UNITED STATES PATENT AND TRADEMARK OFFICE

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BEFORE THE PATENT TRIAL AND APPEAL BOARD

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COX COMMUNICATIONS, INC.
Petitioner

v.

AT&T INTELLECTUAL PROPERTY I, L.P.
Patent Owner

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Case IPR2015-01227
Patent 7,907,714
Title: PROFILE MANAGEMENT SYSTEM INCLUDING USER INTERFACE FOR ACCESSING AND MAINTAINING PROFILE DATA OF USER SUBSCRIBED TELEPHONY SERVICES

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# DECLARATION OF DR. ROBERT AKL, D.Sc.

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## I. INTRODUCTION

1. My name is Robert Akl, and I have been retained by counsel for AT&T Intellectual Property I, L.P. as an expert witness in the above-captioned proceeding.

2. My opinions are based on my years of education, research and experience, as well as my investigation and study of relevant materials. A list of materials considered is included in Appendix B.

3. I may rely upon these materials, my knowledge and experience, and/or additional materials to rebut arguments raised by the petitioner. Further, I may also consider additional documents and information in forming any necessary opinions, including documents that may not yet have been provided to me.

4. My analysis of the materials produced in this investigation is ongoing and I will continue to review any new material as it is provided. This declaration represents only those opinions I have formed to date. I reserve the right to revise, supplement, and/or amend my opinions stated herein based on new information and on my continuing analysis of the materials already provided.

5. I am being compensated on a per hour basis for my time spent working on issues in this case. My compensation does not depend upon the outcome of this matter or the opinions I express.

## II. QUALIFICATIONS

6. I have summarized in this section my educational background, work experience, and other relevant qualifications. A true and accurate copy of my curriculum vitae is attached as Appendix A to my declaration.

7. I earned my Bachelor of Science degrees in Electrical Engineering and Computer Science summa cum laude with a grade point average of 4.0/4.0 and a ranking of first in my undergraduate class from Washington University in Saint Louis in 1994. In 1996, I earned my Master of Science degree in Electrical Engineering from Washington University in Saint Louis with a grade point average of 4.0/4.0. I earned my Doctorate of Science in Electrical Engineering from Washington University in Saint Louis in 2000, again with a grade point average of 4.0/4.0, with my dissertation on "Cell Design to Maximize Capacity in Cellular Code Division Multiple Access (CDMA) Networks."

8. While a graduate student, from 1996 through 2000, I worked at MinMax Corporation in St. Louis, where I designed software packages that provided tools to flexibly allocate capacity in a CDMA communications network and maximize the number of subscribers. As part of this work, I validated the hardware architecture for an Asynchronous Transfer Mode (ATM) switch capable of channel group switching, as well as performed logical and timing simulations, and developed the hardware architecture for the ATM switch. I also worked with

Teleware Corporation in Seoul, South Korea, where I designed and developed algorithms that were commercially deployed in a software package suite for analyzing the capacity in a CDMA network implementing the IS-95 standard to maximize the number of subscribers.

9. After obtaining my Doctorate of Science degree, I worked as a Senior Systems Engineer at Comspace Corporation from October of 2000 to December of 2001. In this position, I designed and developed advanced data coding and modulation methods for improving the reliability and increasing the available data rates for cellular communications. I coded and simulated different encoding schemes (including Turbo coding, Viterbi decoding, trellis coded modulation, and Reed-Muller codes) and modulation techniques using amplitude and phase characteristics and multi-level star constellations. This work further entailed the optimization of soft decision parameters and interleavers for additive white Gaussian and Rayleigh faded channels. In addition, I also extended the control and trunking of Logic Trunked Radio (LTR) to include one-to-one and one-to-many voice and data messaging.

10. In January of 2002, I joined the faculty of the University of New Orleans in Louisiana as an Assistant Professor in the Department of Electrical Engineering. While on this faculty, I designed and taught two new courses called

"Computer Systems Design I and II." I also developed a Computer Engineering Curriculum with strong hardware-design emphasis, formed a wireless research group, and advised graduate and undergraduate students.

11. In September of 2002, I received an appointment as an Assistant Professor in the Department of Computer Science and Engineering at the University of North Texas (UNT), in Denton, Texas. In May of 2008, I became a tenured Associate Professor in the Department of Computer Science and Engineering. As a faculty member, I taught courses and directed research in wireless communications, including 2G, 3G, 4G, CDMA/WCDMA, GSM, UMTS, LTE, wireless sensors, Bluetooth, VoIP, multi-cell network optimization, call admission control, channel coding, ad-hoc networks, and computer architecture. I was the director of the Wireless Sensor Lab ("WiSL"). Several of my research projects were funded by industry. In January of 2015, I became the Associate Chair of Graduate Studies.

12. In addition to advising and mentoring students at UNT, I was asked to join the faculty of the University of Arkansas in Little Rock as an Adjunct Assistant Professor from 2004 to 2008 in order to supervise the research of two Ph.D. graduate students who were doing research in wireless communications.

13. In addition to my academic work, I have remained active in the communication industry through my consulting work. In 2002, I consulted for Input/Output Inc. and designed and implemented algorithms for optimizing the frequency selection process used by sonar for scanning the bottom of the ocean. In 2004, I worked with Allegiant Integrated Solutions in Ft. Worth, Texas to design and develop an integrated set of tools for fast deployment of wireless networks. Among other features, these tools optimize the placement of Access Points and determine their respective channel allocations to minimize interference and maximize capacity. I also assisted the Collin County Sheriff's Office (Texas) in a double homicide investigation, analyzing cellular record data to determine user location.

14. I have authored and co-authored approximately 65 journal publications, conference proceedings, technical articles, technical papers, book chapters, and technical presentations, in a broad array of communications-related technology, including networking and wireless communication. I have also developed and taught over 100 courses related to communications and computer system designs, including a number of courses on wireless communication, communications systems, computer systems design, and computer architecture. These courses have included introductory courses on communication networks and

signals and systems, as well as more advanced courses on wireless communications. A complete list of my publications and the courses I have developed and/or taught is also contained in my curriculum vitae.

15. My professional affiliations include services in various professional organizations and serving as a reviewer for a number of technical publications, journals, and conferences. I have also received a number of awards and recognitions, including the IEEE Professionalism Award (2008), UNT College of Engineering Outstanding Teacher Award (2008), and Tech Titan of the Future (2010) among others, which are listed in my curriculum vitae.

16. A complete list of cases in which I have testified at trial, hearing, or by deposition within the preceding four years is provided in my curriculum vitae, which is attached as Appendix A. In the listed cases, I have been retained by both patent owners as well as petitioners.

## III. SCOPE OF ASSIGNMENT

17. I have been asked to provide my opinions regarding whether claims 1-22 of the U.S. Patent No. 7,907,714 ("the '714 patent") are unpatentable based on the grounds instituted by the Patent Trial Appeal Board in its Institution Decision issued November 19, 2015.

18. This declaration, including the exhibits hereto, sets forth my opinion on this topic.

## IV. LEGAL PRINCIPLES USED IN ANALYSIS

19. In expressing my opinions and considering the subject matter of the claims of the ’714 patent, I am relying upon certain basic legal principles that counsel has explained to me.

20. First, I understand that for an invention claimed in a patent to be found patentable, it must be, among other things, novel and not obvious from what was known before the invention was made.

21. I understand the information that is used to evaluate whether an invention is novel and not obvious is generally referred to as “prior art” and generally includes patents and printed publications (e.g., books, journal publications, articles on websites, product manuals, etc.).

22. I understand that in this proceeding Petitioner has the burden of proving that the claims of the ’714 patent are anticipated or obvious in view of the prior art by a preponderance of the evidence. I understand that “a preponderance of the evidence” is evidence sufficient to show that a fact is more likely true than it is not.

23. I understand that in this proceeding, the claims must be given their broadest reasonable interpretation consistent with the specification. The claims after being construed in this manner are then to be compared to the information in the prior art.

24. I understand that in this proceeding, the information that may be evaluated is limited to patents and printed publications. My analysis below compares the claims to patents and printed publications that are prior art to the claims.

25. I understand that there are two ways in which prior art may render a patent claim unpatentable. First, the prior art can be shown to "anticipate" the claim. Second, the prior art can be shown to have made the claim "obvious" to a person of ordinary skill in the art. I understand that the grounds instituted in this IPR are on both anticipation and obviousness grounds.

26. I set forth my understanding of the anticipation standard as follows: I understand that a claimed invention is not patentable if a prior art reference discloses every element of the claimed invention, either explicitly or inherently and that those elements must be arranged or combined in the same way as the claim. I further understand that being arranged or combined in the same way does not require an identity of terminology.

27. I understand that "prior art" includes patents and printed publications that existed before the earliest filing date (the "effective filing date") of the claim in the patent. I also understand that a patent will be prior art if it was filed before the effective filing date of the claimed invention, while a printed publication will

be prior art if it was publicly available before that date. I also understand that a patent will be prior art if it claims priority to a provisional application filed before the effective filing date of the claimed invention, if that provisional application provides written description and enablement support for the invention of the patent. I understand that the invention of the patent is defined by the claims. I also understand that a reference qualifies as prior art for an obviousness determination under § 103 only when it is analogous to the claimed invention.

28. It is my further understanding that a claimed invention is unpatentable 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.

29. I understand that the ultimate conclusion of whether a claim is (non) obvious should be based upon a determination of several factual considerations: (1) The level of ordinary skill in the field of the invention that someone would have had at the time the claimed invention was made. I describe elsewhere in this Declaration the factors that I considered in connection with assessing the level of ordinary skill in the art. (2) The scope and content of the prior art. I understand that in order to be considered as prior art to a patent, the prior art references must be reasonably related to the claimed invention of that patent. I understand that a

reference is reasonably related if it is in the same field as the claimed invention or is from another field to which a person of ordinary skill in the field would look to solve a known problem. (3) What difference, if any, existed between the claimed invention and the prior art.

30. I understand that the existence of each and every element of the claimed invention in the prior art does not necessarily prove obviousness and that most, if not all, inventions rely on building blocks of prior art. In considering whether a claimed invention is obvious, I understand that one may find obviousness if at the time of the claimed invention there was a reason that would have prompted a person having ordinary skill in the field to combine the known elements in a way the claimed invention does, taking into account such factors as (1) whether the claimed invention was merely the predictable result of using prior art elements according to their known function(s); (2) whether the claimed invention provides an obvious solution to a known problem in the relevant field; (3) whether the prior art teaches or suggests the desirability of combining elements claimed in the invention; (4) whether the prior art teaches away from combining elements in the claimed invention; (5) whether it would have been obvious to try the combinations of elements, such as when there is a design need or market pressure to solve a problem and there are a finite number of identified, predictable

solutions; and (6) whether the change resulted more from design incentives or other market forces. I understand that to find it rendered the invention obvious, one must find that the prior art provided a reasonable expectation of success and that each claim must be considered separately.

31. I understand that one should not use hindsight when considering obviousness. I also understand that in assessing obviousness, that one should take into account any objective evidence (sometimes called "secondary considerations") that may have existed at the time of the invention and afterwards that may shed light on the obviousness or not of the claimed invention, such as: (a) Whether the invention was commercially successful as a result of the merits of the claimed invention (rather than the result of design needs or market-pressure advertising or similar activities); (b) Whether the invention satisfied a long-felt need; (c) Whether others had tried and failed to make the invention; (d) Whether others invented the invention at roughly the same time; (e) Whether others copied the invention; (f) Whether there were changes or related technologies or market needs contemporaneous with the invention; (g) Whether the invention achieved unexpected results; (h) Whether others in the field praised the invention; (i) Whether persons having ordinary skill in the art of the invention expressed surprise or disbelief regarding the invention; (j) Whether others sought or obtained rights to

the patent from the patent holder; and (k) Whether the inventor proceeded contrary to accepted wisdom in the field.

32. I understand that addressing the level of ordinary skill in the art, or "a person of ordinary skill in the art," is an important factor to understanding whether a claim is anticipated or obvious over the prior art. It is my opinion, based upon a review of the '714 patent, the file history for the '714 patent, and the other documents I reviewed, that a person of ordinary skill in the art as of the '714 patent's priority date (April 3, 1997) would have had a bachelor's degree in electrical engineering or computer science and two or three years of work experience in the relevant field.

## V. OVERVIEW

33. I understand that the Board has instituted this *inter partes* review on the following grounds:

A. claims 1–7, 12–17, and 20 as being anticipated under § 102(e) by Buhrmann; and

B. claims 8, 9, 18, and 19 as being unpatentable under § 103(a) over the combination of Buhrmann and Boulware;

C. claim 10 as being unpatentable under § 103(a) over the combination of Buhrmann, Boulware, and Bayless;

D. claims 14, 15, 21, and 22 as being unpatentable under § 103(a) over the combination of Buhrmann and Beck;

E. claims 1–7, 11, and 13–17 as being anticipated under § 102(e) by An;

F. claim 10 as being unpatentable under § 103(a) over the combination of An and Bayless; and

G. claims 14, 15, 21, and 22 as being unpatentable under § 103(a) over the combination of An and Beck.

34. It is my opinion that the instituted grounds of unpatentability do not show that the claims of the ’714 patent are anticipated or obvious. The basis for my opinion is set forth below.

## VI. U.S. PATENT NO. 7,907,714 (“’714 patent”)

35. The ’714 patent describes a profile management system and method for managing subscriber profile data associated with a communications service subscribed to by a subscriber. The ’714 patent describes, for example, a user interface hosted by a client that allows a subscriber to view and update the subscriber profile data. Subscriber profile data, based on the subscriber’s request, is retrieved from the communication network, and forwarded to the client. A request to update the subscriber profile data is received from the client, and then forwarded to the communication network.

36. The ’714 patent describes what may be commonly referred as a two-way method of managing data, and in the ’714 patent, managing subscriber profile data. In such a two-way method, there is an initial pull or retrieval of a current data set, and then a subsequent push or sending of an updated data set. As in claim 1 of the ’714 patent, a subscriber can first view the current details of the subscriber’s profile data (e.g., by transmitting “a subscriber request to view the subscriber

profile data from a client which hosts a user interface configured to allow the subscriber to view and update the subscriber profile data"). Thus, for example, in a two-way method, before determining whether an update is necessary, the subscriber can determine whether an update is actually needed, or whether the subscriber's profile already reflects the desired update. As one example pertinent to the '714 patent, if the subscriber wishes to add a new telephone number, 555-1234, to a list of authorized numbers, the subscriber can view a list of currently authorized telephone numbers to determine whether the new telephone number already exists in the list of authorized numbers. If the new telephone number already exists, no update is necessary. However, if the new telephone number does not appear on the current list of authorized numbers, the subscriber can request an update to the subscriber profile data to add 555-1234. That update can then be forwarded to the communications network, which can execute services in accordance with the updated subscriber profile data.

37. The '714 patent describes that such a two-way method addresses needs that existed from prior systems, for example, like the need for a user interface permitting a user to review and update their data for services. Prior systems, according to the '714 patent and according to the knowledge that a person of ordinary skill in the art would have had at the time, were largely one-way

systems. For example, the ’714 patent describes that prior methods required contacting service personnel, or systems using a DTMF response, to update the subscriber’s profile data. Such methods would not allow a subscriber to view the current state of the data set.

38. I understand that Dr. Mir has alleged that the relevant fields of the ’714 Patent are the design and implementation of modems, routers, and cable systems. I disagree with his conclusion. The ’714 patent is not related to those fields except in the most indirect ways: a modem is only mentioned once in the patent as a component of a client device, there is no direct mention of routers, and cable systems are not implicated in the ’714 patent at all. I believe the relevant field of the ’714 patent to include at least profile management systems and user interfaces for accessing and maintaining profile data of services, such as telecommunications services, provided over telephony and other networks. Ex. 1001, 1:30-35.

39. It is with this background that I analyze the claims of the ’714 patent and the allegations of anticipation and obviousness.

## VII. CLAIMS OF THE ’714 PATENT

### A. Claim 1

40. Claim 1 of the ’714 Patent closely corresponds to the summary provided above. Claim 1 of the ’714 patent recites managing, by a profile

management system, subscriber profile data associated with a communications service subscribed to by a subscriber, the subscriber profile data being stored on a communications network which executes the communications service in accordance with the subscriber profile data. The "pull" or "retrieval of data" corresponds to the first three elements of claim 1: "receiving…," "retrieving…," and "forwarding…" as recited. The "push" or "sending of updated data" corresponds to the final two elements of claim 1: "receiving a subscriber request to update…" and "forwarding an update…"

### B. Claim 13

41. Claim 13 of the '714 Patent also closely corresponds to the summary provided above, but is drafted in a slightly different format. However, the same "pull" and "push" aspects are recited in claim 13. The "pull" or "retrieval of data" corresponds to the first two elements of claim 1: "receiving, from a profile management system, a subscriber request to view the subscriber profile data" and "forwarding the subscriber profile data to the profile management system…" The "push" or "sending of updated data" corresponds to the third element of claim 13: "receiving an update for the subscriber profile data…"

### C. Claim Construction

42. I understand that the PTAB, in the Institution Decision, found the recitations of "subscriber profile data" and "a communications network" in the

preamble of claim 1 to provide antecedent basis for those claim phrases recited in the body of claim 1. I also understand that the PTAB found that the recitation in the preamble of "the subscriber profile data being stored on a communications network which executes the communications service in accordance with the subscriber profile data" recites essential elements of the invention embodied in claim 1. I have considered these claim constructions in my opinion and analysis herein.

## VIII. ANALYSIS

### A. Buhrmann

43. I understand that Ground A, as proposed by Cox and as instituted by the PTAB, alleges anticipation of claims 1-7, 12-17, and 20 by Buhrmann. Based upon my review of Buhrmann, Cox's Revised Amended Petition, Dr. Mir's Declaration, and the other materials considered herein, it is my opinion that Buhrmann does not anticipate claims 1-7, 12-17, and 20 because it does not disclose each and every feature of the claims, arranged as in the claims, whether expressly or inherently.

44. As explained above, updating of subscriber profile data can be accomplished using a two-way method, as in claims 1 and 13 of the '714 patent, or using a one-way method. Buhrmann does not describe a two-way method like the claims of the '714 Patent, but rather describes a one-way method, or "blind push"

method, of updating subscriber profile data. Buhrmann utilizes a subscriber's personal information manager software, which stores personal information data, to generate profile update data. Ex. 1004 (Buhrmann), Abstract. That profile update data is supplied to, and transmitted ("pushed") to a communications network. Ex. 1004 (Buhrmann), Abstract. A component of the communications network then uses the profile update data to update the subscriber profile for the subscriber. Ex. 1004 (Buhrmann), 9:19-22. In such a "blind push" design or method, there is no consideration of the current state of data which is to be updated. There is no "pull" or retrieval of data from the communications network in Buhrmann.

45. Dr. Mir appears to be confused by the various terms in the Buhrmann reference, including the various pieces of data referred to in Buhrmann. A brief vocabulary is provided below for the PTAB's reference, using Buhrmann's terminology and reference numerals.

46. "Personal information data 127" includes "schedule data 128" and "contact data 129." Ex. 1004 (Buhrmann), 6:52-53. Thus, a reference to personal information data 127 includes schedule data 128 and contact data 129. Personal information data 127 is stored on memory 126 of PIM 122. Ex. 1004 (Buhrmann), 6:49-52. Buhrmann contains no disclosure of personal information data 127 being stored anywhere aside from memory 126 of PIM 122. Thus, personal information

data 127 is not stored on a communications network, which I understand the Board has identified as wireless cellular communication network 102 of Buhrmann. Institution Decision, p. 20.

47. The term "profile requests" includes elements 504, 506, 508, and 510 of Buhrmann. Ex. 1004 (Buhrmann), 8:15-33; Fig. 5. Profile requests are instructions from the subscriber to request call processing features. Ex. 1004 (Buhrmann), 8:9-14. Profile requests are entered into a profile request field 502 of Figure 5 of Buhrmann. Ex. 1004 (Buhrmann), 8:15-33.

48. "Profile update data" does not have a reference numeral in Buhrmann. Profile update data is generated by subscriber profile update API 132 of Buhrmann. Ex. 1004 (Buhrmann), 8:42-44. Profile update data is based upon profile requests 504, 506, 508, and 510 entered in profile request field 502. Ex. 1004 (Buhrmann), 8:44-46. Profile update data, after generation by subscriber profile update API 132, is transmitted by PIM 122 to the wireless cellular communication network 102. Ex. 1004 (Buhrmann), 9:14-16.

49. A "subscriber profile record" is a database record for each subscriber describing the subscriber's profile. Ex. 1004 (Buhrmann), 6:11-13. Subscriber profile records are stored in subscriber profile database 118. Ex. 1004 (Buhrmann), 5:57-59; Fig. 1. Subscriber profile records in subscriber profile database 118 are

database records for each subscriber describing the subscriber's profile. Ex. 1004 (Buhrmann), 6:11-13. The subscriber profile record includes the subscriber's telephone number (MIN) and unique electronic serial number (ESN) of the subscriber's mobile station. Ex. 1004 (Buhrmann), 6:13-23. The subscriber profile record also includes feature entries 206 which specify the service features for the subscriber and associated mobile station identified by the MIN and ESN. Ex. 1004 (Buhrmann), 6:22-36. Buhrmann contains no disclosure of subscriber profile data, subscriber profile records, or any other data from subscriber profile database 118 being stored anywhere aside from subscriber profile database 118 itself. The only retrieval of data from database 118 is in Buhrmann's description of a subscriber profile record 600 being accessed from database 118 by MSC 104 in step 706 of Fig. 7. Ex. 1004 (Buhrmann), 10:52-58. There is no disclosure of retrieving data from database 118 by PIM 122 or a component of PIM 122, or retrieval of data from database 118 by a subscriber.

50. As I note above, I understand that the Board has found the recitation in the preamble of "the subscriber profile data being stored on a communications network which executes the communications service in accordance with the subscriber profile" to recite essential elements of the invention embodied in independent claim 1. Institution Decision, pp. 15-16. Thus, I understand that

subscriber profile data must be stored on a communications network in claim 1, and thus, to anticipate claim 1, the reference must meet this limitation. Based on this interpretation, the only element of Buhrmann that can correspond to subscriber profile data which is stored on a communications network is subscriber profile records contained in subscriber profile database 118. The other data mentioned above (personal information data, schedule data, contact data, profile update data) is not "stored on a communications network." Thus, it is my opinion that, to disclose element [1c] of claim 1, a subscriber profile record from subscriber profile database 118 must be retrieved based upon receiving a subscriber request to view subscriber profile data from the client.

51. I understand that the "client" has been identified by Dr. Mir as "user interface 136." Ex. 2042 (Mir Deposition), 162:15-21. I do not agree with this interpretation, at least because it does not comport with the claim language. The claim requires "a client which hosts a user interface." Ex. 1001 ('714 patent), 15:64-67. Using Dr. Mir's identification of the "client" would lead to a nonsensical claim interpretation, namely, that a user interface hosts a user interface. Furthermore, Dr. Mir states that a "client" must be software. Ex. 2042 (Mir Deposition), 78:5-7. Buhrmann defines user interface 136 as "a display monitor, printer, mouse, keyboard, light pen, touch pad, or the like" i.e., all hardware

devices. Ex. 1004 (Buhrmann), 7:13-16. It is my opinion that the "client" in Buhrmann must be PIM 122.

52. With this interpretation of certain claim terms, it is clear that Buhrmann does not disclose, teach, or suggest "retrieving the subscriber profile data from the communications network based upon receiving the subscriber request to view the subscriber profile data from the client." The reasons for my conclusion follow.

53. In Buhrmann, a subscriber's personal information manager software, like the subscriber's calendar program executing on a desktop computer, maintains the subscriber's personal information data, i.e., scheduled or timed events ("schedule data"), and contact data (e.g., telephone numbers of authorized users). Ex. 1004 (Buhrmann), Abstract. That data is stored in a memory of the personal information manager (hereinafter referred to as the "PIM" or "PIM 122" as Buhrmann refers to it). Ex. 1004 (Buhrmann), 6:49-53. Thus, when the subscriber wants to update his or her schedule data or contact data, that data is retrieved from the memory of the PIM and presented via the user interface of the PIM. Ex. 1004 (Buhrmann), 7:13-21. Put another way, the data that the subscriber views and updates in Buhrmann is data stored on the PIM 122 itself in the memory 126. The memory 126, as depicted in Fig. 1 and the other figures of Buhrmann, is not part of

Buhrmann's wireless cellular communications network 102. That understanding of Buhrmann is consistent with how a person of ordinary skill in the art would understand Buhrmann to operate; for example, in 1996 at the time of filing, network-based storage of personal information data was not as common as it is today, as connection speeds were slow (e.g., 56 Kbps modems had just been introduced), and some ISPs charged an hourly rate to access their networks. Thus, one of ordinary skill in the art would not understand Buhrmann to have stored personal information data on a network to be retrieved before updating.

54. After the subscriber updates personal information data, such as the schedule data, the subscriber can store that data in memory 126 of the PIM 122. Ex. 1004 (Buhrmann), 7:46-48. The subscriber can also utilize that data to generate profile update data, as the Buhrmann PIM asks the subscriber whether she would like to update the subscriber's telecommunication subscriber profile. Ex. 1004 (Buhrmann), 7:55-64, 6:55-59. For example, if a subscriber has a meeting from 9:00 AM to 11:00 AM in his or her calendar, the subscriber can enter in data in a profile request field that instructs a communications network to forward calls to the subscriber's voicemail during that time period. Ex. 1004 (Buhrmann), 8:15-20. The subscriber is not presented with existing profile requests to be updated or modified; rather, the subscriber is presented with a blank text entry field for each

profile request field. If the subscriber wishes to update the profile and generate profile update data (e.g., by selecting the "Yes" option presented by the PIM), based on those profile request fields, Buhrmann's PIM 122 generates profile update data using a subscriber profile update API 132, depicted in Figure 1. Ex. 1004 (Buhrmann), 7:62-8:9; 8:37-54.

55. Profile update data is then transmitted as a TCAP message from the PIM 122, over the PSTN 114, to the SCP 108, and stored in SCP 108. Ex. 1004 (Buhrmann), 9:14-19. SCP logic 120 of SCP 108 recognizes the profile update data, and updates the subscriber profile record in database 118. Ex. 1004 (Buhrmann), 9:19-22. The subscriber profile record in database 118 is then used by the wireless cellular communications network 102 to control call processing when a call is received from a caller. Ex. 1004 (Buhrmann), 10:45-47. The subscriber has no visibility into the contents of a subscriber profile record or other data stored in database 118.

56. As I identify above, the closest disclosure of claim 1's "subscriber profile data" in Buhrmann is subscriber profile records contained in subscriber profile database 118. However, Buhrmann does not disclose that a subscriber profile record is retrieved from subscriber profile database 118 based upon receiving a subscriber request to view the subscriber profile data from the client.

57. As described above, Buhrmann is a one-way or blind push process. Data flows over the communication network only one way in Buhrmann. Specifically, Buhrmann discloses pushing profile update data over PSTN 114 from the PIM 122 to the SCP 108 of wireless cellular communication network 102. Ex. 1004 (Buhrmann), 9:14-19. This is explicitly recited in at least two locations in Buhrmann: "The modem 138 is used for sending information from the PIM 122 to the SCP 108 through the PSTN 114" (Buhrmann at 7:21-22) and "The profile update data, which is in the TCAP message format, is transmitted to the SCP 108 via modem 138, link 140, PSTN 114, and link 142." (Buhrmann at 9:16-18). There is no disclosure in the reverse direction, i.e., there is no disclosure of a "pull" of data in Buhrmann. Thus, there is no disclosure of data, much less a subscriber profile, flowing from the communications network 102 to the PIM 122. Nor is there reason to do so in Buhrmann.

58. Interpreting Buhrmann as a one-way process, i.e., a blind push-only process without a retrieval or "pull," is consistent with the context of Buhrmann as well. For example, Buhrmann is titled "Personal Information Manager for Updating a Telecommunication Subscriber Profile" and writes as the Summary of the Invention a largely identical statement: "A personal information manager (PIM) for updating a telecommunication subscriber profile based on subscriber

personal information data entered into the PIM." Ex. 1004 (Buhrmann), [54], 3:43-45. Dr. Mir and I agree: updating data, like a telecommunication subscriber profile, would not require viewing that data. Ex. 2042 (Mir Deposition), 147:8-13. Thus, updating the telecommunication subscriber profile does not require viewing, and thus does not require retrieval of, the telecommunication subscriber profile[1]. No retrieval of the telecommunication subscriber profile would be expected given such a blind push method. Again, such a blind push method would simply provide an update to the telecommunication subscriber profile without consideration of the current state of that data.

59. Similarly, the abstract of Buhrmann begins with the sentence: "A subscriber enters personal information data into a personal information manager (PIM)." Ex. 1004 (Buhrmann), Abstract. There is no indication that any data is retrieved or received from a communication network before that entering of personal information data can occur. The description of the flowchart of Buhrmann's FIG. 3, which refers to the "steps of generating profile update data, based on schedule data, for use in updating the subscriber profile database 118,"

[1] For avoidance of doubt, it is not my opinion that viewing data always requires retrieval of that data. This is simply the case in the context of Buhrmann.

begins with the step 302 of "the subscriber updates the schedule data 128 via the user interface 136." Ex. 1004 (Buhrmann), 7:25-34. Again, there is no retrieval from a communication network of data prior to step 302 (indeed no step occurs before step 302), and updating of schedule data 128 requires only accessing data from the memory 126, not any retrieval of data from the communication network 102. There is no need for the subscriber to retrieve data in Buhrmann prior to updating personal information data, and Buhrmann does not describe that it would be needed or suggested. I agree with Dr. Mir's conclusion that if a subscriber is viewing information from the storage of the PIM to update the subscriber profile database, then retrieval from the communications network is not required. Ex. 2042 (Mir Deposition), 148:13-23. Thus, there is no need for the subscriber to retrieve anything from the subscriber profile database 118, if that data is never viewed, and if viewing that data is never required for updating.

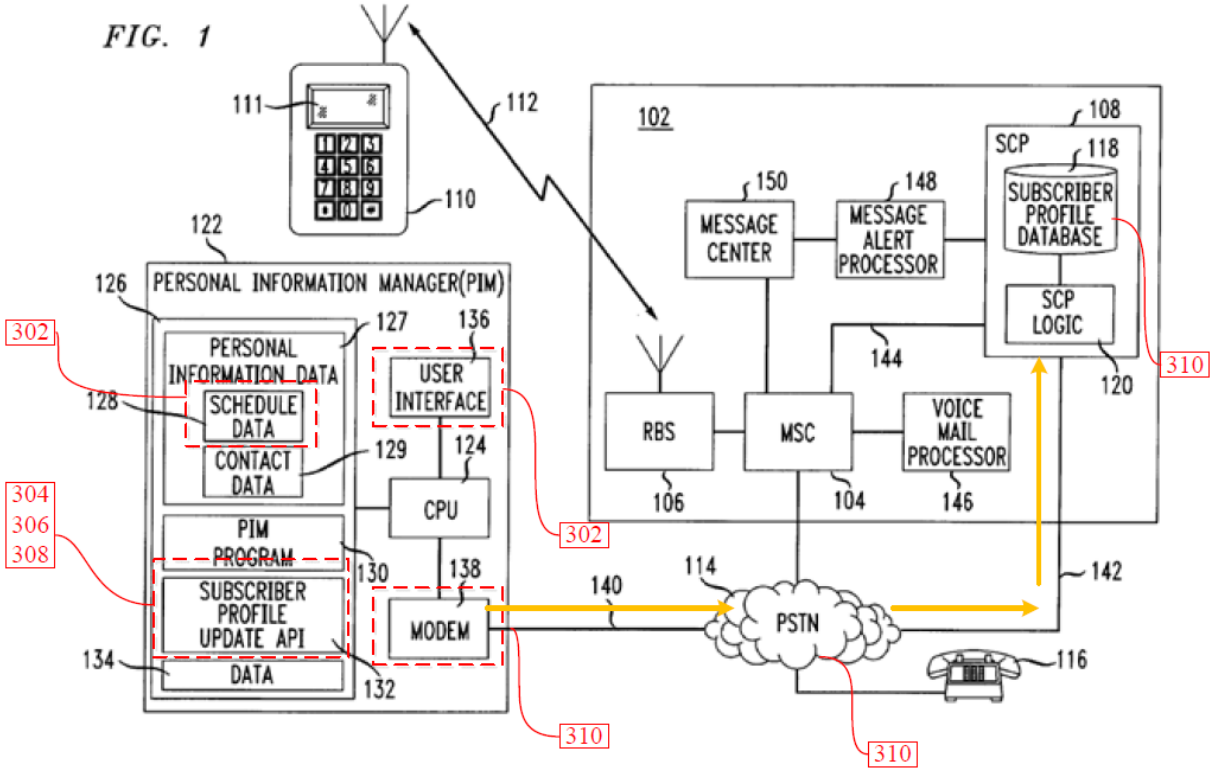
60. As I state above, in Buhrmann, the data that the subscriber views and updates is personal information data local to the PIM 122 itself. Buhrmann does not describe that personal information data 127 is stored on the communications network 102. Thus, because personal information data is already local to the PIM, there is no need, and indeed no disclosure, of retrieving personal information data from a communications network.

61. There is also no disclosure of retrieving a subscriber profile record (i.e., "subscriber profile data") from the subscriber profile database 118 based upon receiving a request to view the subscriber profile record from the PIM. The only transmission of data between PIM 122 and communications network 102 is the discussion of sending profile update data to the communication network 102. Buhrmann describes that modem 138 is used for "sending information from the PIM 122 to the SCP 108 through the PSTN 114." Ex. 1004 (Buhrmann), 7:21-22. Buhrmann contains no disclosure of PIM 122 retrieving data from the communications network 102.

62. I understand that the Board opined that "the function of a conventional modem is not limited to just transmitting information, but also includes receiving information as part of the communication function." Institution Decision, p. 22. While I agree generally that a modem also receives information, this statement does not change my view as to Buhrmann's disclosure. First, there is no explicit description of modem 138 receiving data from the communications network 102 of Buhrmann. Second, if the modem 138 of Buhrmann does receive information, Buhrmann lacks any disclosure as to what information or data that is. Third, the claim recites "***retrieving*** the subscriber profile data from the communications network…" (emphasis added). As Dr. Mir testified, a modem

does not "retrieve" data, it "receives" data. Ex. 2042 (Mir Deposition), 85:7-9, 86:18-22, 87:23-88:2. For retrieval, something else must be performing the retrieval, that is, something else must be causing the modem to receive data. The Board's reference to the capabilities of a modem does not suffice. Thus, a general statement as to the capabilities of a modem to receive data again does nothing to show disclosure of the actual claim language of "retrieving," and I therefore maintain that Buhrmann does not disclose "retrieving the subscriber profile data from the communications network" as recited in claim 1.

63. As I stated above, Buhrmann is a one-way, push process for updating data. That is consistent with Buhrmann's Figure 3. Below, I have annotated Figure 1 of Buhrmann to highlight the components implicated in each step of the method of Figure 3, and the disclosed flow of data in Figure 3. Steps 302, 304, 306, and 308 are all performed by components of the PIM 122. Step 310 implicates the PSTN 114 and SCP 120 of the communications network 102. Step 310 is denoted as "Send Profile Update Data To Database," and Buhrmann states "the PIM 122 transmits the profile update data to the wireless cellular communication network 102 in step 310." Ex. 1004 (Buhrmann), 9:14-16. Again, this supports my conclusion that there is no retrieval in Buhrmann of a subscriber profile, only sending of profile update data.




**Ex. 1004 (Buhrmann), FIG. 1 (annotations added)**

64. Other portions of Buhrmann support my conclusion that subscriber profiles are not retrieved by the PIM 122. First, Buhrmann admits that the data in the subscriber's profile is not the same as the subscriber's personal information data. For example, Buhrmann states that the "subscriber's telecommunication profile closely corresponds to the subscriber's actual schedule." Ex. 1004 (Buhrmann), 4:38-39. If that is the case, then retrieving the subscriber profile would be pointless: the subscriber would not have correct data to work with, which would lead to confusion and a poor user experience.

65. Additionally, Buhrmann does not describe or suggest that the data in the subscriber profile database 118 is personal information data 127, or that the data is the same. The fact that the subscriber profile and the personal information data are different comes as no surprise from a careful analysis of Buhrmann. For example, a subscriber's schedule data is depicted in Fig. 4, while a sample subscriber profile is depicted in Fig. 6. The data in the subscriber's schedule data of Fig. 4 contains expected "Description" field text like "Meeting with John in Room 4A." A subscriber would need such information in their schedule data on the PIM to be reminded of their meeting with John, but the communication network has no use for this information. Thus, as expected, Fig. 6's subscriber profile has no such "Description" field or text; all the subscriber profile record contains is feature invocations and a start and end time for each feature invocation. *See also* Ex. 1004 (Buhrmann), 9:27-34 (explaining that the feature entry of the subscriber profile record contains call completion data corresponding to entry 504 in profile request field 502, but no corresponding "Description" field). Similarly, the format of the subscriber profile record (e.g., in Fig. 2) contains the subscriber's mobile telephone number and serial number: data that the subscriber need not retrieve, but that the communications network would. Thus, there would be no need to retrieve

that data from the communications network, and there is no disclosure of retrieving any data like Figure 6 in Buhrmann.

66. I understand that the Board pointed to Figures 4 and 5 of Buhrmann to support Cox's contention that subscriber profiles are retrieved from the communications network in Buhrmann. Institution Decision, p. 22. I disagree, because Figure 4 depicts schedule data which is stored on memory 126, not on any part of the communications network. Figure 4 is an "example schedule display 400" generated from data in memory 126 in PIM 122. Ex. 1004 (Buhrmann), 7:36-54. Figure 5 depicts schedule data with a profile request field added by subscriber profile update API 132 of PIM 122; again, nothing in the communications network of Buhrmann is implicated in Figure 5, and there is no depiction of retrieved data in Figure 5. Ex. 1004 (Buhrmann), 7:55-65. Thus, any "retrieval" of data depicted in Figure 4 or Figure 5 of Buhrmann by PIM 122 would not require "retrieval" from a communications network: the retrieval would simply be from the memory 126 of the PIM 122.

67. I understand that Cox and Dr. Mir cite discussion of Buhrmann's "user interface 136" of PIM 122 as disclosing "retrieval" as recited. Ex. 1014 (Mir Declaration), ¶ 80; Revised Amended Petition, p. 34. I disagree. The "user interface 136" of Buhrmann "allows the subscriber to view, enter, and update

personal information data 127 and otherwise interact with the PIM 122." Ex. 1004 (Buhrmann), 7:18-21. Thus, the user interface 136 only allows updating and viewing of personal information data 127, which again, is stored on memory 126, not on Buhrmann's wireless cellular communications network 102. There is no disclosure of the user interface 136 allowing updating and viewing of a subscriber profile record or any data from wireless cellular communications network 102.

68. I understand that Dr. Mir alleges that "modem 138 retrieves the subscriber profile data from service control point (SCP) 108 through the PSTN 114 upon request from the client" and cites various portions of Buhrmann as support for that statement. Ex. 1014 (Mir Declaration), ¶ 80. I note that Dr. Mir's statement is not a quote from Buhrmann, and such language does not appear in Buhrmann. Further, none of the citations provided by Dr. Mir (i.e., Buhrmann at 3:54-4:4, 7:36-39, 7:13-22, Fig. 1, 4, and 5) support the contention that the modem 138 retrieves the subscriber profile data as he alleges. Figures 1, 4, and 5 are addressed above. Buhrmann at column 3, line 54 to column 4, line 4, does not mention the modem. Buhrmann at column 7, lines 36-39 describe presenting a schedule display via the user interface 136, which, as addressed above, does not require retrieval from a communication network. Finally, Buhrmann at column 7, lines 13-22, says the opposite of what Dr. Mir alleges. Specifically, that quotation

refers to modem 138 sending information ***from*** the PIM 122 ***to*** the SCP 108, not retrieval from the SCP 108 or receiving of data.

69. I understand that the Board alleged that "personal information data 127 is associated with updated subscriber profile data" in support of the decision to institute this proceeding. Institution Decision, p. 21. Although personal information data 127 is used to update a subscriber profile, it is my opinion that any association between the two concepts does not indicate that subscriber profile data is retrieved. In particular, for personal information data to be associated with an updated subscriber profile in Buhrmann, the subscriber must enter the personal information data and enter in profile requests for the personal information data, those profile requests must be generated into profile update data by Buhrmann's subscriber profile update API 132, the profile update data must be transmitted to the SCP 108, the SCP logic 120 must recognize the profile update data, and the SCP logic 120 must use the profile update data to update an appropriate subscriber profile record in database 118. Thus, multiple steps, transformations, and transmission of data are required before personal information data is associated with updated subscriber profile data. Even with such "association," there is still no disclosure of "retrieval" as recited.

70. As I state above, the only retrieval of data from database 118 is in Buhrmann's description of a subscriber profile record 600 being accessed from database 118 by MSC 104 in step 706 of Fig. 7. Ex. 1004 (Buhrmann), 10:52-54. But this retrieval is not in response to a subscriber request to view the subscriber profile data from a client as recited. Rather, the retrieval that occurs in database 118 occurs in response to a telephone call placed from telephone 116 to the mobile station 110 of Buhrmann. Ex. 1004 (Buhrmann), 10:45-48. There is no disclosure of retrieving data from database 118 by PIM 122 or a component of PIM 122, or retrieval of data from database 118, for view by a subscriber. There is no viewing by the subscriber of the subscriber profile at all in Buhrmann. The "retrieval" in step 706 occurs so the MSC 104 can determine that a call processing feature is active, and can route calls in accordance with that feature. Ex. 1004 (Buhrmann), 10:62-65. The subscriber profile is retrieved by the SCP logic 120 and used by MSC 104, and there is no disclosure or discussion of the data being transmitted elsewhere. Thus, this portion of Buhrmann also does not disclose "retrieving the subscriber profile data from the communications network based upon receiving the subscriber request to view the subscriber profile data from the client" as recited.

71. Accordingly, based on the above, it is my opinion that Buhrmann does not disclose element [1c], "retrieving the subscriber profile data from the

communications network based upon receiving the subscriber request to view the subscriber profile data from the client" as recited.

72. Further, because Buhrmann does not disclose "retrieving the subscriber profile data from the communications network…" as recited, it follows that Buhrmann does not disclose "forwarding the subscriber profile data to the client" as recited in the following element of claim 1. Specifically, the PIM 122 of Buhrmann never receives the subscriber profile data, because one of ordinary skill in the art would understand that subscriber profile data is never forwarded to the PIM 122. Even the "retrieval" by MSC 104 does not disclose the "forwarding" element. The subscriber profile record that is retrieved is used by the MSC 104 to perform call processing or other telephony features, but the subscriber profile record is not transmitted or forwarded to any other component of Buhrmann's system. Accordingly, there is no disclosure of "forwarding the subscriber profile data to the client" as recited.

**B. An**

73. I understand that Ground E, as proposed by Cox and as instituted by the PTAB, alleges anticipation of claims 1-7, 11, and 13-17 by An. I understand that Cox claims that An is entitled to the filing date of the An Provisional. Revised Amended Petition, p. 17. Based upon my review of An, Cox's Revised Amended Petition, Dr. Mir's Declaration, and the other materials considered herein, it is my

opinion that the evidence does not support An's entitlement to the filing date of the An Provisional.

74. I have been informed that, if An is not entitled to the filing date of the An Provisional, then An is not prior art to the '714 Patent, because the filing date of An is after the earliest filing date of the '714 patent. As it is my understanding that references which are not prior art cannot be used to anticipate or render obvious claims, it is my opinion that An does not anticipate claims 1-7, 11, and 13-17.

75. As I state above, it is my understanding that, to be entitled to a filing date of a provisional application, a patent's claims must be supported by the provisional application. I have reviewed the evidence provided by Cox in its Revised Amended Petition, and note that Cox does not quote or otherwise refer to the claims of the An patent, and further note that Cox does not allege support in the An Provisional for the claims of the An patent. The relevant portion of the Revised Amended Petition alleges only that the "An Provisional Application, to which An claims priority, fully supports and explicitly describes An's disclosure of the features claimed by the '714 patent, as shown at least in Table C." Revised Amended Petition, p. 17. I have reviewed Table C, and do not find any support or reference to the claims of An: the citations provided in Table C only appear to

allege that the disclosure of An corresponds to the disclosure of the An Provisional. No reference to the claims of An is made. Accordingly, the Revised Amended Petition does not provide any information by which I can evaluate whether Cox has shown that the claims of the An patent are supported by the An Provisional.

76. I note that Cox refers to paragraph 101 of Dr. Mir's Declaration, Exhibit 1014. Although paragraph 101 of Dr. Mir's Declaration purports to show that the An Provisional "fully describes the substance of the subject matter claimed in An," like Cox's Revised Amended Petition, Dr. Mir's Declaration does not provide any reference or quotation of the claim limitations of the An patent, nor does it provide any support for the claims of the An patent. Ex. 1014 (Mir Declaration), ¶ 101. Accordingly, Dr. Mir's Declaration does not provide any information by which I can evaluate whether Dr. Mir has shown that the claims of the An patent are supported by the An Provisional.

77. Because Cox and Dr. Mir have not provided any evidence to support a contention that the claims of An are supported by the An Provisional, I have been provided no affirmative evidence which I can rebut. Therefore, I reserve my right to supplement and rebut any evidence provided in future filings.

78. I have reviewed the claims of the An patent, and compared the claims of the An patent to the disclosure of the An Provisional. It is my opinion that the An Provisional does not provide adequate written description support and enablement support for the claims of the An patent.

79. As one example, each independent claim of the An patent includes the language "protocol conversion." For example, claim 1 recites "wherein the server performs a protocol conversion dependent on the type of the service manager node". Claim 7 recites "the server performs a protocol conversion dependent on the type of the service manager node." Claim 11 recites "the server…performing a protocol conversion dependent upon a type of service node containing a service manager program that manages the feature profile repository." Claim 14 recites "a protocol conversion is performed dependent upon a type of the service manager node." Claim 15 recites "performing a protocol conversion dependent upon a type of a service node containing a service manager program that manages the feature profile repository."

80. Based on the language of the An claims, I interpret those claims as requiring support for protocol conversion, performed by a server, dependent on a type of service manager node. Thus, the An Provisional must support that there are multiple types of service manager nodes, and must support the ability to perform a

protocol conversion appropriate for each type of service manager node. I have reviewed the entirety of the An Provisional for support for such features, and do not find written description support for such features.

81. As a first observation, I note that the An Provisional does not include or use the word "conversion" or any other form of the word. Thus, although I understand that an exact identity of terminology is not necessary for written description support, such a fact informs my conclusion that the An Provisional does not provide written description support for the claims of the An patent.

82. In discussing service managers, the Domain Model provided as Figure 2 of the An Provisional indicates that there may be multiple Service Managers, but does not indicate that there are different ***types*** of service manager nodes as recited in the claims. Ex. 1006 (An Provisional), p. 28.

83. The Object Instance Diagram of Figure 3 of the An Provisional arguably supports multiple types of ServiceManagers, as it notes one "SM_type" as "HLR" and another as "SMS." Ex. 1006 (An Provisional), p. 29. However, it is unclear whether these are the claimed "service manager node[s]" or "service node[s]" as recited.

84. The description of the Logical Architecture provided as Figure 4 of the An Provisional states "there may be multiple ServiceManagers" but again, does

not describe different ***types*** of service manager nodes or service nodes containing a service manager program. Ex. 1006 (An Provisional), p. 30.

85. None of Figure 2, Figure 3, or Figure 4 describes conversions based on a type of service manager node or service node.

86. Figure 5 at page 31 of the An Provisional depicts a JavaTel Server containing a ServiceMgr Adaptor. Ex. 1006 (An Provisional), p. 31. To the extent that the An Provisional supports a server as claimed in the An patent, I believe the JavaTel Server corresponds to such a server. At page 34, the An Provisional states the responsibilities of the "ServiceManagerAdaptor" include "encapsulates the specific protocols to be used to communicate with each class ServiceManager." Ex. 1006 (An Provisional), p. 34. First, one of ordinary skill in the art would not understand the phrase "encapsulates the specific protocols to be used to communicate" to support "conversion" as recited in the claims of the An patent. Encapsulation, in computer science, is not equivalent to conversion. For example, a contemporaneous computer dictionary defines "encapsulate" as "[i]n object-oriented programming, to keep the implementation details of a class a separate file whose contents do not need to be known by a programmer using that class." Ex. 2049, p. 6 (Microsoft Computer Dictionary, 4th Edition). Second, a person of ordinary skill in the art would not necessarily understand the language "each class"

to refer to different types of service manager nodes or service nodes containing a service manager program. For example, the An Provisional indicates that the software described is written in the Java language, which is an object-oriented computer language. The same contemporaneous computer dictionary defines "class" in object-oriented programming as "a generalized category that describes a group of more specific items, called *objects*, that can exist within it." Ex. 2049, pp. 5-6. There is no disclosure of multiple ServiceManager objects, and thus, one of ordinary skill in the art would understand "each class ServiceManager" to refer to a single class ServiceManager, not multiple types. Finally, there is no mention of "service manager ***nodes***" or "service ***nodes***." (emphasis added).

87. At page 34, the An Provisional further states that the ServiceManagerAdaptor "receives transactions from the Dispatcher, formats them in a ServiceManager specific protocol, and sends them to the ServiceManager." Ex. 1006 (An Provisional), p. 34. In my opinion, this language, while insufficient written description support for the language of the claims quoted above, is the closest the An Provisional comes to such support. However, as I noted, this portion is still insufficient: it appears to support a conclusion that only one ServiceManager exists, and that a format change is done from data of an unknown

format to a singular ServiceManager specific protocol, not from data of an unknown format to potentially multiple ServiceManager specific protocols.

88. At page 35, the An Provisional again refers to object-oriented programming concepts, stating that "each class of ServiceManager has a specific ServiceManager class." Ex. 1006 (An Provisional), p. 35. As a first note, I find this sentence to be circular and to do nothing to provide written description support for the claims of the An patent. Further, to the extent this sentence can be understood, one of ordinary skill in the art would understand it to refer to inheritance in object oriented programming (e.g., how a sub-class can inherit attributes from a super-class), but not to protocol conversion.

89. Also at page 35, the An Provisional refers to encapsulation, not conversion, stating "transactions are received in the J-Protocol format, encapsulated as Request objects." Ex. 1006 (An Provisional), p. 35. Again, no reference to or support for conversion is contained in this quote.

90. Finally, at page 35, the An Provisional states "specific ServiceManager transactions are used with the ServiceManager," again supporting only that a single ServiceManager exists, not different types as would be required to support the claims of the An patent. Ex. 1006 (An Provisional), p. 35.

91. Taken as a whole, the above-identified portions of the An Provisional do not provide written description support for "wherein the server performs a protocol conversion dependent on the type of the service manager node" as recited in claim 1 of An, or the other similar language found in the other independent claims of An.

92. I also understand that, aside from the requirement to provide written description support for the claims of the An patent, the An Provisional must describe how to make and use the invention, defined by the claims, of the An patent. I understand that the claimed invention must be enabled so that a person of skill in the art can make and use the invention without undue experimentation.

93. Based on my review of the An Provisional, in light of the claims of the An patent, and based at least on the reasoning provided in the preceding paragraphs, it is my opinion that the An Provisional does not describe how to make and use the invention of the An claims. Specifically, one of ordinary skill in the art would not be able to make and use the invention of the independent claims of the An patent without undue experimentation, as one of ordinary skill in the art would not be informed as to how to implement the protocol conversion as recited in each independent claim.

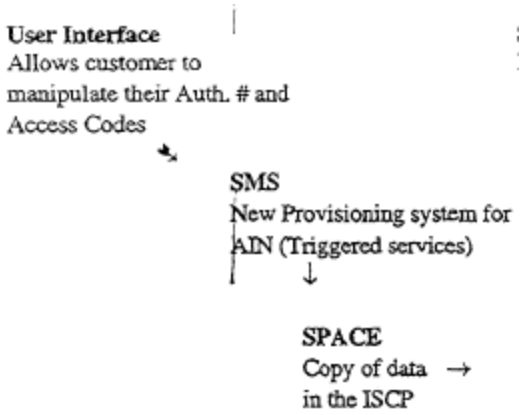
94. I understand that the determination of whether undue experimentation is required turns on multiple factors, such as the amount of direction provided by the inventor, and the existence of working examples. For at least the reasons summarized above, the An Provisional does not provide sufficient direction for how to implement protocol conversion. Further, it appears that working examples did not exist as of the filing of the An Provisional. The An Provisional enumerates at page 56 a list of "Key Issues" including the "Testing environment," suggesting that tests had not been performed yet, as a testing environment was not yet set up. The following page of the An Provisional supports such a conclusion, as it states Next Steps include the purchase of server software and set up of the server and development environment. Additionally, a lab for testing the software was not yet set up. Finally, the first section of Appendix 1 is titled "Conceptual Framework," indicating that the idea may have only been a concept at that time, not a working prototype or example.

95. I also understand that the inventors actually reduced the invention of the '714 patent to practice prior to the filing date of the An Provisional, as supported in part by a document entitled "Requirements Document PC User Interface" dated July 17, 1996. I have reviewed the aforementioned document, and agree that it supports an actual reduction to practice of the claims of the '714

Patent. Evidence from the document supporting a conclusion that each element of the challenged claims was actually reduced to practice is provided in the table below.

| **Claim Element** | **Support in Exhibit 2044** |
|---|---|
| [1a.] A method for managing, by a profile management system, subscriber profile data associated with a communications service subscribed to by a subscriber, the subscriber profile data being stored on a communications network which executes the communications service in accordance with the subscriber profile data, the method comprising: | "SPACE: (Service Provisioning And Creation Environment): SPACE carries a copy of the data in the ISCP. SPACE is the network element used for data queries and management by the selected users that have access to it, such as repair. The users do not access the ISCP directly, because we would not want to interfere with call processing by performing data manipulations on the same platform. Updates made through SPACE are input into the ISCP immediately." Ex. 2044, p. 5.<br><br>"The ISCP reads the Call Processing Record (CPR) for 235-5000, sees that the customer has Positive ID and checks the screening list to see if the originating number is authorized. 314 965-4122 is on the authorized list, so the ISCP sends a message back to the switch to go ahead and complete the call." Ex. 2044, p. 4.<br><br>"The following information is needed to easily and quickly access Southwestern Bell in order to establish and modify your Authorized Telephone Numbers and Access Codes. For your protection, the software was provided under separate cover." Ex. 2044, p. 24. |
| [1b] receiving a subscriber request to view the subscriber profile data from a client which hosts a user interface configured to allow the subscriber to view | "After the customer has successfully completed their installation process, future log-on attempts will be easier. The customer will click on the Application Manager icon in the Southwestern Bell menu. They will be |

| Claim Element | Support in Exhibit 2044 |
|---|---|
| and update the subscriber profile data; | prompted for their User ID and password and then they will connect their modem to Southwestern Bell and bring up their tool bar. From the tool bar, they click on Positive ID and the application will launch. Based on their User ID, the customer will be provided with a choice of Positive ID numbers to work with. The user's choices will be for the active view of each Positive ID number that they have access to, as well as a pending version if one exists." Ex. 2044, p. 11.<br><br>"**User Interface** Allows customer to manipulate their Auth. # and Access Codes" Ex. 2044, p. 4. |
| [1c] retrieving the subscriber profile data from the communications network based upon receiving the subscriber request to view the subscriber profile data from the client; | "Once the customer selects a Positive ID number, the application server will launch a query to SMS to pull down the tables (authorized number table and access code table) associated with that Positive ID number." Ex. 2044, p. 12. |
| [1d] forwarding the subscriber profile data to the client; | "SMS has to send back data for either every AlN service. The server will ignore any extraneous data and only deliver the Positive ID information to the user's screen." Ex. 2044, p. 12. |
| [1e] receiving a subscriber request to update the subscriber profile data from the client, and | "When the customer has created some data, they will "submit" it to Southwestern Bell and software will request an effective date on the changes." Ex. 2044, p. 12. |
| [1f] forwarding an update for the subscriber profile data to the communications network based upon receiving the subscriber request to update the subscriber profile data from the client. | "Once the due date is validated the server will send the tables to SMS who will pass the data through front-end edits and save it until the due date." Ex. 2044, p. 12. |

| Claim Element | Support in Exhibit 2044 |
|---|---|
| [2.] The method for managing subscriber profile data of claim 1, wherein the subscriber profile data is retrieved from the communications network via at least one intermediate system. |  <br>Ex. 2044, p. 4. |
| [3.] The method for managing subscriber profile data of claim 1, wherein the update for the subscriber profile data is forwarded to the communications network via at least one intermediate system. | "Customers will load software on their local PC, review and change their subscriber data and send an updated file back to Southwestern Bell. This file will be received by SMS who will send the updated copy to SPACE and subsequently, the ISCP." Ex 2044, p. 5. |
| [4.] The method for managing subscriber profile data of claim 1, wherein the profile management system comprises a server. | "The hardware that is the engine for our Application called the Application Server." Ex. 2044, p. 6. |
| [5.] The method for managing subscriber profile data of claim 1, wherein the user interface is a graphical user interface. | "VGA or higher resolution video adapter"<br>"A mouse or compatible pointing device"<br>"Microsoft Windows version 3.1 or later"<br><br>"[W]e do not support text-based emulations for VT-100s."<br><br>Ex. 2044, p. 7. |
| [6.] The method for managing subscriber profile data of claim 1, wherein the communications service comprises positive identification. | "The service that is demonstrated is Positive ID." Ex. 2044, p. 4. |

| Claim Element | Support in Exhibit 2044 |
|---|---|
| [7.] The method for managing subscriber profile data of claim 6, wherein the communications network comprises a telecommunications network. | "Below is an example of how the Advanced Intelligent Network (AIN) interacts with our existing switch network." Ex. 2044, p. 4. |
| [10.] The method for managing subscriber profile data of claim 9, wherein a reporting system generates reports comprising calling parties attempting to connect to the subscriber, indicating each calling party successfully connected to the subscriber and each calling party not successfully connected to the subscriber. | "One possible evolution is that the call processing reports that are produced for Positive ID from the DRS system, the 'Successful Attempts Log' and the 'Unsuccessful Attempts Log' be delivered to the user through the PC, rather than through the mail." Ex. 2044, p. 23. |
| [11.] The method for managing subscriber profile data of claim 1, further comprising: controlling access to the subscriber profile data, using an access control system, to only allow authorized subscribers to view and request updates to the subscriber profile data. | "They will be prompted for their User ID and password and then they will connect their modem to Southwestern Bell and bring up their tool bar." Ex. 2044, p. 11. |
| [13a.] A method for managing subscriber profile data associated with a communications service subscribed to by a subscriber, the subscriber profile data being stored on a communications network which executes the communications service in accordance with the subscriber profile data, the method comprising: | *See* [1a] above. |
| [13b.] receiving, from a profile | *See* [1b] and [1c] above. |

| Claim Element | Support in Exhibit 2044 |
|---|---|
| management system, a subscriber request to view the subscriber profile data, the subscriber request to view the subscriber profile data being received from the profile management system based upon the profile management system receiving the subscriber request to view the subscriber profile data from a client which hosts a user interface configured to allow the subscriber to view and update the subscriber profile data; | |
| [13c.] forwarding the subscriber profile data to the profile management system based upon receiving the subscriber request to view the subscriber profile data from the profile management system, the profile management system being configured to forward the subscriber profile data to the client when the profile management system receives the subscriber profile data; | *See* [1c] and [1d], above. |
| [13d.] receiving an update for the subscriber profile data from the profile management system, the update for the subscriber profile data being received from the profile management system based upon the profile management system receiving a subscriber request to update the | *See* [1e] and [1f], above. |

| Claim Element | Support in Exhibit 2044 |
|---|---|
| subscriber profile data from the client, | |
| [13e.] wherein the communications network executes the communications service in accordance with the updated subscriber profile data. | *See* [1a], above. |
| [14.] The method for managing subscriber profile data of claim 13, wherein the subscriber profile data is forwarded to the profile management system via at least one intermediate system. | *See* claim 2, above. |
| [15.] The method for managing subscriber profile data of claim 13, wherein the update for the subscriber profile data is received from the profile management system via at least one intermediate system. | *See* claim 3, above. |
| [16.] The method for managing subscriber profile data of claim 13, wherein the communications service comprises positive identification. | *See* claim 6, above. |
| [17.] The method for managing subscriber profile data of claim 16, wherein the communications network comprises a telecommunications network. | *See* claim 7, above. |
| [21.] The method for managing subscriber profile data of claim 14, wherein the intermediate system further comprises SPACE. | *See* claim 2, above. |
| [22.] The method for managing subscriber profile data of claim | "We may have compatibility issues with modems, ***TCP/IP stacks***, the customer's |

| Claim Element | Support in Exhibit 2044 |
|---|---|
| 13, wherein the profile management system communicates with the client using TCP/IP. | software that is loaded onto their local PC, the hardware that the customer is running on, with the Network LAN configurations of the customer's company, etc." Ex. 2044, p. 21 (emphasis added). |

96. I understand that the '714 Patent claims priority to a provisional application, U.S. Provisional Application No. 60/042,680, filed April 3, 1997, which I understand is submitted as Exhibit 2039 ("the '680 Provisional"). I understand that, for a patent to be entitled to priority of a filing date of a provisional application, that provisional application must contain a written description of and support the claims of the patent, such that a person of ordinary skill in the art would understand that the inventor was in possession of the claimed subject matter of the patent.

97. The document of Exhibit 2044 appears in the provisional application as Appendix D. Ex. 2039, pp. 95-118. Because Exhibit 2044 supports each element of the challenged claims as summarized in the table above, the '680 Provisional also supports each element of the challenged claims.

98. The '680 Provisional also contains additional evidence that supports the claims of the '714 Patent. For example, page 92 of the '680 Provisional (Appendix C) provides "An Example of Possible Flow of Events" which includes

events that correspond to the method steps of claim 1. Ex. 2039, p. 92. For example, Event 6 supports "receiving a subscriber request to view the subscriber profile data from a client which hosts a user interface configured to allow the subscriber to view and update the subscriber profile data" as recited in element [1b] of claim 1. Events 7, 8, and 9 support "retrieving the subscriber profile data from the communications network based upon receiving the subscriber request to view the subscriber profile data from the client" as recited in element [1c] of claim 1. Events 9.4, 9.5, 9.6, and 10 support "forwarding the subscriber profile data to the client" as recited in element [1d] of claim 1. Event 11 supports "receiving a subscriber request to update the subscriber profile data from the client" as recited in element [1e] of claim 1. Events 12-16 support "forwarding an update for the subscriber profile data to the communications network based upon receiving the subscriber request to update the subscriber profile data from the client" as recited in element [1f] of claim 1. Appendix B, which describes the "Positive Id Database," page 14 line 21 through page 15 line 7, and page 16, line 13 through page 18 line 14, along with Figure 3 (at page 124), at least support element [1a] of claim 1.

99. Accordingly, as the '680 Provisional provides support for the claims of the '714 Patent, it is my understanding that the '714 Patent is entitled to the

priority of the filing date of U.S. Provisional Application No. 60/042,680, filed April 3, 1997.

## IX. CONCLUSION

100. I declare under penalty of perjury that the foregoing is true and correct. Executed this 28th day of April, 2016.

Dr. Robert Akl, D.Sc.

# Appendix A

# Robert Akl, D.Sc.

## Professional Summary

Dr. Akl has over 20 years of industry and academic experience. He is currently a Tenured Associate Professor at the University of North Texas and a Senior Member of IEEE. He has designed, implemented, and optimized both hardware and software aspects of several wireless communication systems for CDMA, WiFi, and sensor networks. Dr. Akl has broad expertise in wireless communication, Bluetooth, CDMA/WCDMA network optimization, GSM, LTE, VoIP, telephony, computer architecture, and computer networks. He is a very active researcher and is well published and cited. He has been awarded many research grants by leading companies in the industry and the National Science Foundation. He has developed and taught over 100 courses in his field. Dr. Akl has received several awards and commendation for his work, including the 2008 IEEE Professionalism Award and was the winner of the 2010 Tech Titan of the Future Award.

Dr. Akl has extensive experience with patents in the wireless and networking industry. In the past ten years, he has worked as a technical expert in dozens of patent related matters, involving thousands of hours of research, investigation, and study. He has repeatedly been qualified as an expert by Courts, and has provided numerous technology tutorials to Courts, and given testimony by deposition and at trial. He has worked with companies large and small, both for and against the validity and infringement of patents, and has also helped counsel and Courts to understand technology that often seems complex. In doing so, he has become familiar with, and actively worked with, the legal principles that underlie patentability and validity and claim interpretation in the wireless and networking industries.

## Areas of Expertise

2G, 3G, 4G, CDMA/WCDMA, GSM, UMTS, LTE, Ad-hoc Networks, Bluetooth, Call Admission Control, Channel Coding, Computer Architecture, Multi-cell Network Optimization, Packet-networks, Telephony, VoIP, Wi-Fi, Wireless Communication, Wireless Sensors.

## Education

| Year | College/University | Degree | GPA |
|---|---|---|---|
| 2000 | Washington University in Saint Louis | D.Sc. in Electrical Engineering | **4.0 / 4.0** |
| 1996 | Washington University in Saint Louis | M.S. in Electrical Engineering | **4.0 / 4.0** |
| 1994 | Washington University in Saint Louis | B.S. in Electrical Engineering | **4.0 / 4.0** |
| 1994 | Washington University in Saint Louis | B.S. in Computer Science | **4.0 / 4.0** |

Graduated *summa cum laude* and ranked first in undergraduate class.
Dissertation: "Cell Design to Maximize Capacity in Cellular Code Division Multiple Access (CDMA) Networks." Advisors: Dr. Manju Hegde and Dr. Paul Min.

## Litigation Support and Expert Witness Experience

L1. 2016 **Haynes and Boone, LLP**
Case: Cox Communications, Inc. v., AT&T Intellectual Property I, II, LP IPR2015-01187, IPR2015-01227, IPR2015-01273, IPR2015-01536
Matter: *Inter Partes* Review, cable networks
Project: Four declarations to support Patent Owner

L2. 2015 **McKool Smith**
Case: Optis Wireless Technology, LLC and PanOptis Patent Management, LLC. v. ZTE Corporation and ZTE (USA) Inc.
Eastern district of Texas, Marshal division, Case No. 2:15-cv-300-JRG-RSP
Matter: Patent infringement, cellular messages and multimedia attachments
Project: Claim construction, declaration

L3. 2015 **Fish & Richardson, P.C.**
Case: Saint Lawrence Comm. LLC v. LG Elec., Inc. et al.
Eastern district of Texas, Marshal division, Case No. 2:14-cv-1055-JRG
Matter: Patent infringement, speech coding and decoding
Project: Invalidity expert report

L4. 2015 **Finnegan Henderson Farabow Garrett & Dunner LLP**
Case: LG Electronics, Inc. v. Cellular Communications Equipment LLC IPR2016-00178
Matter: *Inter Partes* Review, LTE
Project: Declaration to support IPR petition

L5. 2015 **McKool Smith**
Case: AT&T, et al. v. Cox Communication, Inc., et al.
District of Delaware, Case No. 14-1106-GMS
Matter: Patent infringement, cable networks
Project: Claim construction, declaration

L6. 2015 **McKool Smith**
Case: Ericsson Inc., et al. v. TCL Communication, et al.
Eastern district of Texas, Marshal division, Case No. 2:15-cv-00011-RSP
Matter: Patent infringement, wireless devices and systems
Project: Claim construction, declaration, infringement expert report, validity expert report, two-day depositions

L7. 2015 **Foley & Lardner LLP**
Case: Kyocera Communications, Inc. v. Cellular Communications Equipment LLC
IPR2015-01559, IPR2015-01564
Matter: *Inter Partes* Review, LTE
Project: Two declarations to support 2 IPR petitions

L8. 2015 **Fish & Richardson, P.C.**
Case: Fairfield Industries Inc. v. Wireless Seismic, Inc.
Southern district of Texas, Case No. 4:14-cv-02972-KPE
Matter: Patent infringement, wireless sensor networks
Project: Non-infringement expert report

L9. 2015 **Quinn Emanuel Urquhart & Sullivan, LLP**
Case: GENBAND US, LLC v. Metaswitch Networks Ltd, et al.
Eastern district of Texas, Marshal division, Case No. 2:14-cv-33-JRG-RSP
Matter: Patent infringement, Internet protocols and VoIP
Project: Expert report regarding essentiality, non-infringement expert report, rebuttal expert report regarding non-practice, supplemental rebuttal expert report, 3-day depositions, trial testimony

L10. 2015 **Foley & Lardner LLP; Duane Morris LLP**
Case: Mobile Telecommunications Technologies, LLC v. Leap Wireless International, Cricket Communications, Inc.
Eastern district of Texas, Marshal division, Case No. 2:13-cv-00885-RSP
Matter: Patent infringement, OFDM and MIMO
Project: Non-infringement expert report, deposition

L11. 2015 **Hogan Lovells US LLP; Kenyon & Kenyon LLP**
Case: One-E-Way v. Beats Electronics, LLC, Sony Corporation, et al.
In the Matter of Certain Wireless Headsets, ITC Investigation No. 337-TA-943
Matter: Patent infringement, wireless communication
Project: Claim construction, declaration

L12. 2015 **McKool Smith**
Case: Solocron Media, LLC v. AT&T Inc., et al.
Eastern district of Texas, Marshal division, Case No. 2:13-cv-1059-JRG
Matter: Patent infringement, ringtone download
Project: Claim construction, claim invalidity expert report

L13. 2015 **EIP US LLP**
Case: Good Technology Software, Inc. v. Mobile Iron, Inc.
IPR2015-00833, IPR2015-00836, IPR2015-01090
Matter: *Inter Partes* Review, software management in wireless devices
Project: Three declarations to support 3 IPR petitions

L14. 2015 **McKool Smith**
Case: AirWatch LLC v. Good Technology Corp
Northern District of Georgia, Case No. 1:14-cv-02281-SCJ
Matter: Patent infringement, software management in wireless devices
Project: Claim construction, declaration

L15. 2014 **Bragalone Conroy PC**
Case: Global Tel*Link Corporation v. Securus Technologies, Inc.
IPR2014-00785, IPR2014-00810, IPR2014-00824, IPR2014-00825, IPR2014-01278, IPR2014-01282, IPR2014-01283
Matter: *Inter Partes* Review, VoIP call monitoring and recording, allocating telecommunication resources and information systems
Project: Seven declarations to support 7 Patent Owner's responses, 5 depositions

L16. 2014 **Orrick, Herrington & Sutcliffe LLP**
Case: Shopkick, Inc. v. Novitaz, Inc.
IPR2015-00277, IPR2015-00278
Matter: *Inter Partes* Review, wireless customer service management
Project: Two declarations to support 2 IPR petitions

L17. 2014 **Paul Hastings LLP**
Case: Cellular Communications Equipment LLC v. AT&T, et al.
Eastern district of Texas, Tyler division, Case No. 6:13-cv-507-LED (Lead Case for Consolidation)
Matter: Patent infringement, 3G cellular communication
Project: Claim construction, declaration

L18. 2014 **EIP US LLP**
Case: Good Technology Software, Inc. v. AirWatch, LLC
IPR2015-00248, IPR2015-00875
Matter: *Inter Partes* Review, software management in wireless devices
Project: Two declarations to support 2 IPR petitions

L19. 2014 **Bragalone Conroy PC**
Case: Securus Technologies, Inc. v. Global Tel*Link Corporation
IPR2015-00153, IPR2015-00155, IPR2015-00156
Matter: *Inter Partes* Review, VoIP call monitoring and recording
Project: Three declarations to support 3 IPR petitions, 2 depositions

L20. 2014 **Andrews Kurth LLP**
Case: Sony Mobile Communications (USA) v. Adaptix Inc.
IPR2014-01524, IPR2014-01525
Matter: *Inter Partes* Review, subcarrier selection in LTE
Project: Two declarations to support 2 IPR petitions, deposition

L21. 2014 **Steptoe & Johnson LLP, Baker & McKenzie LLP**
Case: VTech Communications, Inc. and Uniden America Corporations v. Spherix Incorporated
IPR2014-01432
Matter: *Inter Partes* Review, IP telephony
Project: Declaration to support IPR petition, deposition, reply declaration, deposition

L22. 2014 **Steptoe & Johnson LLP, Baker & McKenzie LLP**
Case: Spherix Inc. v. VTech Telecommunications Ltd., et al.
Spherix Inc. v. Uniden Corp, et al.
Northern District of Texas, Dallas Division, Case No. 3:13-cv-3494 and 3:13-cv-3496
Matter: Patent infringement, IP telephony
Project: Claim construction, declaration, deposition

L23. 2014 **McKool Smith**
Case: Good Technology Corp. v. MobileIron, Inc.
Northern District of California, Case No. 5:12-cv-05826-PSG
Matter: Patent infringement, software management in wireless devices
Project: Claim construction, three declarations, claim invalidity expert report, non-infringement expert report, deposition, trial testimony

L24. 2014 **Lee & Hayes**
Case: Broadcom Corp. v. Ericsson, Inc.
IPR2013-00601, IPR2013-00602, and IPR2013-00636
Matter: *Inter Partes* Review, ARQ protocols
Project: Three declarations to support Patent Owner's Response, two declarations to support Patent Owner's Motion to Amend, deposition, two reply declarations

L25. 2014 **Sidley Austin LLP**
Case: Adaptix, Inc. v. Huawei Technologies Co., et al.
Eastern District of Texas, Case No. 6:13-cv-00438, 439, 440 and 441
Matter: Patent infringement, subcarrier selection in LTE
Project: Non-infringement consulting, source code review

L26. 2014 **Finnegan Henderson Farabow Garrett & Dunner LLP**
Case: Cell and Network Selection LLC v. Huawei Technologies Co., et al.
Eastern District of Texas, Case No. 6:13-cv-00404-LED-JDL

Matter: Patent infringement, base station selection in LTE
Project: Non-infringement consulting

L27. 2014 **Sheppard Mullin Richter & Hampton LLP**
Case: Digcom Inc. v. ZTE (USA), Inc.
District of Nevada, Case No. 3:13-cv-00178-RCJ-WGC
Matter: Patent infringement, cellular communication
Project: Claim construction consulting

L28. 2014 **Lott & Fischer**
Case: Zenith Electronics, LLC, et al. v. Craig Electronics, Inc.
Southern District of Florida, Case No. 9:13-cv-80567-DMM/DLB
Matter: Patent infringement, HDTV transmission and reception
Project: Opening expert report regarding nonessentiality

L29. 2013 **McKool Smith**
Case: Zenith Electronics, LLC, et al. v. Curtis International Ltd.
Southern District of Florida, Case No. 9:13-cv-80568-DMM/DLB
Matter: Patent infringement, HDTV transmission and reception
Project: Claim construction, declaration, deposition

L30. 2013 **Gibson Dunn**
Case: Straight Path IP Group v. Sharp Corp. and Sharp Electronics Corp.
In the Matter of Certain Point-to-Point Network Communication Devices and Products Containing Same, ITC Investigation No. 337-TA-892
Matter: Patent infringement, point-to-point network communication
Project: Non-infringement consulting

L31. 2013 **Kilpatrick Townsend & Stockton LLP**
Case: Monec Holding AG v. Motorola Mobility LLC, et al.
District of Delaware, Case No. 1:11-cv-798-LPS-SRF
Matter: Patent infringement, displaying books on tablets
Project: Non-infringement expert report for Motorola, non-infringement expert report for HTC, deposition

L32. 2013 **Gartman Law Group**
Case: Lone Star WiFi LLC v. Legacy Stonebriar Hotel, Ltd; et al.
Eastern Dist. Of Texas, Tyler, Case No. 6:12-cv-957
Matter: Patent infringement, levels of access in Wi-Fi networks
Project: Claim validity consulting

L33. 2013 **White & Case, LLP**
Case: Nokia Corp and Nokia, Inc. v. HTC Corp and HTC America, Inc.
In the Matter of Certain Portable Electronic Communication Devices, Including Mobile Phones and Components Thereof, ITC Investigation

No. 337-TA-885
Matter: Patent infringement, App download and installation
Project: Non-infringement consulting

L34. 2013 **Heim, Payne & Chorush, LLP**
Case: Rembrandt Wireless v. Samsung Electronics Co., et al.
Eastern Dist. of Texas, Marshal, Case No. 2:13-cv-213-JRG-RSP
Matter: Patent infringement, Bluetooth
Project: Expert report regarding validity, deposition, trial

L35. 2013 **Davis Polk & Wardwell LLP; Baker Hostetler**
Case: Comcast v. Sprint; and Nextel Inc.
Eastern Dist. of Pennsylvania, Case No. 2:12-cv-00859-JD
Matter: Patent infringement, SMS/MMS in Cellular Networks
Project: Infringement expert report, validity expert report, reply expert report, 2-day depositions

L36. 2013 **McKool Smith**
Case: Samsung Electronics America v. Ericsson Inc.
In the Matter of Certain Wireless Communications Equipment and Articles Therein, ITC Investigation No. 337-TA-866
Matter: Patent infringement, LTE uplink and downlink
Project: Prior art research, source code review, claim construction, claim invalidity expert report, non-infringement expert report, hearing testimony

L37. 2012 **DLA Piper US LLP**
Case: CSR Technology Inc. v. Freescale Semiconductor, Inc.
USDC-San Francisco, Case No. 3:12-cv-02619-RS
Matter: Patent infringement, radio transceivers
Project: Claim construction, declaration

L38. 2012 **Fish & Richardson PC**
Case: GPNE Corp. v. Apple, Inc.; et al.
USDC-ND California, Case No. 5:12-cv-02885-LHK
Matter: Patent infringement, resource allocation in wireless networks
Project: Prior art research consulting

L39. 2012 **Polsinelli Shughart PC**
Case: Single Touch Interactive, Inc. v. Zoove Corporation
Northern Dist. of California, Case No. 3:12-cv-00831-JSC
Matter: Patent infringement, abbreviated dialing, information delivery
Project: Claim construction, Markman hearing tutorial, 2 declarations

L40. 2012 **K & L Gates**
Case: EON Corp. IP Holdings, LLC v. Novatel Wireless, Inc.; et al.

DC-Tyler, Texas, Case No. 6:11-cv-00015-LED-JDL
Matter: Patent infringement, wireless modem and 3G services
Project: Non-infringement expert report, deposition

L41. 2012 **Simpson Thacher & Bartlett LLP**
Case: CSR Technology, Inc. v. Bandspeed, Inc.
Western Dist. of Texas, Case No. 1:12-cv-297-LY
Matter: Patent infringement, packet identification in 2.4 GHz and 5 GHz
Project: Source code review, Markman hearing tutorial, infringement expert report

L42. 2012 **Sheppard Mullin Richter & Hampton LLP**
Case: Wi-LAN v. HTC America, Inc.
Eastern Dist. of Texas, Case No. 6:10-cv-521-LED
Matter: Patent infringement, CDMA, Orthogonal Codes
Project: Source code review, non-infringement expert report, deposition, trial testimony

L43. 2012 **Dechert LLP**
Case: Hitachi v. TPV and Vizio, Inc.; and Vizio v. Hitachi, LTD.
Eastern Dist. of Texas, Case No. 2:10-cv-260
Matter: Patent infringement, HD television transmission and reception
Project: Prior art research, claim invalidity consulting

L44. 2012 **Fish & Richardson PC**
Case: InterDigital Commc'n, LLC v. Huawei Tech. Co. LTD; LG Electronics, Inc.; Nokia, Inc.; and ZTE (USA) Inc.
Certain Wireless Devices With 3G Capabilities and Components Thereof, ITC Investigation No. 337-TA-800
Matter: Patent infringement, channel coding in UMTS, HSDPA
Project: Non-infringement consulting

L45. 2012 **Fish & Richardson PC**
Case: InterDigital Commc'n, LLC v. Huawei Tech. Co. LTD; LG Electronics, Inc.; Nokia, Inc.; and ZTE (USA) Inc.
Dist. of Delaware, Case No. 1:11-cv-00654-UNA
Matter: Patent infringement, channel coding in UMTS, HSDPA
Project: Non-infringement consulting

L46. 2011 **O'Melveny & Myers LLP**
Case: MobileMedia Ideas, LLC v. Apple, Inc.
Dist. of Delaware, Case No. 1:10-cv-00258-SLR-MPT
Matter: Patent infringement, voice control, call rejection in mobile phones
Project: Source code review, prior art research, declaration, claim invalidity expert report, non-infringement expert report, deposition, trial testimony

L47. 2011 **Wilmer Cutler Pickering Hale and Dorr**
Case: Apple, Inc. v. Samsung Electronics Co.
Northern Dist. of California, Case No. 5:11-cv-01846-LHK
Matter: Patent infringement, channel coding in CDMA, E-AGCH, TFCI
Project: Prior art research, claim construction consulting

L48. 2011 **Weil, Gotshal & Manges LLP**
Case: Vizio, Inc. v. Renesas Electronics America, Inc.
ITC Investigation No. 337-TA-789
Matter: Patent infringement, HD television transmission and reception
Project: Claim invalidity consulting

L49. 2011 **Shapiro Cohen**
Case: TenXc Wireless Inc. v. Andrew LLC
TenXc Wireless Inc. v. Mobi Antenna Technologies Ltd.
Matter: Patent infringement, antenna design, sectorized cellular network
Project: Claim validity consulting

L50. 2010 **Fish & Richardson PC**
Case: Vizio, Inc., v. LG Electronics, Inc.
ITC Investigation No. 337-TA-733
Matter: Patent infringement, HD television transmission and reception
Project: Claim charts, claim construction expert report, deposition

L51. 2010 **Fish & Richardson PC**
Case: Vizio, Inc., v. LG Electronics, Inc.
Dist. of Maryland, Case No. 1:09-cv-1481-BEL
Matter: Patent infringement, HD television transmission and reception
Project: Claim charts, claim construction expert report, deposition

L52. 2008 **Kaye Scholer LLP**
Case: eBay Inc. v. IDT.
Western Dist. of Arkansas, Case No. 4:08-cv-4015-HFB
Matter: Patent infringement, long distance communication using Internet
Project: Prior art research, claim construction consulting

L53. 2008 **Simpson Thacher & Bartlett LLP**
Case: Commil USA, LLC v. Cisco Systems, Inc.
Eastern Dist. of Texas, Case No. 2:07-cv-00341-DF-CE
Matter: Patent infringement, two-level wireless protocol
Project: Prior art research

L54. 2006 **Woodfill and Pressler**
Case: Charles Russell v. Interinsurance Exchange of the Auto Club
Harris County, Texas, Case No. 2005-19706

Matter: House fire and insurance claim
Project: Determining user location using cellular phone records, expert report, deposition, trial testimony

## Consulting History

From: 1/2013 **Heim, Payne & Chorush, LLP**
To: 3/2013 Houston, TX
Duties: Analyze patents on wireless technologies.

From: 4/2007 **Collin County Sheriff's Office**
To: 5/2007 McKinney, TX
Duties: Analyzed cellular record data and determined user location in a double-homicide investigation.

From: 4/2004 **Allegiant Integrated Solutions**
To: 5/2004 Fort Worth, TX
Duties: Designed and developed an integrated set of tools for fast deployment of wireless networks. The tools optimize the placement of Access Points and determine their respective channel allocations to minimize interference and maximize capacity.

From: 3/2002 **Input/Output Incorporated**
To: 4/2002 New Orleans, LA
Duties: Designed and implemented an algorithm in MATLAB for optimizing the frequency selection process used by sonar for scanning the bottom of the ocean.

From: 6/1998 **Teleware Corporation**
To: 7/1998 Seoul, South Korea
Duties: Designed and developed a software package for analyzing the capacity in a CDMA network to maximize the number of subscribers.

## Employment History

From: 1/2015 **University of North Texas**
To: Present Denton, TX
Position: *Associate Chair of Graduate Studies Department of Computer Science and Engineering*
In charge of all administrative duties related to the Masters and PhD programs in the department.

From: 5/2008 **University of North Texas**
To: Present Denton, TX
Position: *Tenured Associate Professor Department of Computer Science and Engineering*

Conducting research on cellular networks and wireless sensor networks. Teaching wireless communication courses. Advising graduate and undergraduate students.

From: 9/2002 **University of North Texas**
To: 5/2008 Denton, TX
Position: *Assistant Professor Department of Computer Science and Engineering*
Conducting research on WCDMA/UMTS wireless networks. Teaching wireless communication and computer architecture courses. Advising graduate and undergraduate students.

From: 1/2002 **University of New Orleans**
To: 8/2002 New Orleans, LA
Position: *Assistant Professor Department of Electrical Engineering*
Designed and taught two new courses "Computer Systems Design I and II". Developed a Computer Engineering Curriculum with strong hardware-design emphasis. Formed a wireless research group. Advised graduate and undergraduate students.

From: 10/2000 **Comspace Corporation**
To: 12/2001 Coppell, TX
Position: *Senior Systems Engineer*
Designed, coded (in Matlab), and simulated Viterbi decoding, Turbo coding, trellis coded modulation (TCM), and Reed-Muller codes. Optimized soft decision parameters and interleavers for additive white Gaussian and Rayleigh faded channels. Extended the control and trunking of push-to-talk Logic Trunked Radio (LTR) to include one-to-one and one-to-many voice and data messaging.

From: 8/1996 **MinMax Corporation**
To: 8/2000 Saint Louis, MO
Position: *Research Associate*
Designed software packages that provide the tools to flexibly allocate capacity in a CDMA network and maximize the number of subscribers. Validated, simulated (logical and timing), and developed the hardware architecture for an ATM switch capable of channel group switching.

From: 8/1994 **Washington University**
To: 8/2000 Saint Louis, MO
Position: *Research and Teaching Assistant*
Taught, consulted, and graded Circuit Analysis at the undergraduate level and Network Design at the graduate level.

## Publications

### Journal Publications

J1. M. Haidar, H.M. Al-Rizzo, **R. Akl**, and Z. Elbazzal, "The Effect of an Enhanced Channel Assignment Algorithm in an IEEE 802.11 WLAN," *World Scientific and Engineering Academy and Society Transactions on Communications*, WSEAS, Vol. 8, Issue 12, December 2009.

J2. **R. Akl**, P. Kadiyala, and M. Haidar, "Non-Uniform Grid-Based Coordinated Routing in Wireless Sensor Networks", *Journal of Sensors*, article ID 491349, volume 2009, 11 pages.

J3. M. Haidar, M. Al-Rizzo, Y. Chan, **R. Akl**, "User-Based Channel Assignment Algorithm in a Load-Balanced IEEE 802.11 WLAN", *International Journal of Interdisciplinary Telecommunications & Networking (IJITN)*, April-June 2009, 1(2), pp. 66-81.

J4. **R. Akl**, D. Keathly, and R. Garlick, "Strategies for Retention and Recruitment of Women and Minorities in Computer Science and Engineering," *iNEER Special Volume: Innovations 2007- World Innovations in Engineering Education and Research*, 9 pgs., 2007.

J5. R. Garlick and **R. Akl**, "Motivating and Retaining CS2 Students with a Competitive Game Programming Project," *iNEER Special Volume: Innovations 2007- World Innovations in Engineering Education and Research*, 9 pgs., 2007.

J6. **R. Akl** and S. Nguyen, "UMTS Capacity and Throughput Maximization for Different Spreading Factors," *Journal of Networks*, July 2006, vol. 1, issue 3, pp. 40-49. ISSN: 1796-2056

J7. W. Li, K. Kavi, and **R. Akl**, "A Non-preemptive Scheduling Algorithm for Soft Real-time Systems," *Journal of Computer and Electrical Engineering*, 2006, vol. 32, 18 pgs. ISSN: 0045-7906

J8. **R. Akl**, A. Parvez, and S. Nguyen, "Effects of Interference on Capacity in Multi-Cell CDMA Networks," *Journal of Systemics, Cybernetics and Informatics*, 2006, vol. 3, no. 1, p825612, 7 pgs. ISSN: 1690-4524

J9. **R.G. Akl**, M. Hegde and M. Naraghi-Pour, "Mobility-based CAC Algorithm for Arbitrary Traffic Distribution in CDMA Cellular Systems," *IEEE Transactions on Vehicular Technology*, March 2005, vol. 54, no. 2, pp. 639-651.

J10. **R.G. Akl**, M.V. Hegde, M. Naraghi-Pour, P.S. Min, "Multi-Cell CDMA Network Design," *IEEE Transactions on Vehicular Technology*, May 2001, vol. 50, no. 3, pp. 711-722.

## Conference Proceedings

C1. R. Tidwell, S. Akumalla, S. Karlaputi, **R. Akl**, K. Kavi, and D. Struble, "Evaluating the Feasibility of EMG and Bend Sensors for Classifying Hand Gestures," *1st International Conference on Multimedia and Human Computer Interaction*, July 2013, paper no. 63, 8 pgs.

C2. **R. Akl**, K. Pasupathy, and M. Haidar, "Anchor Nodes Placement for Effective Passive Localization," *2011 IEEE International Conference on Selected Topics in Mobile and Wireless Networks (iCOST)*, October 2011, paper no. 1569490799, pp. 127 - 132.

C3. **R. Akl**, P. Kadiyala, and M. Haidar, "Non-Uniform Grid-Based Routing in Sensor Networks", *9th IEEE Malaysia International Conference on Communications*, December 2009, paper no. 1569243649, pp. 536 - 540.

C4. M. Haidar, M. Al-Rizzo, Y. Chan, **R. Akl**, M. Bouharras, "Throughput Validation of an Advanced Channel Assignment Algorithm in IEEE 802.11 WLAN", *ICCSN 2009 – International Conference on Communication Software and Networks*, February 2009, paper no. P385, pp. 801 - 806.

C5. **R. Akl** and D. Keathly, "Robocamp: Encouraging Young Women to Embrace STEM," 4th Annual TETC Best Practices Conference, February 2009, 13 pgs.

C6. M. Haidar, R. Ghimire, M. Al-Rizzo, **R. Akl**, Y. Chan, "Channel Assignment in an IEEE 802.11 WLAN Based on Signal-to-interference Ratio", *IEEE CCECE – Canadian Conference on Electrical and Computer Engineering: Communications and Networking*, May 2008, paper no. 1569092894, pp. 1169 - 1174.

C7. H. Al-Rizzo, M. Haidar, **R. Akl**, and Y. Chan, "Enhanced Channel Assignment and Load Distribution in IEEE 802.11 WLANs," *IEEE International Conference on Signal Processing and Communication*, November 2007, paper no. 1569042132, pp. 768 - 771.

C8. **R. Akl** and Y. Saravanos, "Hybrid Energy-Aware Synchronization Algorithm in Wireless Sensor Networks," *18th Annual IEEE International Symposium on Personal, Indoor and Mobile Radio Communications*, September 2007, paper no 692, 5 pgs.

C9. M. Haidar, **R. Akl**, and H. Al-Rizzo, "Channel Assignment and Load Distribution in a Power-Managed WLAN," *18th Annual IEEE International Symposium on Personal, Indoor and Mobile Radio Communications*, September 2007, paper no. 463, 5 pgs.

C10. D. Keathly and **R. Akl,** "Attracting and Retaining Women in Computer Science and Engineering: Evaluating the Results," *Proceedings of American Society for Engineering Education: ASEE Annual Conference*, June 2007, paper no. AC 2007-1229, 10 pgs.

C11. M. Haidar, **R. Akl**, H. Al-Rizzo, Y. Chan, R. Adada, "Optimal Load Distribution in Large Scale WLAN Networks Utilizing a Power Management Algorithm," *Proceedings of IEEE Sarnoff Symposium*, May 2007, 5 pgs.

C12. R. Dantu, P. Kolan, **R. Akl,** and K. Loper, "Classification of Attributes and Behavior in Risk Management Using Bayesian Networks," *Proceedings of IEEE Intelligence and Security Informatics Conference*, May 2007, pp. 71-74.

C13. **R. Akl** and A. Arepally, "Dynamic Channel Assignment in IEEE 802.11 Networks," *Proceedings of IEEE Portable 2007: International Conference on Portable Information Devices*, March 2007, pp 309-313.

C14. **R. Akl** and U. Sawant, "Grid-based Coordinated Routing in Wireless Sensor Networks," *Proceedings of IEEE CCNC 2007: Consumer Communications and Networking Conference*, January 2007, pp. 860-864.

C15. **R. Akl** and A. Arepally, "Simulation of Throughput in UMTS Networks with Different Spreading Factors," *Proceedings of IEEE VTC Fall 2006: Vehicular Technology Conference*, September 2006, pp. C1-5.

C16. A. Alhabsi, H. Al-Rizzo, and **R. Akl,** "Parity Assisted Decision Making for QAM Modulation," *International Conference on Mobile Computing and Wireless Communications*, September 2006, paper no. 1568988776, 5 pgs.

C17. **R. Akl** and R. Garlick**,** "Retention and Recruitment of Women in Computer Engineering," *ICEE 2006: International Conference on Engineering Education*, July 2006, paper no. 3318, 5 pgs.

C18. R. Garlick and **R. Akl,** "Intra-Class Competitive Assignments in CS2: A One-Year Study," *ICEE 2006: International Conference on Engineering Education*, July 2006, paper no. 3325, 5 pgs.

C19. **R. Akl**, D. Tummala, and X. Li, "Indoor Propagation Modeling at 2.4 GHz for IEEE 802.11 Networks," *WNET 2006: Wireless Networks and Emerging Technologies*, July 2006, paper no. 510-014, 6 pgs.

C20. P. Chen, K. Kavi, and **R. Akl,** "Performance Enhancement by Eliminating Redundant Function Execution," *Proceedings of IEEE: 39th Annual Simulation Symposium*, April 2006, pp. 143-150.

C21. **R. Akl** and S. Nguyen, "Capacity Allocation in Multi-cell UMTS Networks for

Different Spreading Factors with Perfect and Imperfect Power Control," *Proceedings of IEEE CCNC 2006: Consumer Communications and Networking Conference*, January 2006, vol. 2, pp. 928-932.

C22. W. Li, K. Kavi, and **R. Akl**, "An Efficient Non-Preemptive Real-Time Scheduling," *18th International Conference on Parallel and Distributed Computing Systems*, Las Vegas, NV, September 2005, pp. 154-160.

C23. S. Nguyen and **R. Akl**, "Approximating User Distributions in WCDMA Networks Using 2-D Gaussian," *CCCC20T 05: International Conference on Computing, Communications, and Control Technologies*, July 2005, 5 pgs.

C24. **R. Akl** and S. Park, "Optimal Access Point Selection and Traffic Allocation in IEEE 802.11 Networks," *Proceedings of 9th World Multiconference on Systemics, Cybernetics and Informatics (WMSCI 2005): Communication and Network Systems, Technologies and Applications*, July 2005, vol. 8, pp. 75-79.

C25. **R. Akl**, M. Naraghi-Pour, M. Hegde, "Throughput Optimization in Multi-Cell CDMA Networks," *IEEE WCNC 2005 - Wireless Communications, and Networking Conference*, March 2005, vol. 3, pp. 1292-1297.

C26. **R. Akl**, "Subscriber Maximization in CDMA Cellular Networks," *Proceedings of CCCT 04: International Conference on Computing, Communications, and Control Technologies*, August 2004, vol. 3, pp. 234-239.

C27. **R. Akl** and A. Parvez, "Global versus Local Call Admission Control in CDMA Cellular Networks," *Proceedings of CITSA 04: Communications, Information and Control Systems, Technologies and Applications*, July 2004, vol. 2, pp. 283-288.

C28. **R. Akl** and A. Parvez, "Impact of Interference Model on Capacity in CDMA Cellular Networks," *Proceedings of SCI 04: Communication and Network Systems, Technologies and Applications*, July 2004, vol. 3, pp. 404-408. Selected as **best paper** of those presented in the session: Tele-Communication Systems, Technologies and Application II.

C29. **R.G. Akl**, M.V. Hegde, M. Naraghi-Pour, P.S. Min, "Call Admission Control Scheme for Arbitrary Traffic Distribution in CDMA Cellular Systems," *IEEE Wireless Communications and Networking Conference*, September 2000, vol. 1, pp. 465-470.

C30. **R.G. Akl**, M.V. Hegde, M. Naraghi-Pour, P.S. Min, "Cell Placement in a CDMA Network," *IEEE Wireless Communications and Networking Conference*, September 1999, vol. 2, pp. 903-907.

C31. **R.G. Akl**, M.V. Hegde, P.S. Min, "Effects of Call Arrival Rate and Mobility on

Network Throughput in Multi-Cell CDMA," *IEEE International Conference on Communications*, June 1999, vol. 3, pp. 1763-1767.

C32. **R.G. Akl**, M.V. Hegde, M. Naraghi-Pour, P.S. Min, "Flexible Allocation of Capacity in Multi-Cell CDMA Networks," *IEEE Vehicular Technology Conference*, May 1999, vol. 2, pp. 1643-1647.

**Technical Papers**

T1. J. Williams, **R. Akl,** et al, "Flight Control Subsystem," *The Eagle Feather*, Special Section: Undergraduate Research Initiative in Engineering, University of North Texas, Vol. 7, 2010.

T2. **R.G. Akl**, M.V. Hegde, A. Chandra, P.S. Min, "CDMA Capacity Allocation and Planning," Technical Document, Washington University Department of Electrical Engineering WUEE-98, April 1998.

**Book Chapters**

B1. R. Akl, Y. Saravanos, and M. Haidar, "Chapter 18: Hybrid Approach for Energy-Aware Synchronization in Sensor Networks," *Sustainable Wireless Sensor Networks*, December 2010, pgs. 413-429, ISBN: 978-953-307-297-5.

B2. K. Kavi, **R. Akl** and A. Hurson, "Real-Time Systems: An Introduction and the State-of-the-Art," *Encyclopedia of Computer Science and Engineering*, John Wiley & Sons, Volume 4, January 2009, pgs. 2369-2377.

B3. **R. Akl** and K. Kavi, "Chapter 12: Modeling and Analysis using Computational Tools," *Introduction to Queuing Theory: Modeling and Analysis*, Birkhauser Boston, December 2008, pgs. 295-320.

## Technical Presentations

P1. "Bio-Com Project," Raytheon, Richardson TX, May 2012, (invited).

P2. "Bio-Com Project," Net-Centric Software and Systems I/UCRC Meeting, Denton TX, December 2011, (invited).

P3. "Student Outreach Report: Robocamp," College of Engineering Advisory Board Meeting, Denton TX, May 2011, (invited).

P4. "Robocamp: Encouraging Young Women to Embrace STEM," 4th Annual TETC Best Practices Conference, Austin TX, February 2009, (invited).

P5. "Self-Configuring Wireless MEMS Network (demo)," Southern Methodist University, Dallas TX, January 2008, (invited).

P6. "Energy-aware Routing and Hybrid Synchronization in Sensor Networks," *Southern Methodist University,* Dallas TX, September 2007, (invited).

P7. "Retention and Recruitment of Women in Computer Engineering," *ICEE 2006: International Conference on Engineering Education*, Puerto Rico, July 2006, (refereed).

P8. "Capacity Allocation in Multi-cell UMTS Networks for Different Spreading Factors with Perfect and Imperfect Power Control," *IEEE CCNC 2006: Consumer Communications and Networking Conference*, Las Vegas, NV, January 2006, (refereed).

P9. "Research, Teaching, and Outreach," CSE Advisory Council Meeting, *UNT Research Park*, Denton, TX, December 2005, (invited).

P10. "WiFi and WCDMA Network Design," *University of Arkansas*, Little Rock, AR, April 2005, (invited).

P11. "WiFi and WCDMA Network Design," *Southern Methodist University*, Dallas, TX, March 2005, (invited).

P12. "Current Research in Wireless at UNT," *Nortel Networks*, Richardson, TX, October 2004, (invited).

P13. "Subscriber Maximization in CDMA Cellular Networks," *International Conference on Computing, Communications, and Control Technologies*, Austin, TX, August 2004, (refereed).

P14. "Global versus Local Call Admission Control in CDMA Cellular Networks," *International Conference on Cybernetics and Information Technologies, Systems and Applications*, Orlando, FL, July 2004, (refereed).

P15. "Impact of Interference Model on Capacity in CDMA Cellular Networks," *8th World Multi-Conference on Systemics, Cybernetics, and Informatics*, Orlando, FL, July 2004, (refereed).

P16. "CDMA Network Design," IEEE Communications Society – New Orleans Chapter, New Orleans, LA, May 2002, (invited).

P17. "Cell Design to Maximize Capacity in CDMA Networks," Louisiana State University, Baton Rouge, LA, April 2002, (invited).

P18. "Call Admission Control Scheme for Arbitrary Traffic Distribution in CDMA Cellular Systems," *IEEE Wireless Communications and Networking Conference*, Chicago, IL, September 2000, (refereed).

P19. "Cell Placement in a CDMA Network," *IEEE Wireless Communications and Networking Conference*, September 1999, (refereed).

P20. "Effects of Call Arrival Rate and Mobility on Network Throughput in Multi-Cell CDMA," *IEEE International Conference on Communications*, June 1999, (refereed).

P21. "Flexible Allocation of Capacity in Multi-Cell CDMA Networks," *IEEE Vehicular Technology Conference*, May 1999, (refereed).

P22. "CCAP: A Strategic Tool for Managing Capacity of CDMA Networks," Teleware Co. Ltd., Seoul, South Korea, 1998, (invited).

## Courses Developed

- CSCE 5934: Directed Study: LTE Physical Layer Using MATLAB.
  Research issues in the design of LTE physical layer and simulate using MATLAB. Topics include modulation and coding, OFDM, channel modeling, MIMO, and link adaption.

- CSCE 6590: Advanced Topics in Wireless Communications & Networks: 4G/LTE.
  Research issues in the design of next generation wireless networks: cellular systems, medium access techniques, signaling, mobility management, control and management for mobile networks, wireless data networks, Internet mobility, quality-of-service for multimedia applications, caching for wireless web access, and ad hoc networks.

- CSCE 5593: Fundamentals of VoIP.
  Fundamentals of VoIP, with emphasis on network infrastructure implementation and security. Topics include IP protocol suite, SS7, speech-coding techniques, quality of service, session initiation protocol, and security issues.

- CSCE 5540: Introduction to Sensor Networks.
  Topics include: design implications of energy (hardware and software), and otherwise resource-constrained nodes; network self-configuration; services such as routing under network dynamics, localization, time-synchronization and calibration; distributed data management, in-network aggregation and collaborative signal processing, programming tools and language support.

- CSCE 5510. Wireless Communication.
  Point-to-point signal transmission through a wireless channel, channel capacity, channel encoding, and multi-user transmissions. First, second, and third generation cellular systems, and mobility management.

- CSCE 3510. Introduction to Wireless Communication.

Fundamentals of wireless communications and networking, with emphasis on first, second, and third generation cellular systems. Topics include point-to-point signal transmission through a wireless channel, cellular capacity, multi-user transmissions, and mobility management.

- CSCE 3020. Communications Systems.
  Introduction to the concepts of transmission of information via communication channels. Amplitude and angle modulation for the transmission of continuous-time signals. Analog-to-digital conversion and pulse code modulation. Transmission of digital data. Introduction to random signals and noise and their effects on communication. Optimum detection systems in the presence of noise.

- ENEE 3583. Computer Systems Design I (UNO).
  The design process of digital computer systems is studied from the instruction set level, system architecture level, and digital logic level. Topics include machine organization, register transfer notation, processor design, memory design, and input/output considerations. Includes semester project.

- ENEE 3584. Computer Systems Design II (UNO).
  The design and evaluation of contemporary computer systems are analyzed to compare the performance of different architectures. Topics include performance metrics, computer arithmetic, pipelining, memory hierarchies, and multiprocessor systems.

- ENEE 3514. Computer Architecture Laboratory (UNO).
  Selected experiments examining programmable logic, VHDL and logic synthesis, and including a final design project, to accompany and complement the lecture course ENEE 3584. Three hours of laboratory.

## Courses Taught

Spring 2016
- CSCE 5950.743: Thesis
- CSCE 6950.743: Dissertation

Fall 2015
- CSCE 3010.1: Signals and Systems

Spring 2015
- CSCE 5934.743: Directed Study (no evaluation done)

Fall 2014
- CSCE 3010.1: Signals and Systems (3.32 / 4.00)
- CSCE 6590.1: Advanced Topics in Wireless Communications & Networks: 4G/LTE (3.79 / 4.00)

Spring 2014
- CSCE 3510.1: Intro to Wireless Communication (808 – Highly Effective)
- CSCE 5510.1: Wireless Communications (808 – Highly Effective)

Fall 2013
- CSCE 6590.1: Advanced Topics in Wireless Communications & Networks: 4G/LTE (804 – Highly Effective)

Spring 2013
- CSCE 4890.743: Directed Study (no evaluation done)
- CSCE 6940.743: Individual Research (no evaluation done)

Fall 2012
- CSCE 3010.1: Signals and Systems (793 – Highly Effective)
- CSCE 5540.1: Intro to Sensor Networks (814 – Highly Effective)

Spring 2012
- CSCE 3020.1: Communication Systems (809 – Highly Effective)
- CSCE 3510.1: Intro to Wireless Communication (811 – Highly Effective)
- CSCE 5510.1: Wireless Communications (817 – Highly Effective)
- EENG 3810.1: Communication Systems (801 – Highly Effective)

Fall 2011
- CSCE 3010.1: Signals and Systems (793 – Highly Effective)
- CSCE 5540.1: Intro to Sensor Networks (824 – Highly Effective)

Spring 2011
- CSCE 3020.1: Communication Systems (820 – Highly Effective)
- CSCE 3510.1: Intro to Wireless Communication (812 – Highly Effective)
- CSCE 5510.1: Wireless Communications (812 – Highly Effective)
- EENG 3810.1: Communication Systems (826 – Highly Effective)

Fall 2010
- CSCE 3010.1: Signals and Systems (857 – Highly Effective)
- CSCE 5540.1: Intro to Sensor Networks (831 – Highly Effective)

Spring 2010
- CSCE 3020.1: Communication Systems (792 – Highly Effective)
- CSCE 3510.1: Intro to Wireless Communication (793 – Highly Effective)
- CSCE 5510.1: Wireless Communications (834 – Highly Effective)
- EENG 3810.1: Communication Systems (854 – Highly Effective)

Fall 2009
- CSCE 3010.1: Signals and Systems (4.40 / 5.00)
- CSCE 5540.1: Intro to Sensor Networks (4.70 / 5.00)
- EENG 2620.1: Signals and Systems (4.40 / 5.00)

Spring 2009
- CSCE 3020.1: Communication Systems (4.87 / 5.00)
- CSCE 3510.1: Intro to Wireless Communication (4.65 / 5.00)
- CSCE 5510.1: Wireless Communications (4.79 / 5.00)

Fall 2008
- CSCE 3010.1: Signals and Systems (4.91 / 5.00)
- CSCE 5540.2: Intro to Sensor Networks (4.10 / 5.00)
- EENG 2620.3: Signals and Systems (4.91 / 5.00)

Spring 2008
- CSCE 3020.1: Communication Systems (4.68 / 5.00)

- CSCE 3510.1: Intro to Wireless Communication (3.96 / 5.00)
- CSCE 5510.1: Wireless Communications (4.75 / 5.00)

Fall 2007
- CSCE 3010.1: Signals and Systems (4.57 / 5.00)
- CSCE 5540.2: Intro to Sensor Networks (4.01 /5.00)

Summer 2007
- CSCE 3020.1: Fund. of Communication Theory (no evaluation done)
- EENG 3810.1: Communication Systems (no evaluation done)

Spring 2007
- CSCE 5510.2: Wireless Communications (4.75 / 5.00)
- CSCE 5933.6: Fundamentals of VoIP (4.70 / 5.00)

Fall 2006
- CSCE 3010.1: Signals and Systems (4.58 / 5.00)
- CSCE 5540.1: Intro to Sensor Networks (4.70 / 5.00)
- EENG 2620.1: Signals and Systems (4.58 / 5.00)

Summer 2006
- CSCE 3020.1: Fund. of Communication Theory (no evaluation done)
- CSCE 3510.21: Intro to Wireless Communications (no evaluation done)
- CSCE 5510.21: Intro to Wireless Communications (no evaluation done)
- EENG 3810.1: Communication Systems (no evaluation done)

Spring 2006
- CSCE 2610.2: Computer Organization (3.69 / 5.00)
- CSCE 3010.1: Signals and Systems (4.41 / 5.00)
- EENG 2620.1: Signals and Systems (4.41 / 5.00)

Fall 2005
- CSCE 3510.1: Intro to Wireless Communications (4.52 / 5.00)
- CSCE 5510.1: Wireless Communications (4.46 / 5.00)
- CSCE 5933.6: Intro to Sensor Networks (4.60 / 5.00)

Summer 2005
- CSCE 3010.21: Signals and Systems (no evaluation done)
- CSCE 3510.21: Intro to Wireless Communications (no evaluation done)

Spring 2005
- CSCE 3510.02: Intro to Wireless Communications (4.46 / 5.00)
- CSCI 3100.02: Computer Organization (4.14 / 5.00)

Fall 2004
- CSCE 3510.01: Intro to Wireless Communications (4.15 / 5.00)
- CSCI 4510.01: Machine Structures (4.55 / 5.00)
- CSCI 5330.02: Intro to Wireless Communications (4.05 / 5.00)

Summer 2004
- CSCI 4330.22: Intro to Wireless Communications (no evaluation done)
- CSCI 4330.23: Intro to Wireless Communications (no evaluation done)
- CSCI 5330.22: Intro to Wireless Communications (no evaluation done)

Spring 2004
- CSCI 3100: Computer Organization (4.64 / 5.00)

- CSCI 4330: Intro to Wireless Communications (4.22 / 5.00)

Fall 2003

- CSCI 4510: Machine Structures (4.49 / 5.00)
- CSCI 5330: Intro to Wireless Communications (4.83 / 5.00)

Summer 2003

- CSCI 3100: Computer Organization (no evaluation done)

Spring 2003

- CSCI 3100: Computer Organization (3.84 / 5.00)

Fall 2002

- CSCI 4510: Machine Structures (4.38 / 5.00)

## Funded Proposals

R1. "Robotics, Game and App Programming Summer Camps" under Texas Workforce Commission: Summer Merit Program. Requested amount is $63,000. Submitted 11/16/15. Robert Akl (PI), **awarded $63,000**.

R2. "App Design Summer Camp" under Texas Higher Education Coordinating Board: Engineering Summer Program. Requested amount is $13,998. Submitted 5/1/15. Robert Akl (PI), **awarded $13,988**.

R3. "App Design Summer Camp" under Texas Higher Education Coordinating Board: Engineering Summer Program. Requested amount is $12,500. Submitted 5/2/14. Robert Akl (PI), **awarded $12,500**.

R4. "Robotics, Game and App Programming Summer Camps" under Texas Workforce Commission: Summer Merit Program. Requested amount is $63,000. Submitted 12/14/12. Robert Akl (PI), **awarded $63,000**.

R5. "Bio-Com Project," funded by Raytheon under Net-Centric Software and Systems I/UCRC 2nd year. Requested amount is $30,000. Submitted 5/12/12. Krishna Kavi (PI), Robert Akl (co-PI), **awarded $30,000.**

R6. "Bio-Com Project," funded by Raytheon under Net-Centric Software and Systems I/UCRC. Requested amount is $30,000. Submitted 5/12/11. Krishna Kavi (PI), Robert Akl (co-PI), **awarded $30,000.**

R7. "Game Programming for Xbox 360 Summer Camp" under Texas Higher Education Coordinating Board: Engineering Summer Program. Requested amount is $20,000. Submitted 3/21/11. Robert Akl (PI), **awarded $20,000**.

R8. "RoboCamps and Game Programming Summer Camps" under Texas Workforce Commission: Summer Merit Program. Requested amount is $63,000. Submitted 2/17/11. Robert Akl (PI), **awarded $63,000**.

R9. "Game Programming for Xbox 360 Summer Camp" under Texas Higher

Education Coordinating Board: Engineering Summer Program. Requested amount is $13,000. Submitted 2/22/10. Robert Akl (PI), **awarded $18,000.**

R10. "Robotics and Game Programming Summer Camps" under Texas Workforce Commission: Summer Merit Program. Requested amount is $63,000. Submitted 10/16/09. Robert Akl (PI), **awarded $63,000**.

R11. "Micro Air Vehicle Design: A Collaborative Undergraduate Project for Electrical Engineering, Computer Engineering, and Computer Science Students," under UNT Undergraduate Research Initiative. Submitted 9/25/2009. Robert Akl (co-PI), **awarded $8,000**.

R12. "Summer Merit Program" under Texas Workforce Commission. Requested amount is $42,000. Submitted 3/20/09. Robert Akl (PI), **awarded $42,000**.

R13. "Robocamp at Stewpot" under Dallas Women's Foundation. Requested amount is $20,000. Submitted 2/23/09. Robert Akl (PI), **awarded $18,600**.

R14. "Robocamp Jump Start" under Motorola Foundation Innovation Generation Grant. Requested amount is $29,852. Submitted 2/12/09. Robert Akl (PI), **awarded $30,700**.

R15. "Engineering Summer Program" under Texas Higher Education Coordinating Board. Requested amount is $7,944. Submitted 2/13/09. Robert Akl (PI), **awarded $11,111**.

R16. "Texas Youth in Technology" under Texas Workforce Commission. Requested amount is $152,393. Submitted 11/10/08. Robert Akl (PI), **awarded $152,393**.

R17. "IUCRC Center Proposal: Net-Centric Software and Systems," under NSF-07-537: Industry/University Cooperative Research Centers. Requested amount is $349,482. Submitted 9/26/08. Krishna Kavi (PI), Robert Akl (co-PI), **awarded $60,000 per year for 5 years**.

R18. "Robocamp and Beyond" under Motorola Foundation Innovation Generation Grant. Requested amount is $30,000. Submitted 6/20/08. Robert Akl (PI), **awarded $30,000**.

R19. Texas Youth in Technology" under Texas Workforce Commission. Requested amount is $30,000. Submitted 2/27/08. Robert Akl (PI), **awarded $31,500**.

R20. "Robocamp Program for Young Women" under RGK foundation. Requested amount is $30,000. Submitted 11/5/07. Robert Akl (PI), **awarded $15,000**.

R21. "Texas Youth in Technology" under Texas Workforce Commission. Requested amount is $102,514. Submitted 10/22/07. Robert Akl (PI), **awarded $102,514**.

R22. "Women Art Technology" under Hispanic and Global Studies Initiatives Fund. Requested amount is $14,125. Submitted 9/30/07. Jennifer Way (PI), Robert Akl (co-PI), **awarded $12,785**.

R23. "Robocamp Mobile Unit" under Motorola Foundation Innovation Generation Grant. Requested amount is $35,000. Submitted 6/20/07. Robert Akl (PI), **awarded $30,000**.

R24. "ICER: UNT Engineering Challenge Camps" under NSF 0547299. Requested amount is $35,000. Submitted 4/27/07. Oscar Garcia (PI), Robert Akl (senior personnel), **awarded $32,792**.

R25. "IUCRC-Planning Proposal: UNT Research Site Proposal to join Embedded Systems I/UCRC," under NSF-01-116: Industry/University Cooperative Research Centers. Requested amount is $10,000. Submitted 3/31/07. Krishna Kavi (PI), Robert Akl (co-PI), **awarded $10,000**.

R26. "High-assurance NCCS: Ultra Dependability Integration Engineering," Department of Defense. Requested amount is $20,000. Submitted 3/12/07. Krishna Kavi (PI), Robert Akl (co-PI), **awarded $20,000**.

R27. "Recruiting and Retention Strategies for Computer Science at UNT" under Texas Technology Workforce Development Grant Program – 2005. Requested amount is $163,322. Submitted 3/17/05. Robert Akl (PI), **awarded $125,322**.

R28. UNT Faculty Research Grant for Fall 2003, Robert Akl (PI), $5,000, **awarded $4,000**.

R29. UNT Junior Faculty Summer Research Fellowship for Summer 2003, Robert Akl (PI), $5,000, **awarded $5,000**.

## Professional Associations and Achievements

### Membership in Professional Organizations

- Senior Member IEEE
- Member, Federation Council of North Texas Universities
- Member, Eta Kappa Nu Electrical Engineering Honor Society
- Member, Golden Key National Honor Society
- Member, Tau Beta Pi Engineering Honor Society

### Offices and Committee Assignments in Professional Organizations

- Technical Program Committee Member, IEEE Wireless Communications and Networking Conference, IEEE WCNC 2012

- Technical Program Committee Member, International Wireless Symposium, IWS 2012
- Technical Program Committee Member, IEEE International Conference on Computational Science, IEEE ICCS 2012
- Technical Program Committee Member, IASTED International Conference on Wireless Communications, WC 2012
- Technical Program Committee Member, IEEE WCNC 2011
- International Program Committee Member, IASTED International Conference on Wireless Communications, WC 2011
- Technical Program Committee Member, WTS Wireless Telecommunications Symposium 2009
- Technical Program Committee Member, Mosharaka International Conference on Computer Science and Engineering, Amman, 2008
- Invitation to serve as an NSF reviewer/panelist for Engineering Research Centers (ERC) proposals, 2007
- Technical Program Committee Member, 18th IEEE International Symposium on Personal, Indoor and Mobile Radio Communication, Greece, 2007
- Technical Program Committee Member, Mosharaka International Conference on Computer Science and Engineering, Amman, 2007
- International Program Committee, IASTED International Conference on Wireless and Optical Communication, Canada, 2007
- Program Committee Member, Fifth Annual Wireless Telecommunications Symposium, CA, 2006
- Technical Publications Chair, IEEE Vehicular Technology Conference, Dallas TX, 2005
- Session Chair, International Conference on Computing, Commun. and Control Tech., Austin TX, 2004
- Session Chair, International Conference on Cybernetics and Information Technologies, Orlando FL, 2004
- Session Chair, 8th World Multi Conference on Systemics, Cybernetic, and Informatics, Orlando FL, 2004

**Additional Responsibilities and Activities**

- Reviewer, *Wireless Communications and Mobile Computing*, 2012 – present
- Reviewer, *Journal of Sensor and Actuator Networks*, 2012 – present
- Reviewer, *IEEE Transactions on Vehicular Technology*, 2011 – present
- Reviewer, *Elsevier Journal of Computers & Electrical Engineering*, 2008 – present
- Reviewer, *IEEE Globecom*, 2007 – present
- Reviewer, *IEEE International Conference on Advanced Networks and Telecommunication Systems (ANTS)*, 2008 – present
- Reviewer, *The International Wireless Communications and Mobile Computing Conference*, 2007 – present
- Reviewer, *Journal on Wireless Communications and Networking*, 2007 – present

- Reviewer, *IEEE Transactions on Communications*, 2007 - present
- Reviewer, *International Journal of Communication Systems*, 2007 – present
- Reviewer, *IEEE Communications Magazine*, 2005 – present
- Reviewer, *Journal of Wireless Networks*, 2004 – present
- Reviewer, *IEEE Transactions on Mobile Computing*, 2004 – present
- Reviewer, *IEEE Transactions on Wireless Communications*, 2004 – present
- Reviewer, *ACM Crossroads*, 2004 – present

**Honors and Awards**

- Who's Who in America, 2012 Edition
- Winner of Tech Titan of the Future – University Level Award for UNT Robocamps for Girls, Metroplex Technology Business Council, 2010 with **$15,000 cash prize**.
- IEEE Professionalism Award, Ft Worth Chapter, 2008
- UNT College of Engineering Outstanding Teacher Award, 2008
- Certificate of Appreciation: IEEE Vehicular Technology Conference, Dallas, TX, 2005
- Certificate of Appreciation: Denton County Boosting Engineering, Science and Technology (BEST) Robotics Competition, 2004
- Summa Cum Laude Graduate, Ranked First in Undergraduate Class
- The Computer Science Departmental Award for Academic Excellence, Washington University, 1993
- The Dual Degree Engineering Award for Outstanding Senior, Washington University, 1993
- The 1992 Technical Writing Competition Award, The Society for Technical Communication

# Appendix B

# List of Materials Considered

| Document | Exhibit/Paper Number |
|---|---|
| U.S. Patent No. 7,907,714 | Exhibit 1001 |
| U.S. Patent No. 5,903,845 (Buhrmann) | Exhibit 1004 |
| U.S. Patent No. 6,031,904 (An) | Exhibit 1005 |
| U.S. Patent Application No. 60/028,760 to An *et al.* (An Provisional) | Exhibit 1006 |
| Transcript of Deposition of Dr. Nader Mir, January 29, 2016 | Exhibit 2042 |
| Annotated Figure 1 of Buhrmann | Exhibit 2040 |
| Declaration of Professor Nader Mir, Ph.D. in Support of Request for *Inter Partes* Review of the '714 Patent | Exhibit 1014 |
| Revised Amended Petition for *Inter Partes* Review of U.S. Patent No. 7,907,714 | Paper 9 |
| Decision – Institution of *Inter Partes* Review in IPR2015-01227 | Paper 13 |
| File History of U.S. Provisional Application No. 60/042,680 | Exhibit 2039 |
| Requirements Document PC User Interface dated July 17, 1996 | Exhibit 2044 |
| Microsoft Computer Dictionary, 4th Edition | Exhibit 2049 |