Patent Owner and outside counsel on October 13, 2006. '356 patent File History, 612, 618-620, 634. Determining whether Patent Owner is actually entitled to that date of invention is unnecessary because all of the prior art discussed below predates October 13, 2006.

53. None of the art relied upon was used or applied in any rejections against the '889 patent. Dateki was submitted in an IDS, but was not substantively discussed or applied by the Examiner during prosecution of the '889 patent, or any

family member of the '889 patent. '889 File History, 2, 113.

VII. CLAIM CONSTRUCTION

54. It is my understanding that in order to properly evaluate the '889 patent, the terms of the claims must first be interpreted. It is my understanding that for the purposes of this *inter partes* review, the claims are to be construed under the so-called *Phillips* standard, under which claim terms are given their ordinary and customary meaning as would be understood by one of ordinary skill in the art in light of the specification and prosecution history, unless the inventor has set forth a special meaning for a term. For the purposes of my analysis below, I do not believe any claim terms require explicit construction.

VIII. IDENTIFICATION OF HOW THE CLAIMS ARE UNPATENTABLE

55. I have been asked to provide my opinion as to whether the Challenged Claims of the '889 patent would have been obvious in view of the prior art. The discussion below provides a detailed analysis of how the prior art references identified below teach the limitations of the Challenged Claims of the '889 patent.

56. As part of my analysis, I have considered the scope and content of the prior art and any differences between the alleged invention and the prior art. I describe in detail below the scope and content of the prior art, as well as any differences between the alleged invention and the prior art, on an element-by-element basis for each Challenged Claims of the '889 patent.

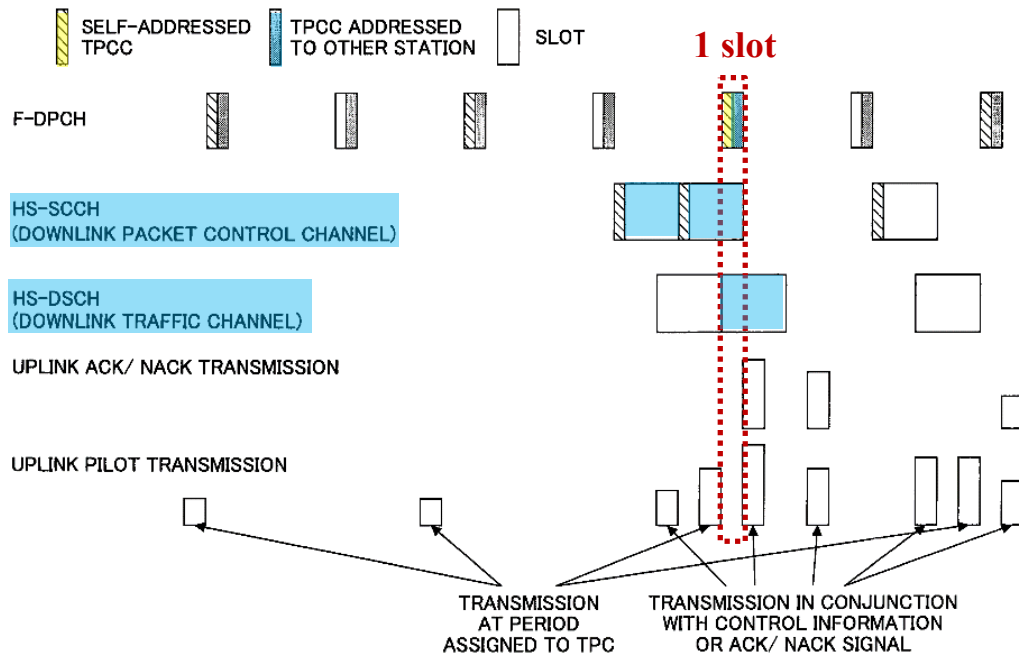
57. As described in detail below, the alleged invention of the Challenged Claims would have been obvious in view of the teachings of the identified prior art references as well as the knowledge of a POSITA.

A. Ground 1: Claims 1, 2, 5, and 6 are obvious under 35 U.S.C. § 103 over Dateki.

1. Summary of Dateki

58. Dateki describes specific implementations of the “fractional dedicated physical channel (F-DPCH),” discussed in the Technology Background above at § V.C. F-DPCH was adopted into the 3GPP standard no later than March of 2005. *See* TS 25.302, v6.3.0 (3GPP standard including F-DPCH features, uploaded to 3GPP FTP site on March 24, 2005).

59. F-DPCH is a channel specifically provided to transmit TPC information addressed to multiple UEs using a single channelization code. The term “fractional” is similar to and consistent with the ’889 patent’s description of the PLCCCH being “fractionated.” *See, e.g.*, ’889 patent, 2:65-67. Dateki’s FIG. 6 and accompanying text show that a single slot of the F-DPCH carries TPC commands (“TPCC”) for at least two UEs: A first UE (“Self-Addressed”), and a second UE (“Addressed to Other Station.”)



Dateki, FIG. 6 (annotated)

60. Dateki shows that the slot carrying the F-DPCH also includes two downlink shared channels (highlighted in blue above): a High-Speed Shared Control Channel (HS-SCCH) and a High-Speed Downlink Shared Channel, (HS-DSCH).

61. Dateki also explains that the UE receiving the F-DPCH extracts its power control information and inputs that power control information into a transmission power control unit:

Also, inverse diffusion outputs including transmission power control information that are obtained by inverse diffusion processes conducted by the TCH inverse diffusion unit 34 and the DCH inverse diffusion unit 35, respectively, are input to **the TPCC extracting unit 37 at**

which the transmission power control information is extracted. The extracted transmission power information is then input to the transmission power control unit 38.

Dateki, 10:51-59.

62. The transmission power control unit uses this extracted power control information to set a transmission power level for uplink pilot symbols and acknowledgement/non-acknowledgement feedback signals:

Also, according to the present embodiment, uplink traffic data, **a pilot symbol, and a ACK/NACK signal** based on the reception processing result of processing downlink traffic data output are input to the diffusion units 45, 46, and 47, respectively, to be diffused by differing diffusion codes. Then the diffused signals are multiplexed at the multiplexing unit 44, and multiplied at the multiplying unit 43 by **a control value from the transmission power control unit 38 to realize transmission power control.**

Dateki, 10:60-11:14.

63. The portions of Dateki relied upon for this claim chart are consistent with the standard adoptions related to F-DPCH, and the CDMA-based cellular technologies described above in the Technology Background. *See supra*, § IV; TS 25.302, 66 (3GPP standard for physical layer services including F-DPCH), 37 (table showing that F-DPCH can be transmitted simultaneously with downlink shared channels such as HS-SCCH and HS-PDSCH); TS 25.899, 47, 48 (3GPP

standard for HSDPA including F-DPCH).

64. Like the '889 patent, Dateki describes CDMA-based cellular communication protocols. *See, e.g.*, Dateki, 8:25-30; '889 patent, 2:62-64. Thus, Dateki is in the same field of endeavor as the '889 patent. Further, Dateki's F-DPCH mechanisms more efficiently provide power control information to mobile stations in a way that uses fewer code resources. Dateki, 5:4-7. The '889 patent also aims to make more efficient use of network resources in its closed loop power control mechanisms. *See* '889 patent, 2:52-64. Thus, Dateki is also reasonably pertinent to the same problem the '889 patent addresses. Accordingly, Dateki is analogous art to the '889 patent

2. Claim 1

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

65. Dateki discloses a “counterpart wireless communication apparatus such as a mobile station.” Dateki, 7:56-57. Dateki describes the “mobile station” transmitting uplink signals to a base station:

The HS-DPCCH [High Speed-Dedicated Physical Control Channel] in the mobile wireless communication system corresponds to **an uplink dedicated control channel from the mobile station to the base station**, and is used upon transmitting **from the mobile station to the base station an [acknowledgement] ACK signal** or a [non-acknowledgement] NACK signal indicating whether data received via

the [High Speed-Physical Downlink Shared Channel] HS-PDSCH are properly received.

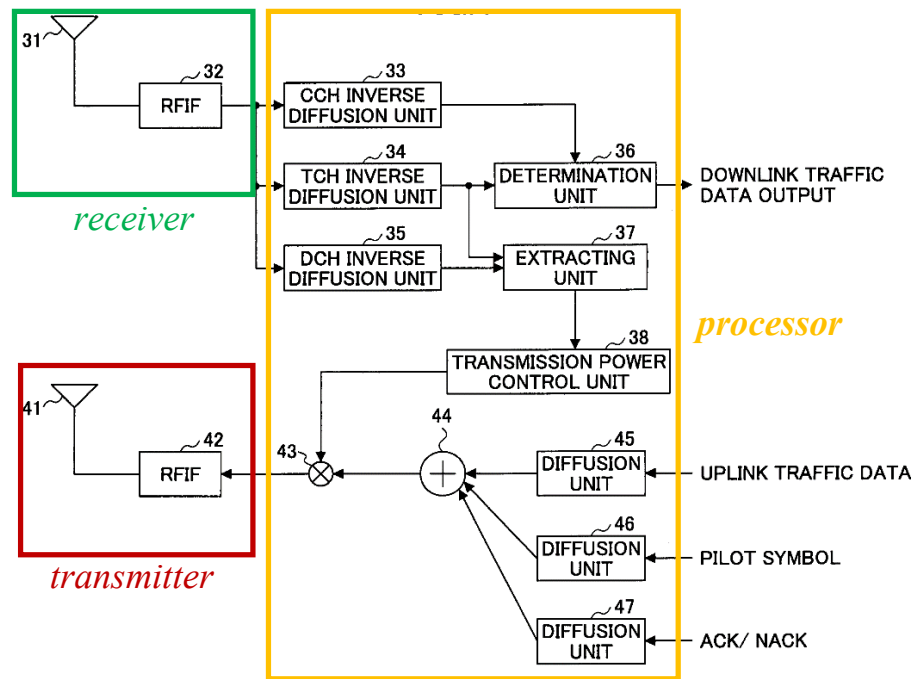
Dateki, 2:35-40.

66. Dateki's "mobile station" is synonymous to a "UE." For instance, Dateki describes a parameter "Xue" that "corresponds to identification information of the mobile station (user)." Dateki, 4:1-3. Dateki also explains that Xue represents a "UE identity." Dateki, 3:34-35. Accordingly, Dateki uses "mobile station" interchangeably with "user" or "UE."

67. Thus, Dateki's "mobile station" discloses *a first user equipment*.

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

68. Dateki's FIG. 4 illustrates a "counterpart wireless communication apparatus," which as explained above in [1.0] corresponds to the "mobile station" (*first user equipment*). See Dateki, 10:8-10. Dateki explains that the apparatus includes an "antenna 41 [] configured to transmit a signal from the high frequency processing unit 42...." Dateki, 10:29-31. The antenna 41 and the high frequency processing unit 42 (shown in FIG. 4 as "RFIF") disclose *the transmitter*.



Dateki, FIG. 4 (annotated)

69. The mobile station shown in FIG. 4 also includes an antenna 31 that “receives a signal transmitted from [the base station] and inputs the received signal to the high frequency processing unit 32. Dateki, 10:25-27. The antenna 31 and the high frequency processing unit 32 (“RFIF”) disclose *the receiver*.

70. The mobile station further includes several components coupled to the antennas 31, 41, and the high frequency processing units 32, 42, including: “a CCH inverse diffusion unit 33, a TCH inverse diffusion unit 34, a DCH inverse diffusion unit 35, a bit determination unit 36, a TPCC extracting unit 37, a transmission power control unit 38...a multiplying unit 43, a multiplexing unit 44, and diffusion units 45, 46, and 47.” Dateki, 10:15-20. These components, shown within the yellow box in annotated FIG. 4 above, disclose *the processor*. These components,

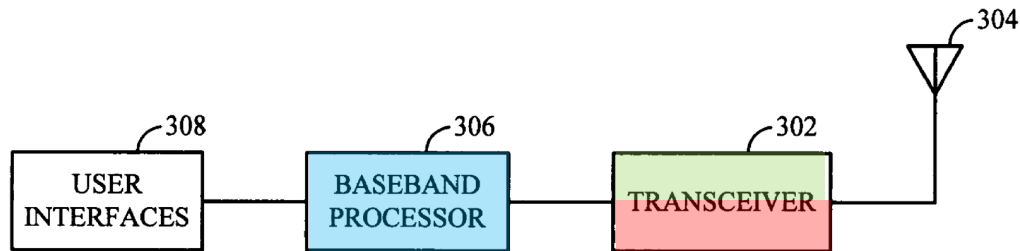
are coupled to each of the antennas 31, 41, and the high frequency processing units 32, 42. Dateki, FIG. 4, 10:35-57, 11:7-18. Accordingly, Dateki discloses that *the processor is operatively coupled to the transmitter and the receiver.*

71. As shown above, Dateki's circuitry within the yellow box (corresponding to the processor) is coupled to each of the antennas 31, 41, and the high frequency processing units 32, 42. Dateki, FIG. 6, 10:35-57, 11:7-18. Accordingly, Dateki discloses that *the processor is operatively coupled to the transmitter and the receiver.*

72. It was known at the time for various signal processing components and circuitry of a mobile wireless device to be implemented on *a processor*, such as an application specific integrated circuit (ASIC). *See, e.g.,* Smee, [0206], [0207]; LeBlanc, [0319].

73. To the extent it is argued that Dateki does not explicitly disclose that the circuitry of its wireless communication apparatus in FIG. 4 comprises *a processor*, a POSITA would have found this obvious. For instance, it was known before the priority date of the '889 patent for various signal processing components and circuitry of a mobile wireless device to be implemented on *a processor*, such as an application specific integrated circuit (ASIC). *See, e.g.,* Smee, [0206], [0207] (UMTS UE circuitry and hardware modules can be implemented as a digital signal processor, an ASIC, or general purpose processor); LeBlanc, [0319] (CDMA data

communication by a mobile station can be performed by an “ASIC chip mobile station modem.”). The processing circuitry of Dateki’s mobile station would have included a baseband *processor* like the one illustrated below by Krishnan’s Fig. 3:



Krishnan, Fig. 3 (annotated)

Krishnan, 3:49-59, 5:39-55.

74. Although Dateki may use other terminology when discussing the circuitry and components that perform the processing operations, using a processor like Krishnan’s was the common and expected way to implement that circuitry, and to achieve the functionality that Dateki describes.

75. Krishnan’s Fig. 5 shows a more detailed view of the baseband processor 306 connected to the receiver and transmitter (shown as Transceiver 302 in Fig. 3):

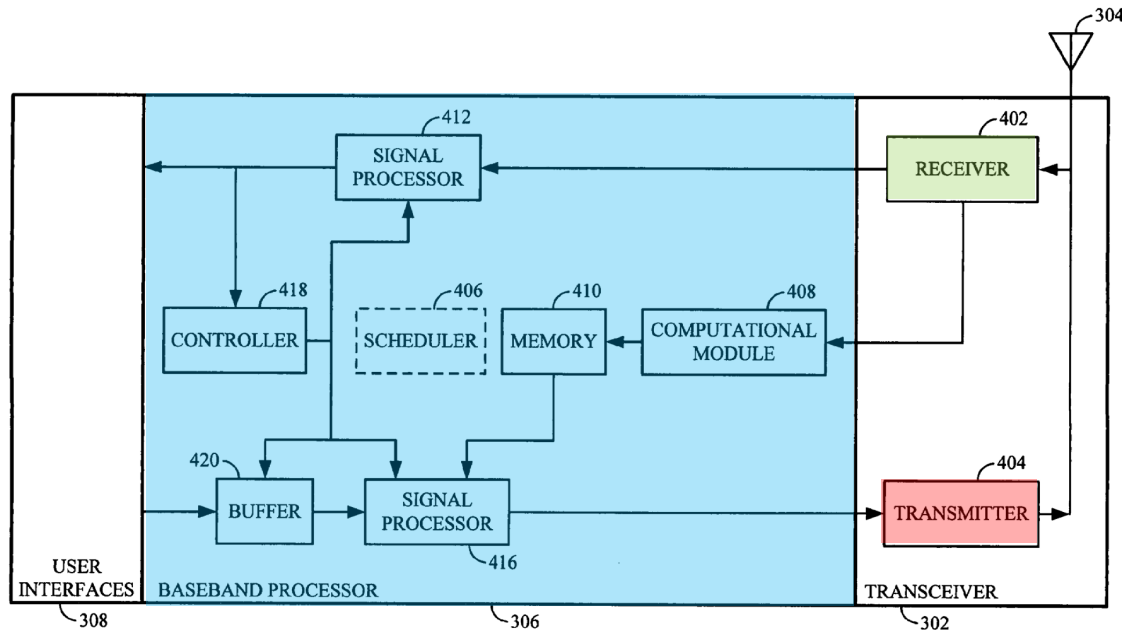


FIG. 5

Krishnan, Fig. 5 (annotated)

Krishnan, 6:30-7:15.

76. These processing components are similar to the computational and signal processing circuitry of the mobile station described in Dateki. Dateki, Fig. 4, 10:55-57, 11:7-18. Thus, Dateki discloses or at least renders obvious that the mobile station comprises *a processor*, such as a baseband *processor*.

77. As shown above, Dateki's circuitry within the yellow box (corresponding to the processor) is coupled to each of the antennas 31, 41, and the high frequency processing units 32, 42. Dateki, FIG. 6, 10:55-57, 11:7-18. Accordingly, *the processor* receives signals obtained by *the receiver*, and sends signals/data to *the transmitter* for wireless transmission to the network. Thus, the processor of Dateki is *operatively coupled to the transmitter and the receiver*.

78. Thus, Dateki discloses or at least renders obvious *a transmitter* (antenna 41 and high frequency processing unit 42); *a receiver* (antenna 31 and high frequency processing unit 32); and *a processor* (TPCC extracting unit and transmission power control unit 43) *operatively coupled to the transmitter and the receiver*.

[1.2] wherein: the receiver and the processor are configured to receive a control message over a physical control channel in a first time slot,

79. Dateki discloses the UE receiving control information over a “fractional dedicated **physical control channel (F-DPCH)**,” which is an example of the recited *physical control channel* in [1.2]. Dateki, 4:35-40 (describing F-DPCH carrying TPC bits for plural users), 12:13-15 (same);

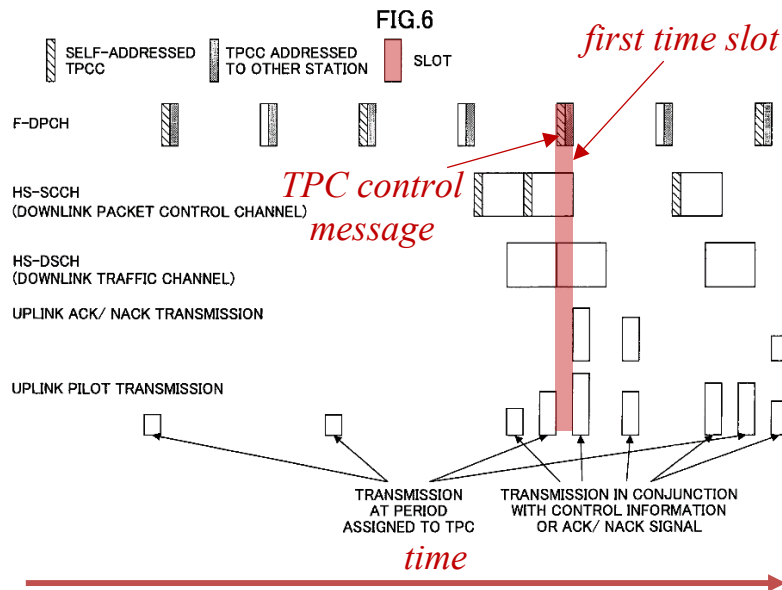
80. Further, Dateki discloses transmitting a *power control message* over the F-DPCH: “[t]he F-DPCH corresponds to a channel that is capable of transmitting a slot including plural TPC [transmit power control] bits addressed to differing mobile stations.” Dateki, 12:13-15. The TPC commands (or bits) carried in the F-DPCH comprise *a control message*, because the TPC commands are communicated together in a control channel (F-DPCH), and the TPC commands are used to facilitate the maintenance, stability, and quality of the communication link. UEs and network nodes (e.g., base stations) exchange control information, including TPC information, as bits in message form. Messages are the conventional mechanisms for exchanging digital information in networks,

including cellular networks like UMTS. Dateki similarly explains that transmitting the TPC bits “is conducted through time division multiplexing **within the same slot.**” Dateki, 5, 4:21-22. Thus, a POSITA would have understood that the TPC commands comprise “*a control message.*”

81. Dateki uses the term “slot” throughout, and a slot is an example of time slot. For example, Dateki uses the term “slot” in the Background section in describing the frame structure of High Speed Downlink Packet Access (HSDPA). In reference to FIG. 2, for example, Dateki explains that in HSDPA “15 slots make up one frame (10 ms).” Dateki, 3:4-5. Other references describing the frame structure of HSDPA refer to the same “slots” as “time slots.” *See, e.g.,* Rudolph, [0031] (“Under current R5 HSDPA specifications, fifteen (15) time slots include one (1) frame...”). The ’889 patent likewise uses “slot” and “time slot” interchangeably. *See, e.g.,* ’889 patent, 6:40-41, 46-48 (“For example, a single terminal may not be able to access all transmit and all receive slots....In particular, this may also apply for the case where there are more than one UL-Beacon timeslot per, [sic] frame.”). Thus, Dateki’s “slot” teaches a *time slot*.

82. Referring to FIG. 6 below, Dateki illustrates a plurality of time slots and associated channels and transmissions. In FIG. 6, time runs horizontally across the figure. Dateki illustrates transmitting TPC commands (*control message[s]*) in various time slots in both the F-DPCH and High Speed Physical Downlink Shared

Channel (HS-PDSCH). *See* Dateki, 12:17-19 (describing periodicity of TPCC transmissions in numbers of slots).



Dateki, FIG. 6 (annotated)

83. The slot during which the highlighted F-DPCH communication including the TPCCs discloses the first time slot. Dateki's F-DPCH communication that includes TPCC for plural users ("self-addressed," and "to other station"), grouped and transmitted together in the slot, is an example of a *control message*. In this regard, Dateki explains that the TPC bits for the plural users are encoded "using the same code." Dateki, 4:35-40. The F-DPCH (Fractional Dedicated Physical Channel) on which the encoded TPC bits are transmitted discloses a physical control channel. Thus, the TPCCs transmitted together in an instance or occasion of an F-DPCH discloses *a control message over*

a physical control channel in a first time slot.

84. Further, as explained above in [1.1], Dateki discloses that the mobile station that receives the F-DPCH includes a processor (TPCC extracting unit 37 and a transmission power control unit 43) and a receiver (antenna 31 and the high frequency processing unit 32) Dateki, FIG. 6, 10:55-57, 11:7-18. Dateki explains that the mobile station's TPCC extracting unit 37 (part of the processor) extracts TPC bits addressed to the mobile station, which are received from the antenna 31 and high frequency processing unit 32 (*the receiver*). Dateki, 10:51-59, 11:6-10, 12:13-15.

85. To the extent Dateki does not explicitly disclose that the receiver and processor of the UE receive the F-DPCH, Dateki suggests it, or at the very least renders it obvious. Dateki's communication protocols and mechanisms are directed to wireless communication protocols related to code division multiple access (CDMA), also known as "3G." It would have been obvious for a CDMA mobile station to use its processor and receiver to receive and extract the TPCC information, because this is the standard, conventional way to exchange and obtain information wirelessly between nodes (e.g., between the mobile station and the base station).

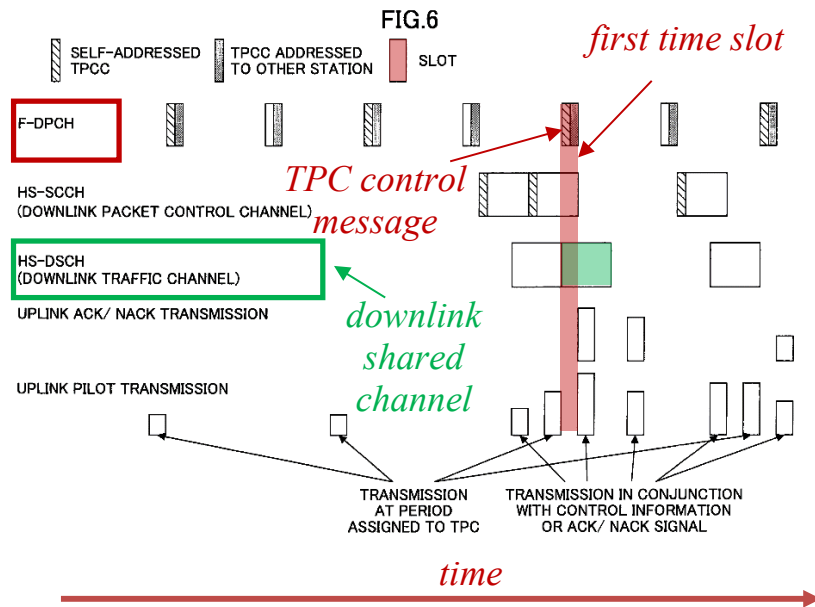
[1.3] wherein the first time slot also includes a downlink shared channel,

86. As explained in [1.2], Dateki discloses the UE receiving control

information in a time slot over a fractional dedicated physical channel (F-DPCH) (*physical control channel*).

87. Dateki discloses that the UE receives data in the same time slot over a “High Speed Physical Downlink **Shared** Channel (HS-PDSCH),” which is an example of the *downlink shared channel* in limitation [1.2]. Dateki, 12:5-6, 14:26-28. Dateki describes HS-PDSCH as a “downlink traffic channel,” and a “shared channel.” Dateki, 12:5-7, 14:26-28.

88. Dateki’s FIG. 6 illustrates transmitting a TPCC in the F-DPCH in a time slot and concurrently transmitting data in the HS-PDSCH (listed in figure as “HS-DSCH”) (*downlink shared channel*) within the same time slot. Specifically, the TPCC command in the F-DPCH is vertically aligned with the transmission in the HS-PDSCH (green) indicating that they are transmitted in the same time slot:



Dateki, FIG. 6 (annotated)

89. Therefore, Dateki discloses that a UE receives TPC information for a plurality of UEs (*a control message*) over a F-DPCH (*physical control channel*) [1.2], and also discloses a UE receiving the TPC information in the F-DPCH that is within the same time resources as a slot (*the first time slot*) in which the HS-PDSCH (*downlink shared channel*) is transmitted [1.3]. Accordingly, Dateki discloses or renders obvious that *the first time slot also includes a downlink shared channel*.

90. FIG. 6 of Dateki is one example of a segment of packet transmissions to one mobile terminal to illustrate the teachings of Dateki. Packets would have been transmitted on the HS-PDSCH, at whatever time those packets are available and scheduled to be transmitted (e.g., arriving in a buffer established for uplink

transmissions).

91. Consistent with the design and purpose of CDMA systems, which includes the use of different channels to simultaneously transmit different types of information (e.g., traffic data, control data, and/or reference signals), it would have been obvious for *the first time slot* to be used to transmit both downlink control information (including TPCC), and to transmit other downlink information (e.g., downlink data). As Dateki illustrates, different channels are used for the transmission of these different types of information, and those different types of channels can be used at the same time. Thus, there would have been numerous and repeated time slots (including *a first time slot*) during a data transfer where packets on the HS-PDSCH (*downlink shared channel*) overlap TPCC bits on the F-DPCH.

92. Thus, Dateki renders obvious limitation [1.3].

[1.4] wherein the control message has power control bits for a plurality of UEs, wherein the plurality of UEs include the first UE,

93. As similarly explained above at [1.2], Dateki explains that “[t]he F-DPCH corresponds to a channel that is capable of transmitting a slot including plural TPC bits addressed to differing mobile stations.” Dateki, 12:13-15. As explained below, Dateki’s “plural TPC bits” include *power control bits for a plurality of UEs*.

94. Dateki explains that, during the Third Generation Partnership Project (3GPP) standards process for CDMA, also known as 3G, F-DPCH was introduced

for transmitting “transmission power control (TCP) information of a dedicated channel for plural users.” Dateki, 4:16-21. In F-DPCH, the TPC information for the multiple UEs is encoded using “the same code to conduct a diffusion process and time division multiplexing with respect to TPC bits and pilot signals of plural users....” Dateki, 4:35-38. Thus, Dateki’s “plural TPC bits addressed to differing mobile users” are processed together in a transmitter using a “same code to conduct a diffusion process.”

95. The plural TPC bits processed using a same diffusion code discloses or at least renders obvious *a control message* having the TPC bits. In that regard, it would have been obvious to use a same code to encode the data in the F-DPCH so that the TPC bits could be transmitted together, which is one of the advantages and aims of CDMA protocols (like W-CDMA used in UMTS). *See* §§ V.A, B. Thus, Dateki discloses or renders obvious that the plural TPC bits addressed to differing mobile stations (*control message*) include *power control bits for a plurality of UEs*.

96. Further, Dateki explains that the TPCC extracting unit 37 of the mobile station (*the first UE*) extracts its TPC bits from the plural TPC bits addressed to the plural UEs. Dateki, 10:51-59, 11:6-10, 12:13-15. For example, in a mobile station, an “DCH inverse diffusion unit 35 conduct inverse diffusion processes on the input signal using the respective diffusion codes used in the corresponding diffusion processes conducted at the transmission side.” Dateki,

10:37-42. In this way, the mobile station processes the TPC bits together (as a *control message*) before extracting the TPC bit that conveys power control for that mobile station. Thus, Dateki also discloses that *the plurality of UEs include the first UE*.

97. Accordingly, Dateki discloses *wherein the control message has power control bits for a plurality of UEs, wherein the plurality of UEs include the first UE*.

[1.5] the processor is further configured to extract power control information for the first UE from the control message, and

98. Dateki explains that the TPCC extracting unit 37 of the mobile station (part of *the processor*) extracts *power control information*:

Also, inverse diffusion outputs including transmission power control information that are obtained by inverse diffusion processes conducted by the TCH inverse diffusion unit 34 and the DCH inverse diffusion unit 35, respectively, are input to **the TPCC extracting unit 37 at which the transmission power control information is extracted**. The extracted transmission power information is then input to the transmission power control unit 38.

Dateki, 10:51-59.

99. As explained above, Dateki discloses transmitting transmission power control information for multiple UEs in the same F-DPCH, where the power control information includes “*plural TPC bits addressed to different mobile*

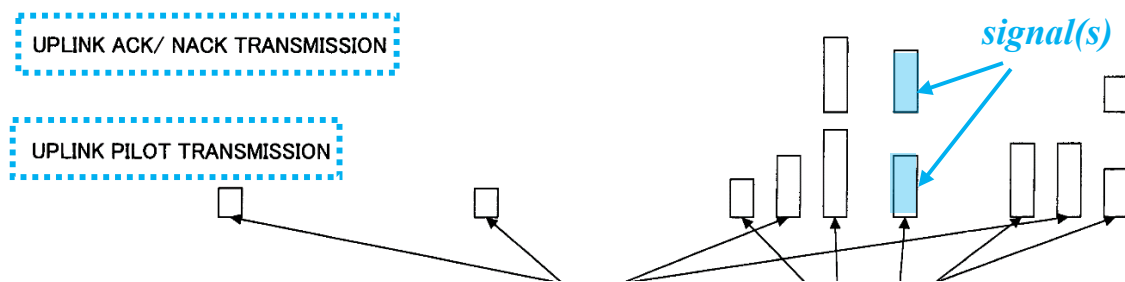
stations.” Dateki, 12:13-15.

100. Accordingly, Dateki discloses that the UE obtains its TPCC from the F-DPCH occasion such that the UE can use that TPCC to update its transmit power in future communications. Thus, Dateki’s TPCC extracting unit 37, which is part of *the processor*, extracts *power control information for the first UE from the control message*.

101. Thus, Dateki discloses *the processor is further configured to extract power control information for the first UE from the control message*.

[1.6] *the transmitter and the processor are configured to transmit a signal over a physical control channel to a base station in a second time slot at a transmission power level based on the extracted power control information.*

102. **First**, Dateki discloses that the UE transmits ACK/NACK feedback and uplink pilot signals (also referred to as pilot “symbols”) to the base station. See Dateki, 12:4-10. Each of these signals, shown in FIG. 6 of Dateki, includes *a signal*.



Dateki, FIG. 6 (partial annotated)

103. Thus, for the purposes of this Petition, either the ACK/NACK signal

transmission or the uplink pilot signal transmission correspond to “*transmit a signal*.” Both options are discussed together below.

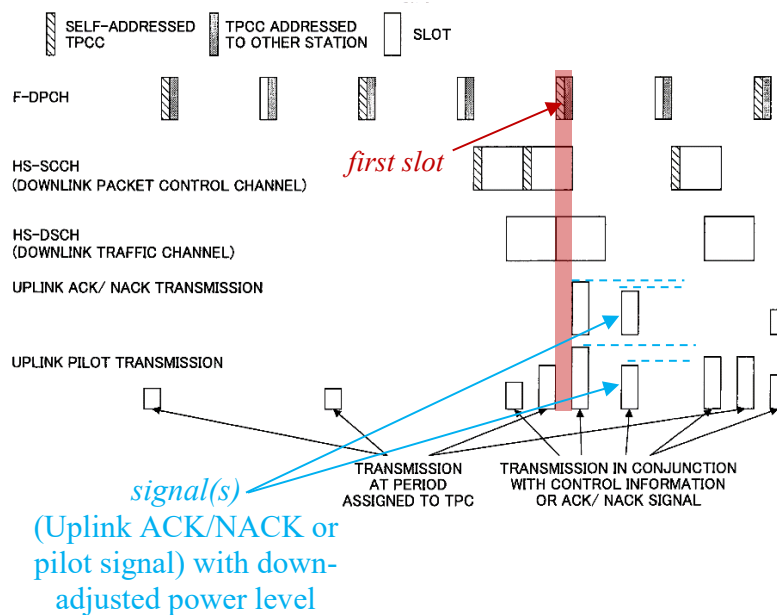
104. Dateki teaches using the extracted TPC command to set a transmission power level for the pilot symbols and the ACK/NACK signals:

Also, according to the present embodiment, uplink traffic data, **a pilot symbol, and a ACK/NACK signal** based on the reception processing result of processing downlink traffic data output are input to the diffusion units 45, 46, and 47, respectively, to be diffused by differing diffusion codes. Then the diffused signals are multiplexed at the multiplexing unit 44, and multiplied at the multiplying unit 43 by **a control value from the transmission power control unit 38 to realize transmission power control**. ... According to an embodiment, the transmission power control unit 38 is configured to increment the transmission power P_{tx} by +1 dB when the transmission power control information TPCC extracted by the TPCC extracting unit 37 is greater than 0 ($TPCC > 0$), and the transmission power control unit 38 is configured to decrement the transmission power P_{tx} by -1 dB when the transmission power control information is TPCC is less than 0 ($TPCC < 0$). In this way, the transmission power control unit 38 is arranged to input a value to the multiplying unit 43 according to the updated transmission power P_{tx} .

Dateki, 10:60-11:14.

105. Adjusting the power level of ACK/NACK transmissions and pilot signals based on the TPCC information is illustrated in FIG. 6, reproduced and

annotated below. In the figure, the height of the boxes for the various signals illustrates the power level. *See* Dateki, 11:26-28 (explaining with respect to similar FIG. 5, height of the signal boxes indicates power level).



Dateki, FIG. 6 (annotated)

106. As shown in the annotated FIG. 6 above, the height of the second ACK/NACK signal and second pilot signal changes after the UE receives and extracts the TPCC information from the F-DPCH. Thus, the second uplink ACK/NACK transmission, or the pilot signal, (*a signal*) is transmitted *based on the extracted power control information*.

107. Second, Dateki teaches that ACK/NACK signals and other control

signals are sent over “control channels” like the High-Speed Dedicated Physical Control Channel (HS-DPCCH) (*physical control channel*):

The channels HS-SCCH, HS-PDSCH, and **HS DPCCH** correspond to **control channels** as described above, and the HS-DPCCH is used to transmit the CQI and ACK/NACK signals.

Dateki, 2:67-3:3.

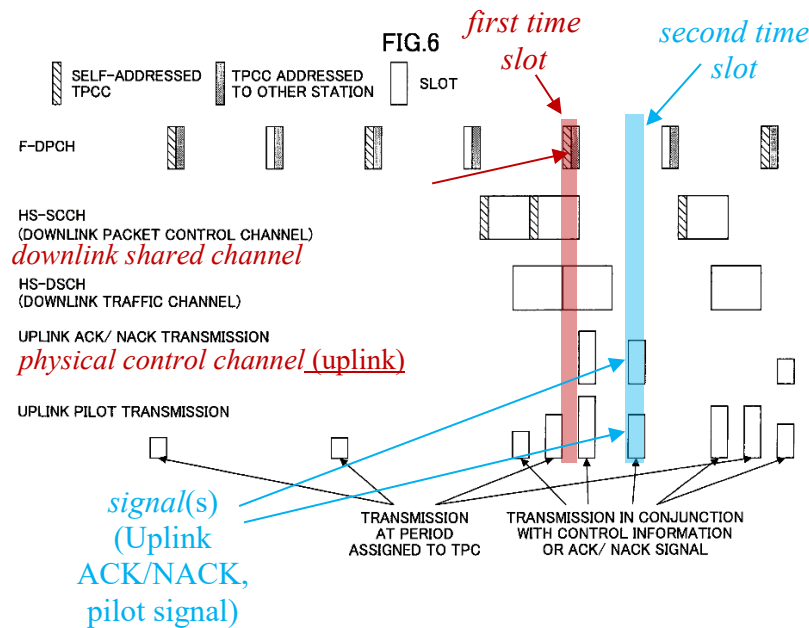
108. Dateki also teaches that pilot signals are transmitted via dedicated physical channels (DPCHs) (*physical control channel*):

On the other hand, in a packet communication scheme using shared channels such as the HS-PDSCH, **pilot signals** and TPC bits are periodically transmitted via **uplink** and downlink **DPCH** channels....

Dateki, 4:59-62; *see also* 12:9-10 (explaining that uplink pilot transmission corresponds to a DPCH).

109. Thus, Dateki’s ACK/NACK signals and uplink pilot signals are transmitted on respective *physical control channel(s)*.

110. Third, Dateki teaches transmitting the ACK/NACK signal and pilot signal in a different time slot than the received TPC commands. For instance, Dateki’s FIG. 6 shows that an ACK/NACK and uplink pilot signal are transmitted in a second time slot that is subsequent to the first time slot in which the F-DPCH is received.



Dateki, FIG. 6 (annotated)

111. Thus, Dateki discloses limitation [1.6].

3. Claim 2

[2.1] *The first UE of claim 1 wherein the signal transmitted over the physical control channel is produced using a code sequence, wherein a plurality of UEs transmit in the second time slot using different code sequences.*

112. **First**, as explained above with respect to limitation [1.6], Dateki's uplink ACK/NACK signal or the uplink pilot signal discloses *the signal transmitted over the physical control channel.*

113. **Second**, mobile stations applying *different code sequences* to their uplink signals for transmission in the same time slot as the ACK/NACK and/or pilot signal (*"in the second time slot"*) would have been an obvious and expected

part of Dateki's Wideband **Code** Division Multiple Access (W-CDMA) communication scheme. *See*, Dateki, 2:1-3, 4:16-22, 4:53-55, 10:8-13. Dateki explains that the F-DPCH power control features disclosed above were implemented in the W-CDMA protocols:

Also, to enhance the W-CDMA system, use of the F-DPCH...is proposed (e.g. see 3GPP R1-031073).

Dateki, 4:16-18.

114. As explained in the Technology Background above, in CDMA, each mobile station applies its own spreading code and scrambling code (also called a diffusion code) to uplink signals. *See* § V.A. In this way, signals from multiple mobile stations (*plurality of UEs*) can be transmitted in the same time resources and in the same frequency band without interfering. *See* Tanenbaum, 321-325.

115. Consistent with W-CDMA, Dateki discloses that the uplink ACK/NACK signals and pilot signals are “diffused by differing **diffusing codes**” (*produced using a code sequence*), and multiplexed for transmission to the base station. Dateki, 10:60-11:1.

116. It would have been an expected and fundamental part of Dateki's W-CDMA-based communications for other mobile stations (*a plurality of UEs*) to transmit uplink signals using their own spreading codes and/or scrambling codes (*using different code sequences*). In such a W-CDMA scheme, the same time slots

are used by multiple devices for uplink transmissions. Other UEs having control signals (e.g., pilot signals, ACK/NACK) to transmit would have used *the second time slot* during which *the first UE* transmits *the signal*. Thus, it would have been obvious to a POSITA for *a plurality of UEs* to transmit in the second time slot using different code sequences.

117. Accordingly, Dateki renders obvious limitation [2.1].

4. Claim 5

118. Claim 5 is a method claim that is analogous to apparatus claim 1. As confirmed in the chart below, the steps of claim 5 are nearly identical to the steps performed by the *transmitter, receiver, and processor* of claim 1. Any differences in wording between the two claims are insignificant and do not affect the arguments presented above for claim 1. For instance, claim 5 recites the steps being performed by *the first UE*, and claim 1 recites the steps being performed by one or more of the *receiver, transmitter, or processor of the first UE*.

Claim 1	Claim 5
A first user equipment (UE) comprising: a transmitter; a receiver; and a processor, operatively coupled	A method performed by a first user equipment (UE), the method comprising:

to the transmitter and the receiver, wherein:	
the receiver and the processor are configured to receive a control message over a physical control channel in a first time slot, wherein the first time slot also includes a downlink shared channel,	receiving, by the first UE, a control message over a physical control channel in a first time slot, wherein the first time slot also includes a downlink shared channel,
wherein the control message has power control bits for a plurality of UEs, wherein the plurality of UEs include the first UE,	wherein the control message has power control bits for a plurality of UEs including the first UE;
the processor is further configured to extract power control information for the first UE from the control message, and	extracting, by the UE, power control information for the first UE from the control message; and
the transmitter and the processor are configured to transmit a signal over a	transmitting, by the UE, a signal over a physical control channel to a base

physical control channel to a base station in a second time slot at a transmission power level based on the extracted power control information.	station in a second time slot at a transmission power level based on the extracted power control information.
--	---

119. Claim 5 is therefore obvious over Dateki for the same reasons explained above with respect to claim 1.

5. Claim 6

120. Claims 6 is a method claim corresponding to apparatus claim 2. Dateki renders claim 6 obvious for the same reasons described above with respect to claim 2. *See* §VIII.A.3.

B. Ground 2: Claims 3 and 7 are obvious over Dateki in view of Mate

1. Mate

121. Mate relates to UMTS communication protocols for communications between UEs and base stations. Mate, [0001]-[0004]. Mate describes “downlink switching” procedures for switching UEs in a network between different connected states, such as cell_DCH, and cell_FACH. Mate, Abstract, [0010], [0013]; *see supra*, §VIII.C.1 (discussing different requirements and services for cell_DCH and cell_FACH).

122. Mate explains that the UMTS protocol includes a variety of transport channels and physical channels, where each transport channel is mapped to at least

one physical channel:

Physical channels and transport channels are specified in 3GPP TS 21.211 V3.4.0 (2000-9). In particular, the DSCH transport channel is mapped onto the Physical Downlink Shared Channel (pDSCH); **the CPCH is mapped to the Physical Common Packet Channel (pCPCH)**; and the DCH is mapped to the dedicated physical channel DPCH....

Mate, [0005].

123. The Physical Common Packet Channel (pCPCH) “has a data part that can carry small amounts of information.” Mate, [0043]. The pCPCH is mapped to the CPCH transport channel, which is “a counter part of the [Downlink Shared Channel (DSCH).” Mate, [0043]. The pCPCH can be used while the UE is still in a “cell_FACH” state, without the need to move to the “cell_DCH” state, which would consume more power and network resources. Mate, [0043], [0044].

124. Like the ’889 patent, Mate is directed to UMTS (W-CDMA) wireless communication protocols. Mate, [0002]-[0005]; ’889 Patent, 1:27-32. Thus, Mate is in the same field of endeavor as the ’889 patent.

125. Further, Mate describes protocols for a UE to switch between different connected states. Mate, [0015]-[0016]. Thus, Mate is relevant to the particular problem the ’889 patent attempts to solve. *See* ’889 Patent, 7:4-16 (UE switching between connected states).

2. Reasons to Combine Dateki and Mate

126. Dateki's F-DPCH procedures are based on W-CDMA technologies standardized by the 3GPP. Dateki, 2:1-3, 4:16-22, 4:53-55, 10:8-13. Mate discloses additional W-CDMA-based protocols and features that would have been performed alongside Dateki's F-DPCH procedures in the same 3GPP standardized UMTS system. Mate, [0002]-[0005] (discussing UMTS standards and explaining that pCPCH is a physical channel in the UMTS standards). For instance, the various transport and physical channels Mate describes were part of the same 3GPP-standardized UMTS protocols on which Dateki is based. Mate, [0002]-[0005]; Denk, [0004]. In other words, Dateki's description of the power control mechanisms in the context of W-CDMA-based standards would have motivated a POSITA to use Mate's additional W-CDMA procedures to comply with the W-CDMA standards.

127. A POSITA would have found it beneficial to implement base stations and terminals according to the known 3GPP standards on which both Dateki and Mate are based to ensure compatibility and marketability of the product. Moreover, a POSITA would have found it beneficial and advantageous to implement such devices with standardized techniques that have already been well vetted and tested for workability. For instance, the pCPCH channel described by Mate allows the UE to transmit small amounts of data without the need to

transition to a cell_DCH state. Mate, [0043], [0044] (“...the UE maintains the cell_FACH state in the messaging period, without the need of switching to the cell_DCH state.”). The combination would simply use Mate’s uplink common packet channel and Dateki’s W-CDMA-based power control mechanisms as part of a more comprehensive UMTS-standardized common data channel communication protocol. The combination would have been predictable, because both Dateki’s and Mate’s features were part of the same protocols using the same underlying CDMA mechanisms.

128. Further, modifying Dateki with Mate would have involved a simple combination of the uplink common packet channel, described in Mate, and the W-CDMA-based power control mechanisms described in Dateki. This combination would have been achievable by implementing UMTS physical layer procedures between UEs and base stations (e.g., via software and network configuration) to provide a more comprehensive W-CDMA communication protocol compliant with UMTS. The results would have been predictable because the combined W-CDMA protocols, including Dateki’s F-DPCH power control procedures and Mate’s pCPCH, had already been standardized and in use for some time. Mate, [0005] (pCPCH standardized in 3GPP TS 21.211 v3.4.0); Dateki, 4:16-18.

129. A POSITA also would have had a reasonable expectation of success because both Dateki and Mate are directed to cellular communication systems that

follow 3GPP standards for W-CDMA. *See* Dateki, 4:4-22 (describing use of HSDPA channels and F-DPCH as standardized by 3GPP); Mate, [0003] (“UE radio transmission and reception (FDD) is described in the Technical Specification (TS) 25.101 v 3.1.0 (1999-12) of the Third Generation Partnership Project (3GPP) and documents referenced therein”). Accordingly, both Dateki and Mate describe known methods according to 3GPP standards.

3. Claim 3

[3.1] The first UE of claim 1 wherein the transmitter and the processor are further configured to transmit data over a physical shared channel in a third time slot

130. First, Dateki explains that the mobile station transmits “uplink traffic data”:

Also, according to the present embodiment, **uplink traffic data**, a pilot symbol, and a ACK/NACK signal based on the reception processing result of processing downlink traffic data output are input to the diffusion units 45, 46, and 47, respectively, to be diffused by differing diffusion codes.

Dateki, 10:60-64.

131. Thus, Dateki discloses that the mobile station is configured to *transmit data*.

132. Second, it would have been obvious for the mobile station to transmit the uplink traffic data *over a physical shared channel*. Dateki discloses that its

communication procedures are based on the W-CDMA protocols standardized in the UMTS. *See* Dateki, 8:25-30. It was well known that UMTS included *shared* data channels that could be used for uplink or downlink data. *See* Dateki, 2:19-23; Chitrapu, 47, 48; Mate, [0030], [0074].

133. One example of a physical shared channel from the 3G standards is the “**Physical Common** Packet Channel (pCPCH).”² Mate, [0005]. For instance, Mate explains that pCPCH was a physical channel assigned to the “Uplink Common Packet Channel (CPCH),” which is a transport channel. Mate, [0004], [0005]. The CPCH, via the pCPCH, was “intended to carry **packet data** in the uplink direction.” Mate, [0004].

134. Mate explains that the “pCPCH has a data part that can carry small amounts of uplink information.” Mate, [0043]. Mate further explains that “a single CPCH can be time-division **shared** between different bearers of different UEs in a similar manner as the [Downlink Shared Channel (DSCH)].” Mate, [0070]; *see also*, Denk, [0024]-[0026], [0030], [0074] (confirming pCPCH was a well-known UMTS shared uplink channel). pCPCH was therefore a physical channel that was shared by multiple users to carry data. Thus, pCPCH discloses *a physical shared channel*.

135. A POSITA would have found it obvious for Dateki's uplink traffic data (*data*) to be transmitted using Mate's pCPCCH channel (*physical shared channel*) because pCPCCH was another part of the comprehensive 3GPP-standardized UMTS protocols on which Dateki is based. *See §§V.A, B.* In other words, Mate teaches aspects of the 3GPP UMTS standard that Dateki does not explicitly describe.

136. Although pCPCCH was not widely used by wireless service providers, it was nevertheless a well-known channel type and would have been an obvious feature to add to the suite of standards that would have been used in Dateki's system. For instance, a POSITA would have appreciated the benefits of allowing for small transmissions of uplink data without requiring the UE to move from the Cell_FACH state to the Cell_DCH state. As explained above, the Cell_DCH state typically involves greater use of power and network resources in order to provide the services (e.g., dedicated channels) available in the dedicated connected states.

137. Third, it would have been obvious for the mobile station to transmit the uplink traffic data in *a third time slot* different from (for instance, after) the *first* and *second time slots*. The transmission timing of uplink pilot signals and ACK/NACK (*the signal*) is based either on a periodic configured schedule, or on the timing of the received downlink traffic. Dateki, 12:37-41, 53-60. Uplink data transmissions would have been triggered by a different event (e.g., uplink data

arriving in buffer from higher layers) than the uplink pilot and ACK/NACK signals. For instance, Markovic explains that uplink data is received at a buffer from the higher layers (URLC) and can be transmitted when the mobile station (MS) moves to a URLC-ACTIVE state:

Upon entering URLC-SERVICE-ATTACHED state, the MS URLC initially transitions to URLC-STANDBY state and the corresponding URLC TC does not exist yet. The MS URLC must be able to **buffer the uplink data packet** or packets while the URLC TC activation is in progress. After successful URLC TC activation, the MS URLC transitions to URLC-ACTIVE state. The following are the possible triggers for URLC TC activation on the MS side:

- 1) The LLC **initiates the uplink data transfer** using LLC SAPI 3, 5, 9, or 11.
- 2) The UNC initiates URLC TC activation; i.e. the MS receives a URLC-ACTIVATE-GPRS-TC-REQ message from the UNC.

Markovic, [0120]-[0122].

138. Toskala similarly describes the role that buffers and data rates play in uplink data transmissions and transmission timing for UMTS systems using HSDPA:

According to the prior art, signaling in an uplink by a wireless terminal to a radio access for high speed downlink packet access (HSDPA) conveys for example HARQ (hybrid automatic repeat request) related information and channel quality feedback. In release 99 of UTRAN, all signaling between a UE and a radio access network (RAN) takes place

in the radio resource control (RRC) protocol level (in layer 3 of the WCDMA protocol stack), and is terminated (in uplink) in the radio network controller (RNC) serving the UE, i.e. the SRNC. **UE transmission (i.e. uplink) can be scheduled by using a transport format combination control (TFCC) message**, which can indicate a rate and other parameters defining a configuration, and which is signaled by the RRC protocol. Such a TFCC message can be sent without an explicit time reference for immediate effect, or instead an explicit activation time can be included for the configuration indicated in the message. In both cases the message is originated by the RNC serving the UE (i.e. the SRNC).

A UE would want to **increase its data rate if its uplink buffer is filling up**. Alternatively, if the uplink buffer is emptying, the UE may be able to provide adequate service delay with a decreased data rate.

Toskala, [0004]-[0005].

139. Thus, the general timing of uplink data transmissions is, in part, determined by higher-layer procedures that do not necessarily follow for other types of signaling, such as Dateki's periodically-scheduled pilot signal transmissions. ACK/NACK transmission timing is in part based on the timing of the corresponding received downlink communication for which the ACK/NACK is being transmitted.

140. Additionally, in the case of pCPCH, which corresponds to the physical shared channel in this limitation, Mate explains that the pCPCH is used

when the UE is in the “cell_FACH” state. Mate, [0004]. Dateki’s ACK/NACK signal (*the signal*) is transmitted on the High-Speed **Dedicated** Physical Control Channel (HS-DPCCH). Dateki, 2:67-3:3. Dateki’s pilot signal (*the signal*, alternatively) is transmitted on the **Dedicated** Physical Channel (DPCH). Dateki, 4:59-62, 12:9-10. Those dedicated channels are only available when the UE is in a dedicated connected state—specifically the cell_DCH state. Mate, [0004].

141. A UE in the UMTS system would have transitioned from one state to the next, and would not have operated in both states at the same time. For instance, Chitrapu explains that “the UE can be in one” state, including one of CELL_DCH or CELL_FACH. Chitrapu, 89. These states are used to allocate network resources to various UEs according to their immediate needs, and determine which types of services are available to the UE. Mate, [0010] (UE is either in cell_FACH or cell_DCH).

142. Further, a PCPCH is available for transmission by the UE only at “specific access time slots.” Denk, [0030].

143. It would have been obvious for the mobile station to transmit uplink data in *a third time slot* once the mobile station has uplink traffic data to transmit. Further, because the UE transmits the data using the pCPCH, it would have been obvious for the UE to transmit the data in a specific access time slot” (*third time slot*) for the pCPCH, which only becomes available once the UE has moved from

the cell_DCH state to the cell_FACH state.

144. Thus, Dateki and Mate render obvious limitation [3.1].

[3.2] and the transmitter and the processor are further configured to not transmit the signal over the physical control channel at a same time that data over a physical shared channel is transmitted.

145. As explained above with respect to limitation [3.1], it would have been obvious for Dateki's mobile station to transmit pCPCH uplink data in a different slot than the pilot symbol and/or the ACK/NACK. In fact, because said uplink data is transmitted while the UE is in the Cell_FACH state, the UE would not transmit the ACK/NACK, for instance, until the UE changed to the Cell_DCH state. See Mate, [0004] (CPCH is transmitted in Cell_FACH state). As explained above, the UE would have been either in Cell_FACH or in Cell_DCH - in these two states simultaneously. Chitrapu, 126

146. Thus, because pCPCH data (*data over a physical shared channel*) is transmitted in a different state (Cell_FACH) than the ACK/NACK, for example, these two transmissions would be made at different times. In that regard, ACK/NACK would have been made on a dedicated channel, which would have occurred in an appropriate dedicated state (Cell_DCH). Accordingly, it would have been obvious for the UE to transmit the *data* on a pCPCH at a different time than the UE transmits *the signal*. In other words, it would have been obvious for the UE to be configured ***to not transmit the signal*** (e.g., ACK/NACK) over *the physical*

control channel (e.g., HS-DPCCH) *at a same time* that pCPCH data (*data over a physical shared channel*) is transmitted.

147. Thus, Dateki and Mate render limitation [3.2] obvious.

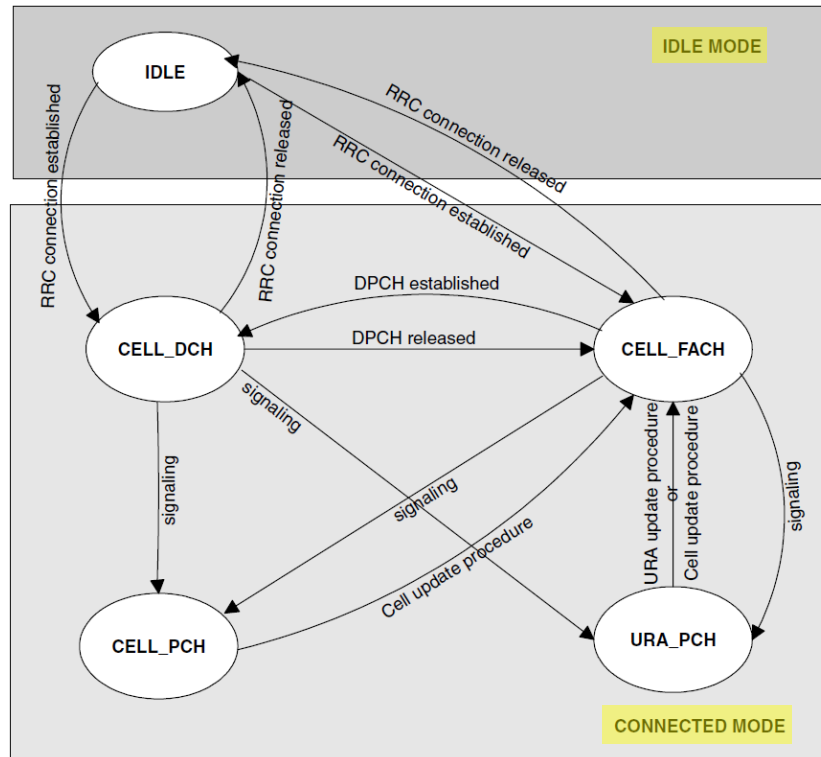
4. Claim 7

148. Claim 7 is a method claim corresponding to apparatus claim 3. Dateki renders claim 7 obvious for the same reasons described above with respect to claim 3. *See* §VIII.B.3.

C. Ground 3: Claims 4 and 8 are obvious over Dateki in view of Chitrapu

1. Technology Background – Connection States and Random Access

149. 3G protocols use different modes or “states” corresponding to the level of activity a mobile device has with the network. Chitrapu, 89. These connection states are governed by the Radio Resource Control (RRC) layer, and are categorized into “Idle” modes, and “connected” modes.

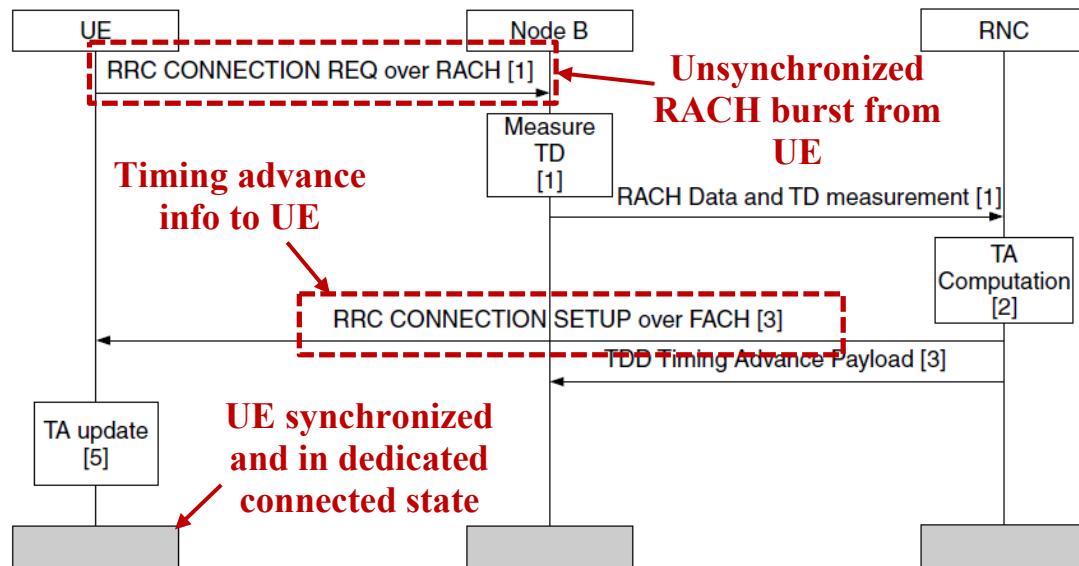


Chitrapu, FIG. 5.1.

150. For instance, the mobile device enters an Idle mode if (1) a mobile device does not have data to transmit or receive, or (2) the mobile device moves out of range of the cell to which it was previously connected. In Idle mode, the mobile device's contact with the network is limited. Chitrapu, 89-91. This limited contact reduces the amount of power and network resources the mobile device would otherwise use if it stayed connected to the network continuously. When the mobile device wants to use network services (e.g., receive a data stream), the mobile device initiates a random access procedure to request to enter a connected state in a given cell. Chitrapu, 89-91.

151. Many 3G network services, such as high-speed data communication, are often only available through dedicated channels. Those dedicated channels typically rely on the mobile device keeping tight time synchronization with the network's cell tower. Chitrapu, 39, 104. When the mobile device is in an Idle, or disconnected state, there is usually insufficient time synchronization to use dedicated channels. Chitrapu, 53. By initiating the random access procedure to enter the RRC connected state, the mobile device may obtain the level of time synchronization required for those dedicated channels. Chitrapu, 105, 120-121.

152. The random access procedure involves the mobile device using a Random Access Channel (RACH) to request to move to a connected state. Chitrapu, 120-121. RACH is a shared uplink channel used for transmitting short signaling messages, sometimes called "preambles," or "bursts." Chitrapu, 120. One feature of the RACH is that devices do not need to be closely time-synchronized with the network to initiate access. Chitrapu, 23, 120. When a mobile device wants to connect, it sends a signal (RACH burst) on the RACH channel indicating a request to connect. Chitrapu, 120-121. The base station then responds with a timing adjustment and grant message, allowing the device to begin the connection process. Chitrapu, 120-121.



Chitrapu, Fig. 5.24 (annotated).

153. Once the device has successfully connected to the network, it transitions into different Radio Resource Control (RRC) connected states, such as Cell_DCH (Dedicated Channel), where the device is actively communicating, or Cell_FACH (Forward Access Channel), where the device is connected but transmitting less data. Chitrapu, 89-91. Each of these connected states is associated with different types of channels, and allows for different types and levels of services. For instance, Cell_FACH has less stringent time synchronization requirements than Cell_DCH, but Cell_DCH supports more advanced services and channels (e.g., faster data speeds). Chitrapu, 121-122. Time synchronization in these states ensures that the device's transmissions align with the network's

scheduling, reducing interference and optimizing network performance.

2. Chitrapu

154. Chitrapu is entitled “Wideband TDD: WCDMA for the Unpaired Spectrum.” Chitrapu, cover. Chitrapu explains that Wideband TDD (WTDD) “is a radio interface technology that combines the best of WCDMA and TDMA.”

Chitrapu, 2. Some of Chitrapu’s teachings relate to particular implementations of W-CDMA which were proposed, but not necessarily adopted. However, the portions of Chitrapu relied upon in this Petition describe the W-CDMA protocols as adopted into the UMTS by the 3GPP. *See* Chitrapu, 3, 4 (explaining that disclosed Wideband TDD build onto standardized W-CDMA protocols).

155. Chitrapu describes the random access procedures for WCDMA. For instance, Chitrapu explains that WCDMA relies on time synchronization between the UE and the network:

It should be noted that the received chips and the spreading code should **be synchronized in time** for the correlation operation.

Chitrapu, 39.

156. A UE that desires to enter an RRC connected state from an Idle mode performs a random access procedure via a random access channel (RACH):

Random Access procedure is the means by which a UE in the Idle Mode or CELL FACH/CELL PCH/URA PCH states of the Connected Mode can request access for Network Services.

Chitrapu, 97.

157. To initiate a RACH procedure, a UE transmits a “PRACH burst,” which is also referred to as a “RACH burst.” Chitrapu, 98, 120. The PRACH burst initiates a connection procedure, resulting in the UE receiving timing advance information to time synchronize with the network. Chitrapu, 120.

158. Like the ’889 patent, Chitrapu is directed to CDMA-based wireless network protocols. Chitrapu, 4; ’889 patent, 1:27-32. Chitrapu describes random access protocols for a UE to initiate and maintain a reliable connection to the network. Chitrapu, 97-106. Thus, Chitrapu is in the same field of endeavor as the ’889 patent. *See* ’889 patent, 2:38-41 (random access procedures for cellular communications).

159. Further, Chitrapu describes channel access procedures that facilitate transmission power control when the UE is not synchronized with the network. *See* Chitrapu, 98. Thus, Chitrapu is relevant to the particular problem the ’889 patent attempts to solve. *See* ’889 Patent, 2:38-41.

3. Reasons to Combine Dateki and Chitrapu

160. Dateki’s F-DPCH procedures are based on W-CDMA technologies. Dateki, 2:1-3, 4:16-22, 4:53-55, 10:8-13. Chitrapu discloses additional W-CDMA-based protocols and features that would have been performed alongside Dateki’s F-DPCH procedures. Chitrapu, 3, 4 (explaining that disclosed Wideband TDD build

onto standardized W-CDMA protocols), 5-12 (describing UMTS architecture and protocols). In other words, Dateki's description of the power control mechanisms in the context of W-CDMA-based standards would have motivated a POSITA to use Chitrapu's additional teachings concerning W-CDMA technologies to comply with the W-CDMA standards.

161. A POSITA would have found it beneficial to implement base stations and terminals according to the known 3GPP standards on which both Dateki and Chitrapu are based to ensure compatibility and marketability of the product. For instance, Chitrapu's random access procedures for moving a UE between Idle and connected states were conventional implementation details that a POSITA would have implemented in the same 3GPP W-CDMA protocols on which Dateki is based. Chitrapu, 3, 4. Moreover, a POSITA would have found it beneficial and advantageous to implement such devices with standardized techniques that have already been well vetted and tested for workability. In particular, the random access procedures described by Chitrapu facilitate mobility by allowing the UE to handover from one cell to the next as the user travels. Chitrapu, 89, 90 (handover procedures facilitated by connection state switching and random access). The random access procedures also facilitate discontinuous reception (DRX) that allow the UE to conserve power when it does not have data to transmit or receive. Chitrapu, 90, 91 (random access and connection state switching facilitates DRX).

The combination is nothing more than the predictable use of prior art elements (Chitrapu's W-CDMA-based RACH protocols and Dateki's W-CDMA-based power control mechanisms) according to their established functions (UMTS random access and power control protocols).

162. Further, modifying Dateki with Chitrapu would have been the combination of prior art elements (Chitrapu's W-CDMA-based random access procedures and Dateki's W-CDMA-based power control mechanisms) according to known methods (3GPP physical layer procedures between UEs and base stations) to yield predictable results (a more comprehensive W-CDMA communication protocol compliant with UMTS). The results would have been predictable because the combined W-CDMA protocols had already been standardized. Chitrapu, 149 (referencing 3GPP standard documents for physical layer procedures and procedures for switching between idle mode and connected modes).

163. A POSITA also would have had a reasonable expectation of success because both Dateki and Chitrapu are directed to cellular communication systems that follow 3GPP standards for W-CDMA. *See* Dateki, 4:4-22 (describing use of HSDPA channels and F-DPCH as standardized by 3GPP); Chitrapu, 3, 4, (explaining that disclosed Wideband TDD build onto standardized W-CDMA protocols), 5-12 (describing UMTS architecture and protocols). Accordingly, both

Dateki and Chitrapu describe known methods according to 3GPP standards.

4. Claim 4

[4.1] *The first UE of claim 1 wherein the transmitter and the processor are further configured to transmit the signal over the physical control channel when time synchronized and to transmit a signal over a random access channel when not time synchronized.*

164. Limitation [4.1] relates to the transmissions of two “*signal(s)*” using different channels and with different time synchronization conditions. The parameters of these transmissions are summarized in the table below:

Signal	Channel	Time Synchronization
“ <i>the signal</i> ” (ACK/NACK signal or uplink pilot signal)	“ <i>physical control channel</i> ” (HS-DPCCH or DPCH)	“ <i>when time-synchronized</i> ”
“ <i>a signal</i> ”	“ <i>random access channel</i> ”	“ <i>when not time-synchronized</i> ”

165. First, the ’889 patent explains that whether transmissions are *time synchronized* or *not time synchronized* depends on whether the UE is in a disconnected state (e.g., Idle) or a connected state (e.g., CELL_DCH). See ’889 patent, Fig. 4, 7:38-43 (UE leaves connected state in response to losing time synchronization); §VIII.C.1. Chitrapu similarly explains that the CDMA decoding process relies on time synchronization between the UE and the network:

It should be noted that the received chips and the spreading code should **be synchronized in time** for the correlation operation.

Chitrapu, 39.

166. Chitrapu further explains that the connected state CELL_DCH is used for dedicated channel transmissions. Chitrapu, 89-91. Thus, in UMTS, dedicated channel transmissions are performed in CELL_DCH with time synchronization, while other transmissions (e.g., RACH transmission) are performed from an Idle state without time synchronization.

167. Dateki discloses transmitting the ACK/NACK signal and uplink pilot signal (*the signal*) on **dedicated** physical control channels:

The [High Speed-**Dedicated** Physical Control Channel (HS-DPCCH)] in the mobile wireless communication system corresponds to an uplink dedicated control channel from the mobile station to the base station, and is used upon transmitting from the mobile station to the base station an **ACK signal or a NACK signal** indicating whether data received via the HS-PDSCH are properly received.

Dateki, 2:35-40.

...an uplink ACK/NACK transmission (the transmission channel corresponding to a HS-DPCCH), and **an uplink pilot transmission** (the transmission channel corresponding to a [**Dedicated** Physical Channel (DPCH)] are shown.

Dateki, 12:7-10.

168. The dedicated W-CDMA channels Dateki describes (e.g., HS-DPCCH, DPCH) are used in a dedicated RRC connected state and depend on time

synchronization with the network. *See supra*, §VIII.C.1. It would have been obvious for Dateki's mobile station to transmit the pilot symbol or the ACK/NACK signal (*the signal*) when in a connected state, such as Cell_DCH (*when time synchronized*). ACK/NACK is typically transmitted on dedicated channels, which are available on the UE is in **dedicated** connection state like Cell_DCH. As stated above, Dateki explains that ACK/NACK is transmitted on the High-Speed **Dedicated** Physical Control Channel (HS-DPCCH), and pilot symbols are transmitted on the **Dedicated** Physical Channel (DPCH). Dateki, 12:7-10. Thus, Dateki discloses or at least renders obvious transmitting *the signal when time synchronized*, Dateki renders it obvious.

169. Second, as explained above in the Technology Background section, W-CDMA procedures employ a random access procedure to move a mobile device from an Idle state to a connected state (e.g., CELL_DCH, CELL_FACH). §VIII.C.1; Chitrapu, 89-91, 120-121. In these procedures, a mobile device that wishes to move into a connected state sends a Random Access Channel (RACH) preamble (*a signal*) over a RACH (*a random access channel*) to the base station. § VIII.C.1; Chitrapu, 89-91.

170. Chitrapu explains that a UE that desires to enter an RRC connected state performs a random access procedure via a Random Access Channel (RACH):

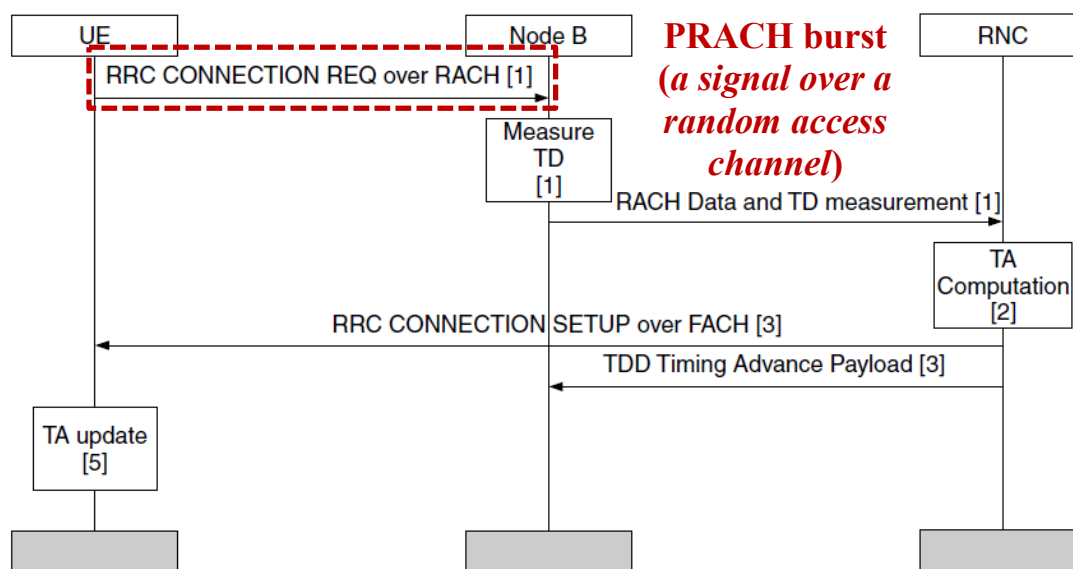
Random Access procedure is the means by which a UE in the Idle Mode or CELL FACH/CELL PCH/URA PCH states of the Connected Mode can request access for Network Services.

Chitrapu, 97.

171. The random access channel (RACH) does not require time synchronization like dedicated WCDMA channels do. Chitrapu, 53 (“Since Random Access is used for initial access to UTRAN, the UE does not have tight time synchronization with the UTRAN.”) The random access procedure include the UE selecting a channelization code and transmitting a “PRACH burst.” Chitrapu, 98. The PRACH burst, which includes the RACH preamble (*a signal*), facilitates a request to enter an RRC connected state, such as Cell_DCH). Chitrapu, 104, 105. Once requested, the RRC connection procedure includes transmitting timing advance (TA) information to the UE to allow the UE to time synchronize with the network:

In the initial RACH burst, **there is no application of Timing Advance** but it is provided from then on subsequent USCH or DCH bursts. The initial value for the Timing Advance is determined from one or more measurements of Time Delay (TD) of the RACH burst, and signaled to, and implemented in the UE Layer 1 prior to the commencement of user plane traffic.

Chitrapu, 120.



Chitrapu, Fig. 5.24 (annotated).

172. Thus, Chitrapu discloses transmitting a RACH/PRACH burst (*a signal*) before there is any application of timing advance (*when not time synchronized*).

173. It would have been obvious for Dateki's W-CDMA power control scheme to include the standardized UMTS random access procedures described by Chitrapu. Random access procedures are fundamental for establishing initial access to a W-CDMA network, to facilitate handovers between cells, and to save power when a mobile device did not have data to communicate. Chitrapu, 89, 90. The RACH protocol a well-known industry standard incorporated into UMTS, and would have been the expected behavior for the mobile station in Dateki's UMTS-

based communication and power control procedures. *See* § VIII.C.1. Returning to the two signals and channels recited in claim 4, the combination is summarized in the table below. The mapped features from Dateki and Chitrapu are shown in parentheses. Accordingly, Chitrapu in view of Dateki renders obvious claim 4.

5. Claim 8

174. Claim 8 is a method claim corresponding to apparatus claim 4. Dateki and Chitrapu render claim 8 obvious for the same reasons described above with respect to claim 4. *See* §VI.E.4.

IX. CONCLUSION

175. This declaration and my opinions herein are made to the best of my knowledge and understanding, and based on the material available to me, at the time of signing this declaration. I declare that all statements made herein on my own knowledge are true and that all statements made on information and belief are believed to be true, and further, that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 or Title 18 of the United States Code.

Date: Nov. 25, 2024

Michael D. Kotzin
Michael D. Kotzin