

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

NOKIA OF AMERICA CORPORATION, ERICSSON INC.,
AND T-MOBILE USA, INC
Petitioners

v.

GENERAL ACCESS SOLUTIONS, LTD.,
Patent Owner

Case No. IPR2023-01416

U.S. Patent No. 6,947,477

**DECLARATION OF DANIEL VAN DER WEIDE, PH.D. IN SUPPORT OF
PETITION FOR *INTER PARTES* REVIEW OF U.S PATENT NO. 6,947,477**

IPR2023-01416
Petitioners' Ex. 1003

Ex.1003.00001

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TABLE OF EXHIBITS

Exhibit	Short Name	Description
Ex. 1001	'477 Patent	U.S. Patent No. 6,947,477
Ex. 1002	'477 File History	File History of U.S. Patent No. 6,947,477
Ex. 1003	van der Weide Declaration	Declaration of Daniel van der Weide, Ph.D.
Ex. 1004	CV	Curriculum Vitae of Daniel van der Weide, Ph.D.
Ex. 1005	Genossar	U.S. Patent No. 6,643,321
Ex. 1006	WiMAX	IEEE 802.16.1 Draft Standard, "Air Interface for Fixed Broadband Wireless Access Systems"
Ex. 1007	Barratt '470	U.S. Patent No. 5,909,470
Ex. 1008	Barratt '490	U.S. Patent No. 5,592,490
Ex. 1009	PHS	Personal Handy Phone System, Association of Radio Industries and Businesses (ARIB) Standard, Version 2 (December 26, 1995)
Ex. 1010	Hall-Ellis Declaration	Declaration of Sylvia Hall-Ellis, Ph.D.
Ex. 1010-1	Hall-Ellis CV	Curriculum Vitae of Sylvia Hall-Ellis, Ph.D.
Ex. 1010-2	PHS MARC Record	MARC Record of Personal Handy Phone System, Association of Radio Industries and Business (ARIB) Standard, Version 2 (accessed October 8, 2023)
Ex. 1011	'477 Contentions	General Access Solutions' Disclosure of Initial Infringement Contentions Pursuant to P.R. 3-1 and 3-2, Exhibit B, "T-Mobile's Infringement of the '477 Patent"
Ex. 1012	Wang Article	Wang et al., "Forward Error-Correction Coding," Crosslink Magazine (published Winter 2001)
Ex. 1013	IBM Term Webpage	"Terms and Definitions," IBM Cloud Object Storage System, IBM.com (first published June 15, 1999)

Exhibit	Short Name	Description
Ex. 1014	District Court DCO	Doc. No. 34, Docket Control Order, <i>General Access Solutions, Ltd. v. T-Mobile USA, Inc.</i> , Case No. 2:23-cv-00158 (E.D. Tex.)
Ex. 1015	Caseload	U.S. District Court – Judicial Caseload Profile (Sept. 2022)
Ex. 1016	Fundamentals of WiMAX	Jeffrey G. Andrews, Ph.D., et al., <i>Fundamentals of WiMAX: Understanding Broadband Wireless Networking</i> , Prentice Hall (published October 2007)

DECLARATION OF DANIEL VAN DER WEIDE, PH.D.

I, Daniel van der Weide, Ph.D., do hereby declare and say as follows:

I. INTRODUCTION

1. I have been retained as a technical expert by counsel at Alston & Bird LLP for Petitioners Nokia of America Corporation (“Nokia”), Ericsson, Inc. (“Ericsson”), and T-Mobile USA, Inc. (“T-Mobile”) (collectively, “Petitioners”) to address certain issues regarding U.S. Patent No. 6,947,477 (“the ’477 Patent”). Ex. 1001.¹

2. I have been asked to consider whether certain references disclose or render obvious the features recited in Claims 1-20 (the “Challenged Claims”) of the ’477 Patent. My opinions are set forth below. Based on my experience and expertise, it is my opinion that the prior art anticipates and/or renders obvious all limitations of the challenged claims, as I discuss in detail below.

3. I have personal knowledge of the facts contained in this Declaration, am of legal age, and am otherwise competent to testify.

4. Unless otherwise stated, the matters contained in this Declaration are of my own personal knowledge and, if called as a witness, I could and would testify completely and truthfully with regard to the matters set forth herein.

¹ Where appropriate, I refer to exhibits that I understand are to be attached to the petition for *inter partes* review of the ’477 Patent.

5. My opinions are based on my years of education, research, and experience, as well as my study of the relevant materials. A list of materials I considered is included at the beginning of this Declaration.

6. I reserve all available rights to supplement this Declaration if further information becomes available, or if I am asked to consider additional information. This Declaration represents only those opinions I have formed to date.

7. Further, I reserve all available rights to consider and comment on any additional expert statements or testimony of Patent Owner's expert(s) in this matter.

8. I am being compensated at my usual consulting rate of \$750 per hour for my time spent working on issues in this matter. My compensation does not depend on the outcome of this matter or the opinions I express.

II. QUALIFICATIONS

9. I am qualified by education and experience to testify as an expert in the field of telecommunications. Attached as Ex. 1004 to this Declaration is a copy of my curriculum vitae detailing my education and experience. Additionally, the following overview of my background pertains to my qualifications for providing expert testimony in this matter.

10. I am a Full Professor in the Department of Electrical and Computer Engineering at the University of Wisconsin-Madison. I received my Bachelor of Science Degree in Electrical Engineering from the University of Iowa in 1987; my

Master of Science Degree in Electrical Engineering from Stanford University in 1990; and my Ph.D. degree in Electrical Engineering from Stanford in 1993. I teach several courses in my area of expertise, which includes high frequency electrical measurement and communications systems and advanced high-frequency circuit design and measurement. Specifically, I perform research on digital radio and communications systems ranging from RFID tags to lightwave transceivers, with emphasis on wireless and microwave technology. My first full-time employment upon graduation was as an engineer with Motorola Inc. International Cellular Subscriber division, where I participated in the development of “The Cellular Connection,” an early fixed wireless access solution. The patents-in-suit refer generally to fixed wireless access systems, whose receivers involve, among other techniques, sampling and coherent signal detection. I have built and published electronic circuits that have generated and measured the shortest pulses on record (480 fs @ 3.5V), and these results incorporate sampling and coherent signal detection. In addition, in 2007 I co-founded Optametra, a company developing and selling hardware and software for analysis of coherent communications in long-haul single mode optical fiber using many of the same techniques found in modern wireless communications, such as high-order modulation, forward error correction, and multicarrier transmission. Optametra sold its systems worldwide to many major telecommunications vendors and carriers—competing directly and successfully with

Agilent Technologies (the major telecom test and measurement vendor)—and was acquired by Tektronix in 2012. Before and during the timeframe relevant to the '477 Patent's purported invention, I trained students in both analog and digital wireless communications techniques and standards, many of whom have been hired by Qualcomm, Google (formerly Motorola) and Skyworks. I am a Fellow of the IEEE.

11. I have previously testified as an expert witness in wireless telecommunications matters, as well as in matters related to adjacent wireless fields, such as RFID. Over the past two years, I've testified as an expert in more than twelve proceedings, and several of these were in wireless telecommunications, including written testimony on 3G standards in HTC Corp. v. Telefonaktiebolaget LM Ericsson Case No. 23844/FS Arbitration, International Chamber of Commerce. I currently serve on the Working Group for the IEEE P1765 Modulated Signal Measurement Uncertainty standards-setting body.

III. MATERIALS REVIEWED

12. The opinions contained in this Declaration are based on the documents I reviewed, my professional judgment, as well as my education, experience, and knowledge.

13. In forming my opinions expressed in this Declaration, I reviewed the materials and information contained in the Table of Exhibits on pages iv-v.

14. I also reviewed any other materials I refer to in this Declaration in support of my opinions.

15. My opinions have also been guided by my appreciation of how a person of ordinary skill in the art would have understood the state of the art, the prior art, and the claims and specification of the '477 Patent at the time of the alleged invention.

IV. LEGAL STANDARDS

16. Petitioners' counsel has explained to me the legal standards that apply in this case. My understanding of those standards is described below. I am not an attorney, and I do not have formal training in the law regarding patents. I have used my understanding of the following legal principles set forth in this section in reaching my opinions.

17. I understand that, in this proceeding, Petitioners have the burden of proving that the challenged claims are invalid by a preponderance of the evidence.

A. Anticipation

18. I have been informed that a claim is invalid as anticipated under 35 U.S.C. § 102 (pre-AIA) if a prior art reference discloses, either expressly or inherently, all limitations of a claim as those limitations are arranged in the claim.

19. I have been informed that a limitation is disclosed inherently in a reference if it is necessarily present in the process or product described in the prior

art reference. I understand that probabilities or possibilities are insufficient to show that a prior art reference inherently discloses something beyond what it discloses explicitly.

B. Obviousness

20. I have been informed that a claim is invalid as obvious under 35 U.S.C. § 103 (pre-AIA) if the differences between the claimed subject matter and the prior art are such that the subject matter as a whole would have been obvious at the time of the invention to a person of ordinary skill in the art. I have been informed that the following matters are relevant to determining whether the claimed invention would have been obvious: (1) the scope and content of the prior art, (2) the difference or differences between the patent claim and the prior art, (3) the level of ordinary skill in the art at the time of the invention of the patent, and (4) any secondary considerations or objective indicia of non-obviousness.

21. I have been informed that the combination of familiar elements according to known methods is likely to be obvious when it does no more than yield predictable results. When a claim simply arranges prior art elements with each performing the same function it had been known to perform and yields no more than one would expect from such an arrangement, then such a combination is obvious. When a patent claims a structure already known in the prior art altered by the mere

substitution of one element for another known in the field, the combination is likely to be obvious unless the combination yields an unpredictable result.

22. I have been informed that when a work is available in one field of endeavor, design incentives and other market forces can prompt variations of it, either in the same field or a different one. If a person of ordinary skill in the art can implement a predictable variation, such a variation is likely unpatentable. For the same reason, if a technique has been used to improve one device, and one of ordinary skill in the art would recognize that it would improve similar device in the same way, using the technique is obvious unless its actual application is beyond his or her skill. One question to consider is whether the improvement is more than predictable using prior art elements according to their established functions.

23. I have been informed that it may often be necessary, in a validity analysis, to consider whether there was an apparent reason to combine the known elements in the fashion claimed by the patent at issue. This can be accomplished by looking to interrelated teachings of multiple patents or other publications or pieces of prior art; the effects of demands known to the design community or present in the marketplace; and the background knowledge possessed by one of ordinary skill in the art.

24. I have been informed that a validity analysis need not seek out precise teachings directed to the specific subject matter of the challenged claim; it is

appropriate to take account of the inferences and creative steps that a person of ordinary skill in the art would employ. I have been informed that a person of ordinary skill in the art is a person of ordinary creativity, not an automaton.

25. I have been informed that a claim composed of several elements is not proved obvious merely by demonstrating that each element was, independently, known in the prior art. I have been informed that it can be important to identify a reason that would have prompted a person of ordinary skill in the art in the relevant field to combine the elements in the way the claimed new invention does. I am told that one way the subject matter can be proved obvious is by noting there existed at the time of the invention a known problem for which there was an obvious solution encompassed by the patent's claims. I have been informed that any need or problem known in the field of endeavor at the time of the claimed invention and addressed by the patent can provide a reason for combining the elements in the manner claimed.

26. I have been informed that one should not assume that a person of ordinary skill in the art attempting to solve a problem will be led only to those elements of prior art designed to solve the same problem. Instead, I have been informed that since familiar items may have obvious uses beyond their primary purposes, in many cases a person of ordinary skill in the art will be able to fir the teachings of multiple prior art references together like pieces of a puzzle.

27. I have been informed that, when there is a design need or market pressure to solve a problem and there are a finite number of identified, predictable solutions, persons of ordinary skill in the art have good reason to pursue the known options within their technical grasp. If this leads to the anticipated success, the product was likely not accomplished by innovation but by using ordinary skill and common sense. I have been informed that, in such an instance, the fact that the combination was obvious to try may show that the combination was obvious.

28. I have been informed that, when determining whether a claimed combination would have been obvious, the correct analysis is not whether a person of ordinary skill in the art, writing on a blank slate, would have chosen the particular combination of elements described in the claim. Instead, I have been informed that the correct analysis considers whether one of ordinary skill, facing the wide range of needs created by developments in the field of endeavor, would have seen a benefit to selecting the combination claimed.

29. I have been informed that, when determining whether a claimed invention is obvious, any “secondary considerations” of non-obviousness identified by the patentee should also be considered. These secondary considerations can include:

- commercial success of the invention, causally related to the invention itself rather than to companion factors, such as advertising or attractive packaging;
- the invention taught away from the technical direction followed by those skilled in the art;
- a long-felt but unsatisfied need for the invention while the needed implementing arts and elements had long been available;
- the invention achieves results unexpected to those skilled in the art;
- copying of the invention by competitors as distinguished from their independent development;
- unsuccessful attempts by those skilled in the art to make the invention;
- acquiescence by the industry to the patent's validity by honoring the patent through taking licenses or not infringing the patent, or both; and
- skepticism, disbelief in or incredulity by those skilled in the art that the patentee's approach worked.

30. I have been informed that, for the above information to impact the obviousness of a patent claim, there must be a nexus between the alleged secondary considerations and the claims. In addition, I have been informed that the burden of introducing evidence of secondary considerations generally is on the Patent Owner. If the Patent Owner or its expert should assert secondary considerations of non-

obviousness, I reserve the right to provide a Declaration addressing assertions of non-obviousness due to secondary considerations.

C. Claim Construction

31. I have been informed that claim terms are typically given their plain and ordinary meanings, as would have been understood by a person of ordinary skill in the art at the time of the earliest alleged priority date. I have further been informed that when considering the meaning of any terms in the challenged claims of the '477 patent, I should apply the plain and ordinary meaning of those terms. I have further been informed that in considering the meaning of the claims, one must consider the language of the claims, the specification, and the prosecution history of record.

32. I have been informed that in general, a preamble limits the invention if it recites essential structure or steps, or if it is necessary to give life, meaning, and vitality to the claim. I have further been informed that a preamble is not limiting where a patentee defines a structurally complete invention in the claim body and uses the preamble only to state a purpose or intended use for the invention. I have further been informed that dependence on a particular disputed preamble phrase for antecedent basis may limit claim scope because it indicates a reliance on both the preamble and claim body to define the claimed invention. I have further been informed that clear reliance on the preamble during prosecution to distinguish the claimed invention from the prior art transforms the preamble into a claim limitation

because such reliance indicates use of the preamble to define, in part, the claimed invention.

D. Person of Ordinary Skill in the Art

33. All of the opinions I express in this Declaration have been made from the standpoint of a person of ordinary skill in the relevant art at the time of the invention of the '477 Patent, which I am informed is, for purposes of this matter, the earliest claimed priority date of January 19, 2001.²

34. Base on the materials and information I have reviewed and based on my experience in the technical areas relevant to the '477 Patent, it is my opinion that a person of ordinary skill in the art pertinent to the '477 Patent would have had at least a Bachelor's Degree in computer science, electrical or computer engineering, or a related field, and at least two years of work or research experience in digital communications systems, such as wireless communications systems and networks, or equivalent, or a Master's Degree in electrical engineering, computer engineering, computer science, or a similar field. I myself had these capabilities at the time of the alleged invention of the '477 Patent.

² The '477 Patent claims priority to a number of provisional applications filed between January 19, 2001 and March 5, 2001. For purposes of this proceeding only, Petitioners have assumed that the earliest alleged priority date of the '477 Patent is not earlier than January 19, 2001.

V. TECHNICAL BACKGROUND

35. Below, I present a brief overview of certain technical concepts and features that would have been known to a person of ordinary skill in the art prior to and at the time of the earliest alleged priority date of the '477 Patent. The technical concepts and features that I describe in this Technical Background section reflect the state of the art that a person of ordinary skill in the art would have had knowledge of and would have understood prior to and at the time of the alleged invention of the '477 Patent. I rely on, and incorporate as applicable (even if not expressly mentioned below in Section VIII), the following disclosures to support my opinions in this Declaration, including those opinions relating to how the prior art discloses and/or suggests the challenged claims of the '477 Patent and how (and why) a person of ordinary skill in the art would have been motivated to consider and combine the disclosures and suggestions from one or more prior art references.

36. Prior to the '477 Patent's earliest alleged priority date, a POSITA would have been familiar with fixed wireless access communication systems. Fixed wireless access allows service providers to provide wireless connectivity through radio links between two fixed points, providing wireless internet access to homes or businesses without laying fiber or cables to provide last mile connectivity. The transceiver base stations of fixed wireless systems receive downlink (or forward channel) signals from an external network, such as a public switched telephone

network or a data network (e.g., internet protocol networks, wide area networks, local area networks), and transmit uplink (or reverse channel) signals back to the external network. Ex. 1001, 8:8-23. The base stations also transmit downstream signals to fixed location antennas attached to the residences or offices of subscribers and receive upstream signals transmitted by the broadband access equipment at subscriber locations. *Id.*; Ex. 1001, 5:24-30. A fixed wireless access system is illustrated in the following figure.

Ex. 1001 at Fig. 1

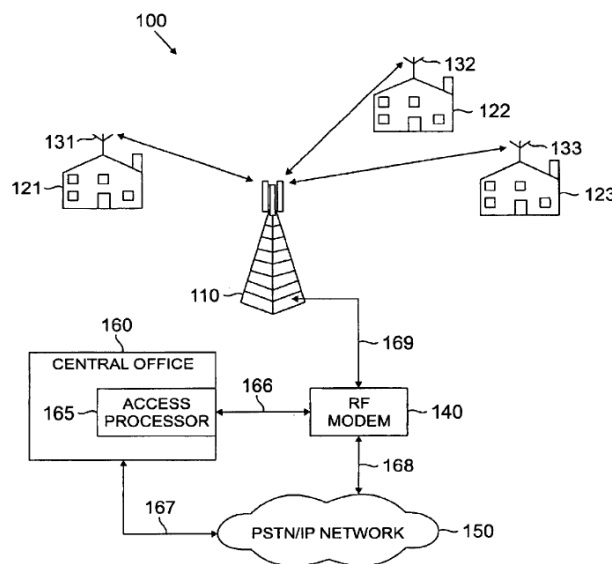


FIG. 1

37. In this configuration, the base station transmits a single signal to each subscriber on the downlink transmissions. *Id.* at 9:46-63. The subscribers, however, transmit upstream to the base station at the same time, causing the base station to receive a burst of data on a demand basis from the subscribers. *Id.* The uplink portion

of a data frame, transmitted from subscribers to a base station, is received by a base station modem that processes the burst signal and each subscriber's transmission.

VI. SUMMARY OF THE '477 PATENT

A. Claim Construction

38. I have been informed that, terms in the claims should receive their respective plain and ordinary meaning as understood by a person of ordinary skill in the art.³

B. The '477 Patent's Specification

39. The '477 Patent discloses a system for storing parameter values at a base station to purportedly improve “the speed and accuracy” of receive operations performed on subsequent bursts of a data signal received from the same subscriber station. Ex. 1001, 11:38-45. The '477 Patent states that the sets of parameter values (or “profiles”) maintained for each subscriber station can include both “signal-related parameters and channel-related parameters. *Signal-related* parameters include, for instance, the amount of forward error correction (FEC) of the burst, change in frequency of the burst, changes in time of the burst, changes in power levels of the burst, etc. and *channel-related* parameters include values of

³ I understand that Petitioners reserve the right to argue alternative constructions before a district court, including with respect to indefiniteness.

equalization weighting, antenna parameters, . . . etc.” *Id.* at 11:56-64 (emphasis added).

40. Annotated FIG. 3 (reproduced below) illustrates a base station where “[t]he profiles associated with the various communication channels stored at memory device 318 include [equalizer] weighting values 320 by which to weight equalizers 303 and 305.” *Id.* at 10:25-37. The ’477 Patent explains that “[w]hen *subsequent bursts* generated by the *same subscriber station* are received at the base station and applied to the modem, the updated profile (*e.g.*, equalizer weights 320) is *retrieved and utilized* when the subsequent burst of data is to be operated upon by the modem.” *Id.* at 18:14-23. Thus, according to the ’477 Patent, “[c]ompensation for distortion introduced on the uplink data signal is improved because the profile was updated as the data signal's channel conditions changed.” *Id.* at 11:9-23.

Ex-1001, Fig. 3 (annotated)

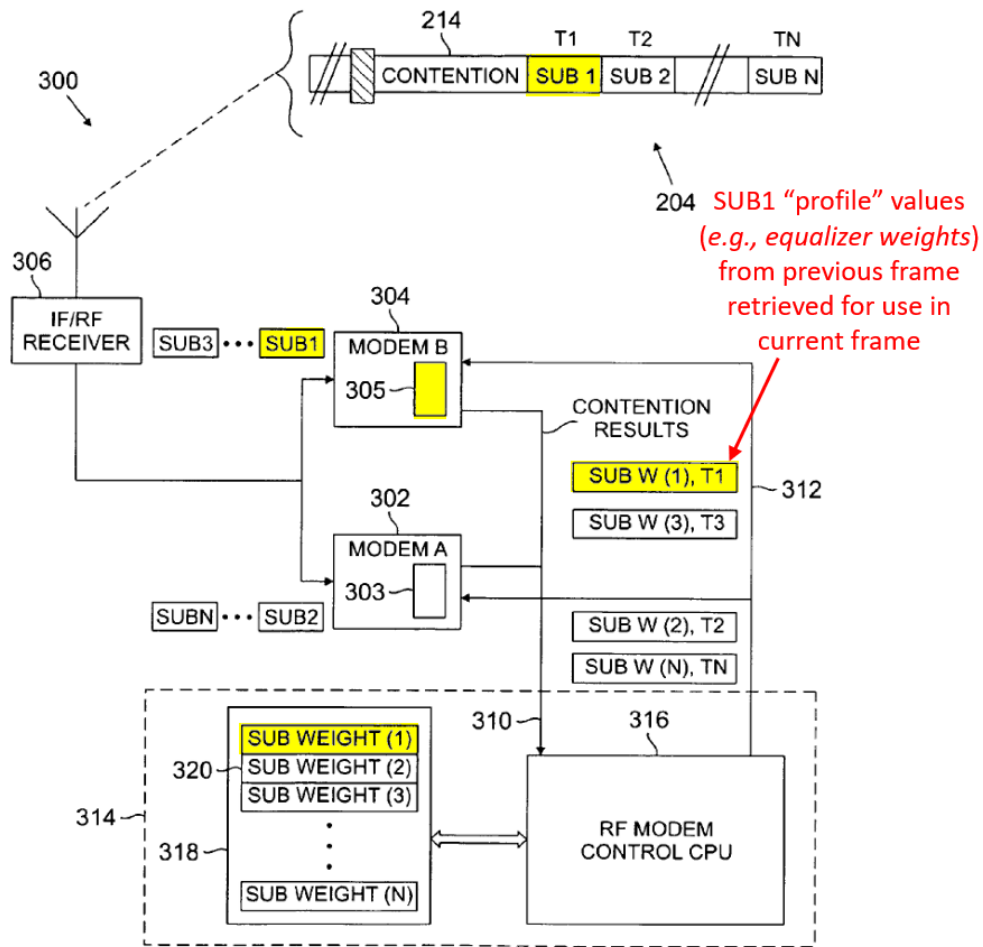


FIG. 3

41. The '477 Patent asserts that, because a large number of subscriber stations can communicate with a single base station, the base stations “must be able to quickly and accurately [] operate upon data bursts from a potentially large number of subscribers.” Ex-1001, 5:44-57. Further, the '477 Patent states that there “is a need for an apparatus to compensate for distortion introduced upon data signals transmitted on a wireless communication channel.” *Id.* Thus, according to the '477 Patent, “any manner by which to facilitate an increase in speed and accuracy by

which the data bursts can be operated upon by the base stations . . . would therefore be advantageous.” *Id.*

42. To address these purported concerns, the ’477 Patent discloses an apparatus and associated method that allows for “an increase in the speed and accuracy by which bursts of data signals are operated upon, when received at the receiving station.” *Id.* at 5:60-67.

43. The ’477 Patent describes storing characteristics of data bursts and the channels by which they are received as signal and channel profiles at a receiving station in order to facilitate more rapid processing of data bursts generated by a plurality of subscribers. *Id.* at 11:43-45. For example, annotated Figure 5 (reproduced below) illustrates a method by which the receiving base station creates and updates a profile used to facilitate receive operations on subsequent data bursts.

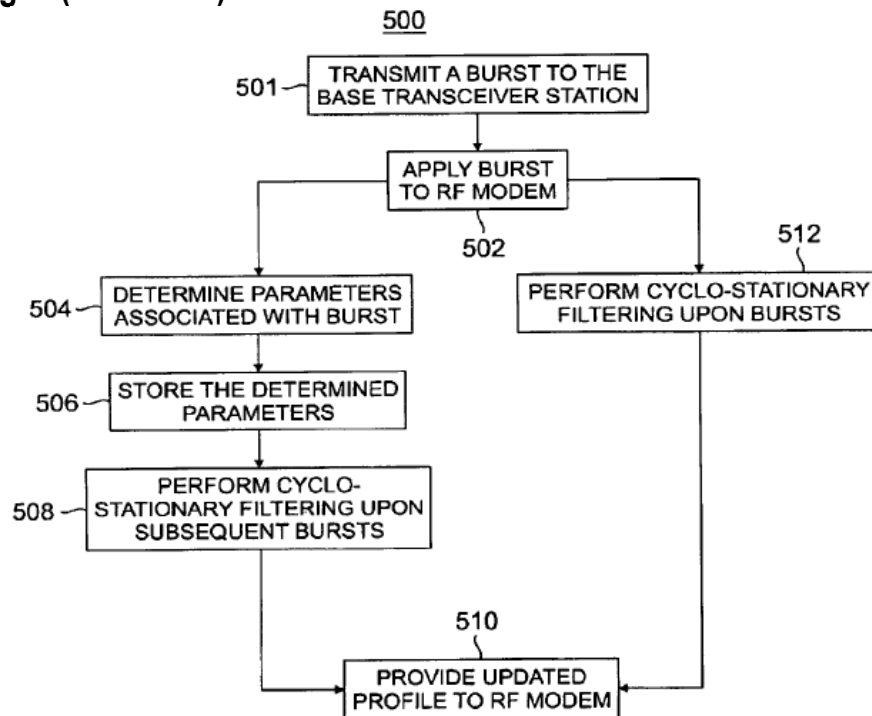


FIG. 5

44. The '477 Patent further discloses that data burst of data signals are communicated to the base station, generated by a plurality of subscriber stations. *Id.* at 6:50-64. Alternating ones of the bursts are provided to a pair of modems that form the receive portion of the base station and are controlled by a base station controller or central processing unit. *Id.* The disclosed controller maintains profiles associated with the channels of each subscriber, which are retrieved and utilized in the demodulation of the data bursts. *Id.*

45. The profiles described store information required by demodulators to permit their operation to demodulate signals and further include information related

to modulation indices of data signals, modulation orthogonalizations of the bursts, parameters associated with forward error correction of the data bursts, timing adjustment parameters, and other similar values. *Id.* at 6:3-18.

VII. SUMMARY OF THE PRIOR ART

46. The '477 Patent and the prior art discussed below address a common problem related to the processing of data signals received from multiple wireless subscriber stations. Ex. 1001, 5:44-57; Ex. 1005, 1:37-2:40; Ex. 1006, 27-28, 115; Ex. 1007, 2:15-6:15; Ex. 1008, 2:24-63; Ex. 1009. The goal of the invention allegedly described in the '477 Patent is to allow for base stations in a wireless communications system to be able to quickly and accurately operate upon data bursts received from a large number of subscribers. *Id.* The prior art, like the '477 Patent, discloses a system and method that determines certain parameters associated with burst data signals received from each of the wireless subscriber stations for use in processing future burst data signals from the same subscriber stations. Ex. 1005, 1:37-2:40; Ex. 1006, 27-28, 115; Ex. 1007, 6:19-33, 8:48-62, 16:17-43, 16:44-17:7, 18:8-20, 18:39-45; Ex. 1008, 2:46-63, 7:59-8:8, 12:49-66; Ex. 1009.

47. As will be discussed further *infra* § VIII, one of ordinary skill in the art would have been motivated to combine the prior art references. Each of the prior art references discussed below relates to the field of telecommunications and is directed towards transmission procedures of data signals in a point-to-multipoint network for

improving the performance of wireless communication systems. *Id.* In particular, a POSITA would have understood that determining and storing parameters associated with various characteristics of the transmitted signal and associated transmission channel as described in the prior art references would have been advantageous for facilitating the processing of subsequent signals received from the wireless subscriber stations.

A. U.S. Patent No. 6,643,321 (“Genossar”)

48. Genossar is titled “Method for Rapid Synchronization of a Point to Multipoint Communication System.” I have been informed that I should assume Genossar was filed on September 30, 1998 and issued on November 4, 2003. Ex. 1005. I have also been informed that I should assume Genossar qualifies as prior art under at least pre-AIA 35 U.S.C §§102(b) and (e). I understand Genossar was not cited and was not considered during prosecution.

49. Specifically, the system described in Genossar comprises a base station, containing a modem, that controls transmissions to a plurality of terminal stations, which each contain a transceiver including a modem. *Id.* at 8:56-9:3. Signals are exchanged between the base station and terminal stations according to timing set by the base station. *Id.* When an upstream signal transmitted by a terminal station is received at the base station, the base station transceiver processes the signal by selecting parameters for receiving from a certain terminal station. *Id.* at 9:29-46.

50. Like the '477 Patent, Genossar discloses a system for storing parameter values (*e.g.*, equalizer weights) at a base station to improve the efficiency of receive operations performed on subsequent bursts of a data signal received from the same subscriber station. *Id.* at Abstract, 2:17-39.

51. The method taught in Genossar involves receiving a “training sequence of known values” from the transmitting modem at the terminal station. *Id.* The controller of the equalizer uses this received training sequence to update the coefficients of the equalizer, where the adjustments are made recursively in an attempt to make the coefficients converge to optimal values. *Id.* at 11:19-42. The equalizer controller stores the values for the coefficients and then reuses these values as an initial estimate when a new signal is received, allowing for increased efficiency by enabling the equalizer to begin processing at a point much closer to convergence than simply starting at an arbitrary value. *Id.*

52. For instance, Genossar discloses that “for certain types of applications, in particular fixed systems in which both the base station and the terminal stations are stationary, various values calculated during the signal processing change relatively slowly between consecutive bursts, but these values are still time variant. For example, the *equalizer coefficients* typically do not change significantly between bursts. Therefore, using the values obtained from the calculation of equalizer coefficients for a *previous burst* transmission as the basis for the calculation for a

subsequent consecutive burst from the *same terminal station*, rather than starting from a random or otherwise unrelated value, could significantly improve the efficiency of the equalizer coefficient adaptation.” *Id.* at 2:17-29 (emphasis added).

53. Genossar concludes “[t]here is thus a widely recognized need for ... a method for storing certain relatively slowly changing receiver parameters between transmissions for signal processing, such as the equalizer coefficients and the carrier frequency offset, in order to increase the efficiency of signal processing” operations performed at the base station. *Id.* at 2:32-39 (emphasis added).

B. IEEE 802.16.1 Draft Standard, “Air Interface for Fixed Broadband Wireless Access Systems (“WiMAX”)

54. I have been informed that I should assume WiMAX was published in September 2000 and qualifies as prior art under at least pre-AIA U.S.C. §102(a). Ex. 1006. First, WiMAX includes a 2000 Copyright stamp. *Id.* at 1. Second, IEEE draft standards, such as WiMAX were and are available to the public and are easily searchable through libraries (such as my campus library) and other IEEE resources. These indicia establish WiMAX was publicly available as of its 2000 publication date.

55. Furthermore, any POSITA interested in the subject matter of fixed access wireless network systems in the early 2000’s would have likely been a member of the IEEE or, at the very least, followed its publications and discussions, because of the IEEE’s prominence in the industry as a source of innovation and

important standards, such as 802.11 WiFi. For example, the IEEE and, in particular, the WiMAX Forum at the IEEE, was instrumental in developing broadband wireless access systems. *See* Ex. 1016, 7, 9-11. Those skilled in the art and interested members of the public, such as those working to develop standards for telecommunications and those working to implement the standards, would have had access to the relevant documents at the IEEE, including draft standards documents such as WiMAX.⁴ I myself was a member of the IEEE at the time when the WiMAX draft standard was published, would have had access to the document, and would have obtained and read this specific document, as could any of the other 100,000+ members of IEEE at the time.⁵ These facts further support WiMAX as a publicly available document as of its publication date.

56. I understand WiMAX was not cited and was not considered during prosecution. The WiMAX reference is a document published as a potential draft

⁴ Notably, the WiMAX document is a draft “FOR COMMENT.” *See* Ex. 1006, 1. By releasing this draft standard “FOR COMMENT,” the IEEE 802.16 Working Group’s goal was to intentionally circulate the draft to the interested public in order to garner feedback on its contents from professionals and POSITAs in the relevant technical space. This would have been successful as, discussed above, an interested POSITA would have been aware of and purposefully sought out IEEE documents because of the organization’s importance in developing standards for telecommunications technology.

⁵ The WiMAX document additionally lists several industry members who directly worked on and facilitated the production of the draft standard, including Roger Marks, Scott Marin, Glen Sater, and Carl Eklund. *Id.* at iii-iv. These individuals also have direct knowledge of the importance and availability of the WiMAX draft standard to other relevant, interested POSITAs.

standard for medium-access and physical layer components that meet the functional requirements of a point-to-multipoint Broadband Wireless Access (BWA) system as defined by the IEEE 802.16 Working Group.

57. The IEEE 802.16 Standard, as a whole, defines a means for wireless broadband access as a replacement for cable and DSL “last mile” services to homes and businesses. The WiMAX 802.16.1 Draft Standard, in particular, includes specifications for the air interface, including the physical layer and medium access control layer, of fixed point-to-multipoint broadband wireless access systems. Ex. 1006, 1.

C. U.S. Patent No. 5,909,470 (“Barratt ’470”)

58. Barratt ’470 is titled “Method and Apparatus for Decision Directed Demodulation Using Antenna Arrays and Spatial Processing.” I have been informed that I should assume Barratt ’470 was filed on October 11, 1996 and issued on June 1, 1999. I have also been informed that Barratt ’470 qualifies as prior art under at least Pre-AIA 35 U.S.C. §§102(b) and (e). Ex. 1007. I understand Barratt ’470 was not cited and was not considered during prosecution.

59. Similar to Genossar, Barratt ’470 discloses a wireless communication system including a base station, comprising an array of antennas, and a set of remote terminals. *Id.* at cl. 1. Barratt ’470 discloses a method for storing parameter values at a base station to facilitate receive operations performed on subsequent bursts of a

data signal received from the same subscriber station. *Id.* at 8:48-61, 16:17-17:7. For example, Barratt '470 discloses a method that “involves a recursive loop *repeated every frame . . .* On an ongoing basis, *one starts the loop with starting estimate of [weight vector] w_r and of the [time] alignment and frequency offset obtained from the processing of the same signal on the previous frame.*” *Id.* at 16:32-43 (emphasis added). This process is illustrated in annotated FIG. 6 (reproduced below), which shows values obtained from the *previous frame* being used in receive operations (603, 607) performed on the *current frame*. *Id.* at 16:44-17:35.

Ex. 1007, FIG. 6 (annotated)

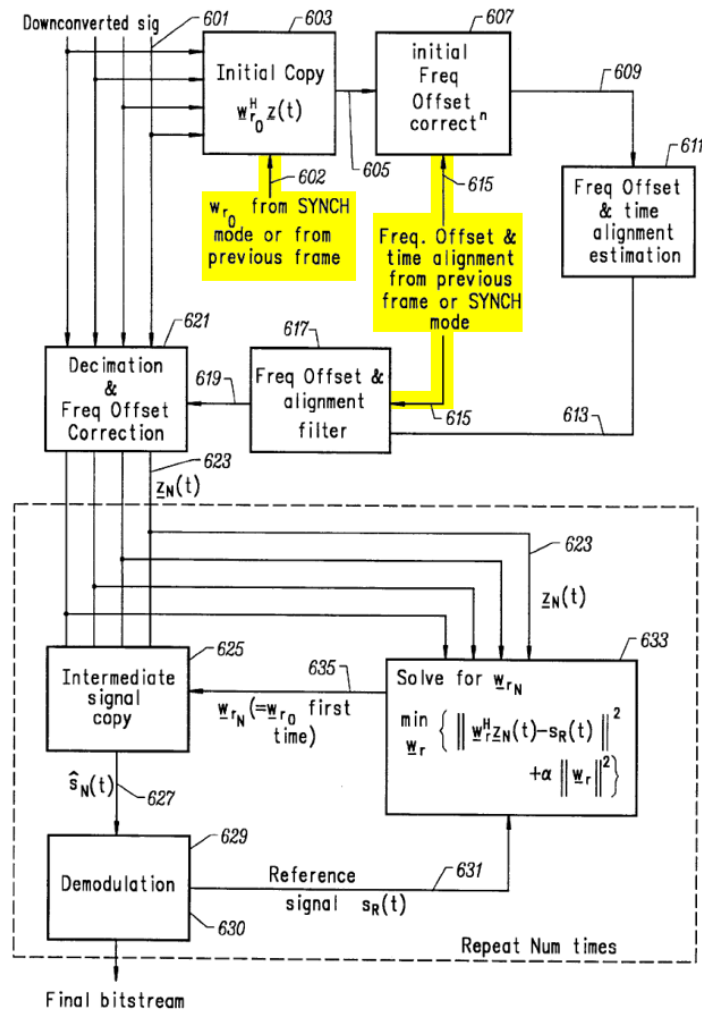


FIG. 6

D. U.S. Patent No. 5,592,490 (“Barratt ’490”)

60. Barratt ’490 is titled “Spectrally Efficient High Capacity Wireless Communication Systems.” I have been informed that I should assume Barratt ’490 was filed on January 20, 1995 and issued on January 7, 1997. I have also been informed that Barratt ’490 qualifies as prior art under at least Pre-AIA 35 U.S.C.

§§102(b) and (e). Ex. 1008. I understand Barratt '490 was not cited and was not considered during prosecution.

61. Barratt '490 describes a wireless system comprising a network of base stations for receiving uplink signals transmitted from a plurality of remote terminals and for transmitting downlink signals to the plurality of remote terminals. *Id.* at Abstract. This system shares many of the same characteristics and features of the systems disclosed in Barratt '470. The wireless system of Barratt '490 uses a plurality of conventional channels, including antenna elements, at each base station for receiving uplink signals and for transmitting downlink signals. *Id.* Barratt '490 also discloses a signal processor at each base station connected to the receiving and transmitting antenna elements for determining spatial signatures and multiplexing/demultiplexing functions for each remote terminal antenna. *Id.* Additionally, the system of Barratt '490 contains a multiple base station controller for optimizing network performance. *Id.*

62. Like Barratt '470, Barratt '490 discloses maintaining parameter values at a base station to facilitate receive operations performed on subsequent bursts from the same subscriber station. *Id.* at 2:64-3:67. For example, in addition to “maintain[ing] an active remote terminal list 34 that catalogs which remote terminals are currently using each conventional communication channel as well as their

current transmit power levels,” Barratt ’490 also notes that “[o]ther parameters of the remote terminals ... are stored as well.” *Id.* at 12:49-60 (emphasis added).

E. Personal Handy Phone System Standard (“PHS”), ARIB Standard, Version 2 (RCR STD-28)

63. PHS was published on December 26, 1995. I have also been informed that PHS qualifies as prior art under at least pre-AIA U.S.C. §102(a). Ex. 1009. I understand PHS was not cited and was not considered during prosecution. PHS was publicly available and easily accessible to a POSITA as of at least July 3, 1997, when it was publicly available in the Engineering Library at Stanford University. Ex. 1010, ¶¶19-21.

64. PHS, as cited in Barratt ’470, describes an 8 slot time division multiple access (TDMA) communication system with time division duplexing (TDD), where each “frame” comprises 8 timeslots that are divided into 4 transmit (i.e., “downlink”) timeslots and 4 receive (i.e., “uplink”) timeslots. Ex. 1007, 7:58-8:22. As explained in Barratt ’470, any particular remote terminal and a base station communicate in “bursts” sent in timeslots that are a frame apart. *Id.*

VIII. THE PRIOR ART ANTICIPATES AND/OR RENDERS OBVIOUS THE CLAIMS OF THE ’477 PATENT

A. Ground 1: Genossar Anticipates Claims 1, 3-5, 8-9, 13, 15-17, and 19-20 of the ’477 Patent

65. Genossar anticipates claims 1, 3-5, 8-9, 13, 15-17, and 19-20 of the ’477 Patent.

- i. ***Claim 1, [1.pre]: Profile-creating apparatus for creating at least a first profile associated with transmission upon at least a first channel of at least a first burst-data signal transmitted in bursts to a receiving station, said profile-creating apparatus comprising:***

66. To the extent the preamble is limiting, Genossar discloses Claim [1.pre]. Genossar discloses “a system for communication between a base station and at least one terminal station, [where] the base station receiv[es] a plurality of sequentially transmitted *bursts from the at least one terminal station according to a TDMA (time division multiple access) protocol.*” Ex. 1005, 2:43-50 (emphasis added). Thus, Genossar discloses transmission of at least a “first burst-data signal” to a receiving station (i.e., base station) upon at least a “first channel” (e.g., TDMA time slot). *Id.*

67. Genossar discloses a fixed system containing a base station (i.e., “receiving station” as disclosed in the claim) and multiple terminal stations where transmissions upstream, from the terminal stations to the base station, are often transmitted in signal bursts. *Id.* at 2:17-29. In such systems, various values calculated during the signal processing, such as equalizer coefficients, change relatively slowly between consecutive bursts, though they are still time variant. *Id.*

68. The '477 Patent defines “profile” as including any “values pertinent to the implementation of the communication system.” Ex. 1001, 6:42-45. This includes values “required by the demodulators . . . to demodulate bursts” received at the base station. Ex. 1005 at 6:10-18. As discussed above, Genossar discloses “storing certain

. . . parameters between transmissions . . . such as the equalizer coefficients . . . to increase the efficiency of [processing bursts received at the base station].” *Id.* at 2:32-39.

69. Genossar teaches that the values obtained from the calculation of equalizer coefficients from a previous burst transmission (i.e., a “first burst-data signal transmitted in bursts”) can be used as the basis for the calculation for a subsequent consecutive burst from the same terminal station, rather than starting from a random or otherwise unrelated value. *Id.* This process is carried out by a base station modem 18 (i.e., profile-creating apparatus), as shown in Figures 1-2, that “determin[es] each set of coefficients by processing” the signal. *Id.* at 2:66-3:9, 11:28-42, Fig 1, Fig. 2. In this way, Genossar discloses essentially “a profile-creating apparatus for creating at least a first profile associated with transmission upon at least a first channel” because it teaches an equalizer controller that stores information, or characteristics, associated with a channel for future use (i.e., a “profile”), as disclosed in Claim [1.pre]. *Id.*; see also Ex. 1011, 2-8.

ii. Claim 1, [1.A]: a profile parameter determiner coupled to receive an indication of an initial burst of the first burst data signal transmitted upon the first channel to the receiving station,

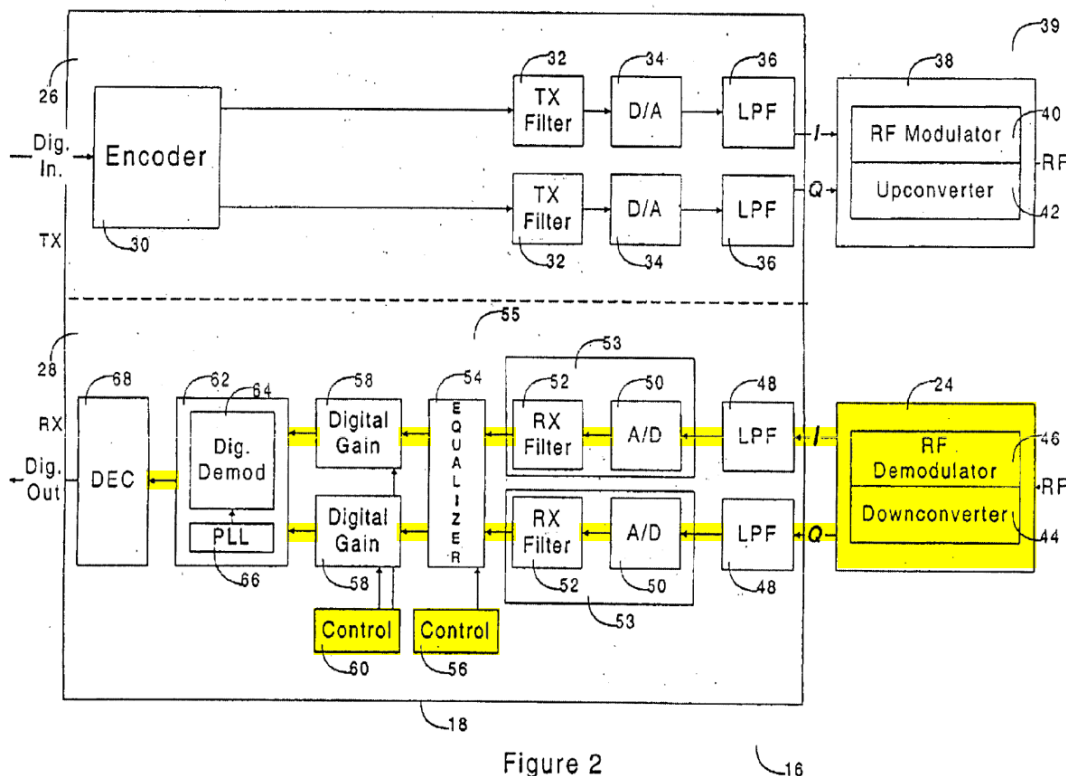
70. Genossar discloses Claim [1.A]. Genossar describes a system wherein the base station receives a “plurality of sequentially transmitted *bursts*” from a terminal station according to a time division multiple access (TDMA) protocol. Ex.

1005, 2:43-3:9. Genossar further discloses that each burst features a synchronization portion and that each of the sequentially transmitted bursts is denoted “ S_i ”, where “ i ” is an integer. *Id.* Genossar teaches that the plurality of sequentially transmitted bursts includes “at least a burst S_m and a burst S_n ” sent from a terminal station, where “ m ” and “ n ” are each integers, and “ m ’s” value is less than “ n ’s” value. *Id.*

71. Additionally, Genossar discloses that its system comprises a base station containing a “receiver unit for receiving the plurality of bursts S_i , including at least the burst S_m and the burst S_n ,” an equalizer for “equalizing each sampled digital signal according to each of a plurality of sets of equalizer coefficients,” and an equalizer controller for “determining each set of coefficients by processing a portion of an equalized signal corresponding to the synchronization portion of a burst S_i according to an initialized coefficient adjustment procedure.” *Id.* In particular, Genossar teaches that the “[b]ase station modem 18 has two portions: a transmit portion 26 and a receive portion 28.” Ex. 1005, 9:66-67. Annotated Figure 2 (reproduced below) illustrates that the receive portion 28 (i.e., “profile parameter determiner”) is coupled to receive “I” and “Q” signal components for each upstream burst received by the radio-frequency receiver unit 24. *Id.* at 10:33-54. Thus, Genossar discloses a base station 12 (i.e., “receiving station”) that includes a receive portion 28 (i.e., “profile parameter determiner”) coupled to receive an indication of

an initial burst (e.g., “burst S_m ”) of a first burst data signal transmitted by a terminal station.

Ex. 1005, Figure 2 (annotated)



72. In addition, Genossar further discloses that the receive portion 28 (i.e., “profile parameter determiner”) determines and stores certain parameter values (e.g., equalizer coefficients) for the signals received from each terminal station. Ex. 1005,11:27-43. For example, Genossar teaches that equalizer controller 56, which forms part of the receive portion 28 (as shown in Figure 2), “stores the values for the equalizer coefficients and then reuses these values as an initial estimate when a new signal is received” from the same terminal station. *Id.*

73. Thus, Genossar discloses Claim [1.A]. See also Ex. 1011, 8-16.

- iii. ***Claim 1, [1.B]: said profile parameter determiner for determining a value of at least one signal-related parameter and at least one channel-related parameter, wherein the signal related and channel-related parameters are collectively representative of communication of the first burst data signal over the first channel to the receiving station; and***

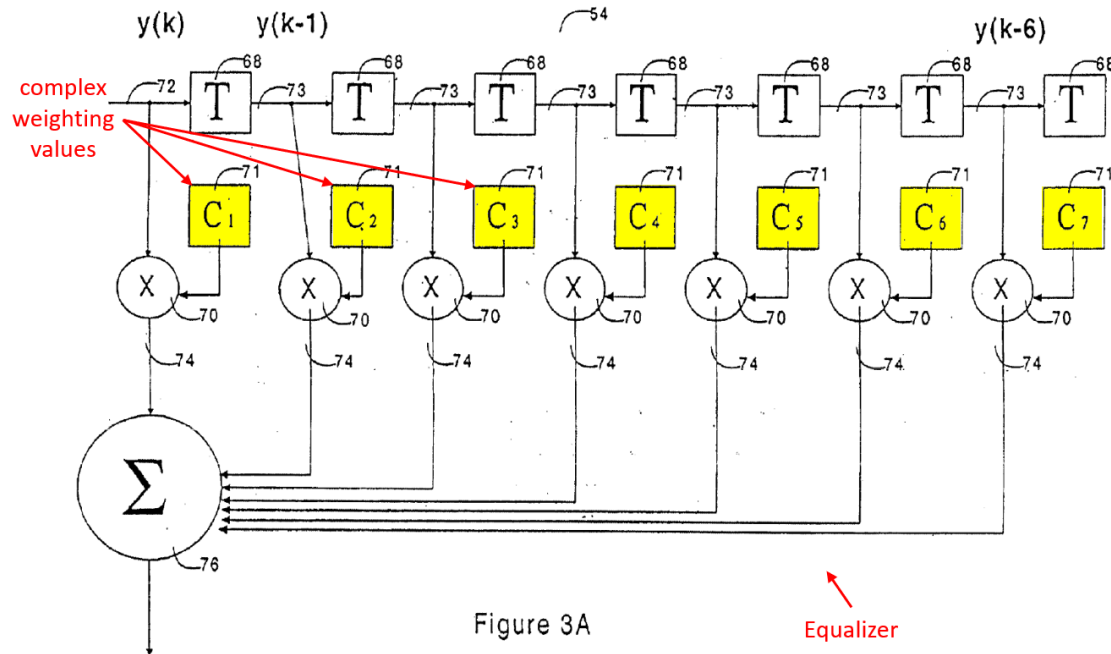
74. Genossar discloses Claim [1.B]. The '477 Patent states that “signal-related parameters” can include, for instance, “the amount of forward error correction (FEC) of the burst, *change in frequency of the burst*, changes in time of the burst,” etc. Ex. 1001, 11:56-63. As discussed above, Genossar discloses that the receive portion 28 (i.e., “profile parameter determiner”) determines and stores certain parameters for each terminal station. Ex. 1005, 2:43-3:9, 10:33-54. This includes, for instance, “*the carrier frequency offset*” parameter, which reflects a change in frequency of the burst as received at the base station. *Id.* at 2:17-39, 11:22-65. For example, Genossar explains that “[t]he frequencies by which the signal is modulated, upconverted, downconverted and demodulated will have some deviation from their ideal values. The sum of all these *deviations* is *the carrier frequency offset*.” Ex. 1005, 17:44-47.

75. The '477 Patent further states that “channel-related parameters” can include, for instance, “values of *equalization weighting*, antenna parameters,” etc. *Id.* Genossar teaches that the equalizer controller processes the burst data signals to determine the “*equalizer coefficients*,” which are a type of channel-related parameter because they comprise complex weighting values to be used by the equalizer during

equalization operations, as illustrated in annotated Figure 3A (reproduced below).

Id.; *Id.* at 12:19-67.

Ex. 1005, Figure 3A (annotated)



76. Because together these two categories of parameters comprise characteristics related to the burst signal and the channel, the parameters collectively represent a communication of the first burst data signal over the first channel to the receiving station. *Id.* Thus, Genossar discloses determining a value of at least one signal-related parameter (e.g., “carrier frequency offset”) and at least one channel-related parameter (e.g., “equalizer coefficients”), which are collectively representative of communication over the channel between the base station and the at least one terminal station. *See also* Ex. 1011, 16-20.

- iv. ***Claim 1, [1.C]: a profile parameter storage device coupled to said profile parameter determiner, said profile parameter storage device for storing values representative of the at least one signal-related parameter and the at least one channel-related parameter determined by said profile parameter determiner,***

77. Genossar discloses Claim [1.C]. Genossar teaches that each of the parameter values discussed in the preceding claim limitation—specifically, the values representing the signal-related parameters and channel-related parameters, as defined above—are “*stored* for each terminal station 14 separately, and then reused when that terminal station 14 is transmitting again.” Ex. 1005, 11:22-65. Genossar expressly teaches that these determined parameter values can be stored on the “stored memory” (i.e., profile parameter storage device) of the base station. *Id.* at 13:37-45, 18:41-67. Genossar further teaches that these values are transferred from the equalizer controller to the stored memory. *Id.* at 14:34-35. Thus, Genossar discloses Claim [1.C]. *See also* Ex. 1011, 20-21.

- v. ***Claim 1, [1.D]: the values stored at said profile parameter storage device to be used to facilitate receive operations performed at the receiving station on subsequent bursts of the first burst data signal.***

78. Genossar discloses Claim [1.D]. Genossar teaches that the determined parameter values including “the equalizer coefficients can be stored for each terminal station 14 separately, *and then reused when that terminal station 14 is transmitting again*” which allows the components of the base station to begin processing the received signals “at a point which is much closer to convergence than

simply starting at any arbitrary value.” Ex. 1005, 11:22-65; *see also, e.g.*, Abstract, 2:17-39, 8:44-52, 12:56-13:45, 16:26-52, 17:5-21. Thus, Genossar discloses that the values stored in the “profile parameter storage device” are used to facilitate receive operations performed at the base station on subsequent bursts sent from the same terminal station. *Id.*; *see also* Ex. 1011, 22.

vi. Claim 3: The apparatus of claim 1 wherein the channel-related parameter is representative of a channel condition of the first channel.

79. Genossar discloses Claim 3. As discussed above in the analysis of Claim 1, the '477 Patent states that “channel-related parameters” can include, for instance, “values of *equalization weighting*, antenna parameters,” etc. Ex. 1001, 11:56-63. These values indicate conditions of the transmission channel. Further, Genossar teaches that the equalizer controller processes the burst data signals to determine the “equalizer coefficients,” which are a type of channel-related parameter because one such equalizer coefficient includes the values of equalization weighting. *Id.*; *Id.* at 12:56-67. For example, Genossar teaches that “[s]ince the channel response is typically time variant for wireless communication, equalizers are usually adaptive, such that *the equalizer coefficients* are varied over time to be able to *track the changes in the channel response*.” *Id.* at 1:63-66. Thus, the apparatus discussed in Claim 1 processes a “channel-related parameter” that is representative of a channel condition of the first channel. Genossar discloses at least one channel-

related parameter (e.g., “equalizer coefficients”) which is representative of a channel condition (e.g., “channel response”) of the first channel; see also Ex. 1011, 24-25.

vii. Claim 4: The apparatus of claim 3 wherein the channel-related parameter determined by said profile parameter determiner comprises a value representative of fading exhibited upon the first channel.

80. Genossar discloses Claim 4. As discussed above in the analysis of Claims 1 and 3, Genossar teaches a “profile creating apparatus” comprised of a receive portion 28 that process burst data signals in order to determine channel-related parameters, such as “equalizer coefficients.” As the ’477 Patent states, “channel-related parameters” can include “values of *equalization weighting*, antenna parameters,” etc. Ex. 1001, 11:56-63. Genossar further teaches that “the equalizer coefficients are varied over time to be able to track the changes in the channel response,” which will include changes in fading. Ex. 1005, 1:63-66. Additionally, Genossar teaches that “[a]lthough *slow flat fading* could be compensated for by the *analog gain* control, *digital gains* 58 [shown in Figure 2] have the advantage of being able to rapidly and precisely adjust the gain of the digital signal in order to overcome *rapid fading*.” *Id.* at Thus, the apparatus disclosed by Genossar and discussed in Claim 3 determines a channel-related parameter (e.g., “equalizer coefficients”) comprising a value representative of fading exhibited on the first channel between the base station and at least one terminal station. See also Ex. 1011, 25.

- viii. Claim 5: The apparatus of claim 4 wherein the receiving station comprises an equalizer for performing equalization operations when the at least the first burst data signal and wherein the value representative of fading exhibited when the first channel comprises an equalizer weighting value to be used by the equalizer during the equalization operations.**

81. Genossar discloses Claim 5. As discussed above in Claim 1, the base station of Genossar (i.e., the “receiving station”) contains an equalizer for performing equalization operations on received bursts: “the equalizer “equaliz[es] each sampled digital signal according to each of a plurality of sets of equalizer coefficients to produce an equalized signal.” Ex. 1005, 10:63-11:42. In addition, as discussed in Claims 1 and 4, Genossar discloses determining “equalizer coefficients,” which comprise equalizer weighting values to be used by the equalizer during the equalization operations, as further illustrated in Figure 3A. *Id.* at 12:19-33.

Ex. 1005, Figure 2 (annotated)

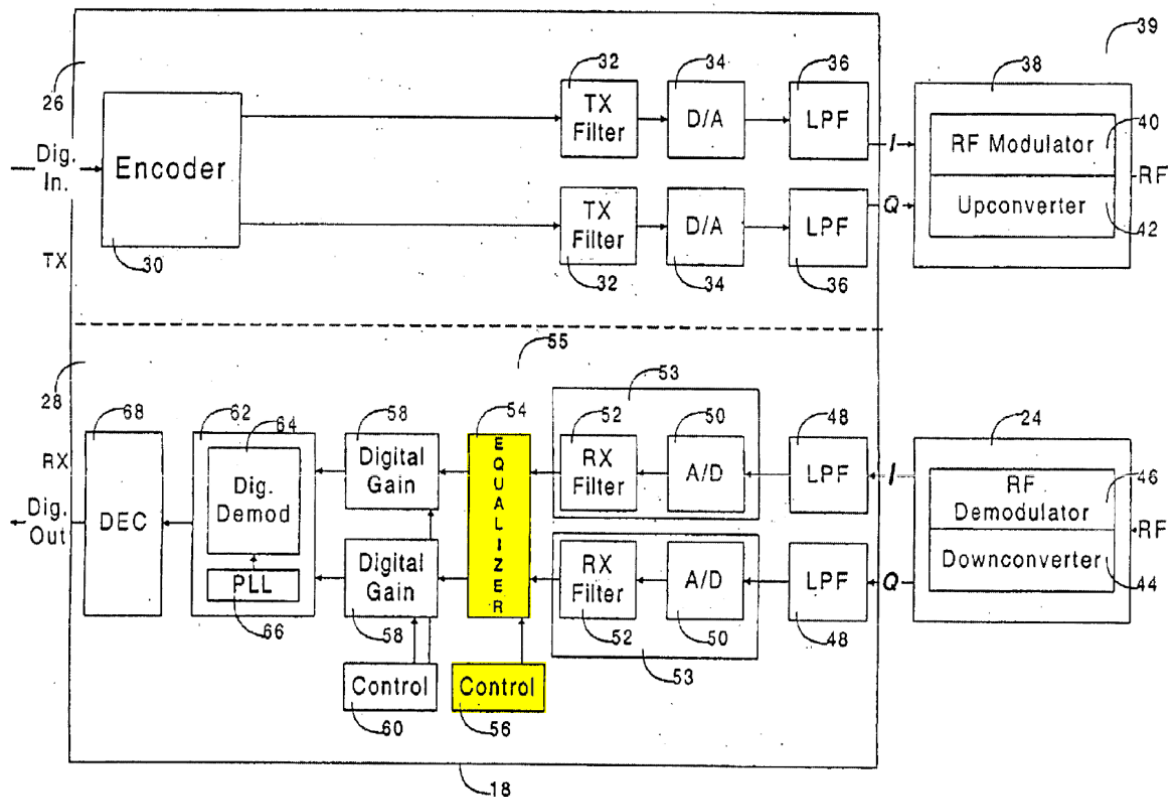


Figure 2

82. Additionally, as discussed in the analysis of Claims 3 and 4, the '477 Patent states that "channel-related parameters" include "values of equalization weighting" and such values are types of "equalizer coefficients," as disclosed in Genossar. *Id.* at 12:56-67; Ex. 1001, 11:56-63. Thus, since the equalizer of Genossar performs equalization operations according to sets of equalizer coefficients, which contain equalizer weighting values representative of fading exhibited on the channel, Genossar discloses Claim 5. *Id.*; see also Ex. 1011, 26.

- ix. ***Claim 8: The apparatus of claim 1 wherein the signal-related parameter is representative of a signal characteristic of the first burst data signal transmitted over the first channel.***

83. Genossar discloses Claim 8. As discussed above in the analysis of Claim 1, the '477 Patent states that “signal-related parameters” include “change[s] in frequency” of the burst data signal. Ex. 1001, 11:56-67. As discussed above in Claim [1.B], Genossar discloses determining “*the carrier frequency offset*” for each terminal station, which is representative of a *signal characteristic* of the first burst data signal. Ex. 1005, 2:17-39, 11:22-65. For example, as discussed above, Genossar explains that “[t]he frequencies by which the signal is modulated, upconverted, downconverted and demodulated will have some deviation from their ideal values. The sum of all these deviations is *the carrier frequency offset*.” *Id.* at 17:44-47. Thus, Genossar discloses Claim 8. *See also* Ex. 1011, 44.

- x. ***Claim 9: The apparatus of claim 8 wherein the signal-related parameter determined by said profile parameter determiner comprises a value representative of a frequency characteristic of the first burst data signal.***

84. Genossar discloses Claim 9. As discussed previously in the analysis of Claim 1 and again in the analysis of Claim 8, Genossar teaches that certain parameters determined during the processing of burst signals by the equalizer controller include the “*carrier frequency offset*.” Genossar discloses determining “*the carrier frequency offset*” for each terminal station, which is representative of a *frequency characteristic* of the first burst data signal. Ex. 1005, 2:17-39, 11:22-65.

Thus, because Genossar discloses a “profile parameter determiner” that determines a “signal-related parameter” representative of a “frequency characteristic” of an initial burst data signal, Genossar discloses Claim 9. *See also* Ex. 1011, 44-45.

- xi. Claim 13: The apparatus of claim 1 wherein said profile parameter determiner is further coupled to receive an indication of at least one additional burst of the first burst data signal, said profile parameter determiner further for determining an updated value of the at least one parameter responsive to the at least one additional burst of the first burst signal.***

85. Genossar discloses Claim 13. As discussed above in Claim 1, Genossar discloses a base station (i.e., receiving station) comprised of a receive portion 28 (i.e., “profile parameter determiner”) coupled to receive “a plurality of sequentially transmitted bursts” from a terminal station, where the “*plurality*” of transmitted bursts includes an initial burst and at least one *additional* burst. Ex. 1005, 5:20-45. Genossar further teaches that, after the plurality of bursts is received by the receiver unit, the receive portion 28 determines an adapted (i.e., “*updated*”) value of at least one parameter value (e.g., “equalizer coefficients”). *Id.* at 12:56-67. Genossar discloses determining parameter values including, for instance, “equalizer coefficients.” Ex. 1005, 2:17-3:9. For example, Genossar teaches that the equalizer coefficients are “adapted once every burst,” where the “values from a previous burst are used as the basis for the adaptation.” *Id.* Genossar teaches “using the values obtained from the calculation of equalizer coefficients for a *previous burst* transmission as the basis for the calculation for a *subsequent consecutive burst* from

the same terminal station,” i.e., for determining and updated value *Id.* Thus, Genossar discloses equalizer controllers that utilize “at least one additional burst” for “determining an updated value” of a parameter as discussed in Claim 13. Ex. 1011, 53-54.

- xii. ***Claim 15: The apparatus of claim 1 wherein at least the first burst data signal transmitted upon the at least the first channel comprises a plurality of burst data signals transmitted upon a plurality of channels and wherein said profile parameter determiner determines a value of a plurality of parameters representative of communication of the plurality of burst data signals and each of the plurality of channels.***

86. Genossar discloses Claim 15. As discussed above in the analysis of Claim 1, Genossar discloses a wireless communication system where a plurality of terminal stations 14 can communicate with a single base station 12 by using a time division multiple access (TDMA) protocol, as illustrated in Figure 1. Ex. 1005, 1:14-51. The various paths from each of the terminal stations 14 to the base station 12 comprise a plurality of channels upon which a plurality of burst-data signals is sent. *Id.* Genossar discloses that each “channel” corresponds to an uplink, or upstream, transmission path between each terminal station and each base station (i.e., receiving station). *Id.* at 2:17-29.

87. Additionally, Genossar discloses that the receive portion 28 of the base station determines acts as the claimed “profile parameter determiner,” processing the burst data signal in order to determine a variety of parameters and characteristics associated with the transmission signal and channel. *Id.* Genossar discloses

determining parameter values for each such terminal station including at least one signal-related parameter (*e.g.*, “carrier frequency offset”) and at least one channel-related parameter (*e.g.*, “equalizer coefficients”), which are collectively representative of communication over the channel between the base station and the terminal station. *Id.* at 2:17-3:9. Further, Genossar teaches that each of the signal-related parameters and channel-related parameters are “stored separately” for each terminal channel station for reuse on the terminal station’s next transmission. *Id.* at 11:22-42. Thus, Genossar discloses a base station receive portion 28 (*i.e.*, “profile parameter determiner”) that determines a value of a plurality of parameters representative of communication of the plurality of burst data signals and each of the plurality of channels. Genossar therefore discloses determining a value of a plurality of parameters representative of communication of the plurality of burst data signals and each of the plurality of channels between the base station 12 and the plurality of terminal stations 14. *See also* Ex. 1011, 55-59.

xiii. Claim 16, [16.pre]: A method for creating at least a first profile associated with transmission upon at least a first channel of at least a first burst data signal in bursts to a receiving station, said method comprising:

88. Genossar discloses Claim [16.pre]. As discussed above in the analysis of Claim [1.pre], Genossar discloses “a system for communication between a base station and at least one terminal station, [where] the base station receiv[es] a plurality of sequentially transmitted *bursts from the at least one terminal station according to*

a TDMA (time division multiple access) protocol.” Ex. 1005, 2:43-50 (emphasis added). Thus, Genossar discloses transmission of at least a “first burst-data signal” to a receiving station (i.e., base station) upon at least a “first channel” (e.g., TDMA time slot).

89. Additionally, Genossar discloses a method of “processing [] a received signal by storing the carrier frequency offset and equalizer taps between [the] processing of burst transmission” at a base station (i.e., receiving station). Ex. 1005, 1:8-13. The ’477 Patent defines “profile” as including any “values pertinent to the implementation of the communication system.” Ex. 1001, 6:42-45. This includes values “required by the demodulators . . . to demodulate bursts” received at the base station. *Id.* at 6:10-18. These values determined through processing the burst signal account for characteristics associated with the signal and associated transmission channel. Ex. 1005, 1:8-13. Further, Genossar teaches that the values obtained from a previous burst transmission (i.e., a “first burst data signal”) can be used as the basis for processing subsequent consecutive bursts from the same terminal station (i.e., bursts transmitted on the same channel). *Id.* at 2:17-29. This process is carried out by a base station modem 18 (i.e., profile-creating apparatus), as shown in Figures 1-2, that “determin[es] each set of coefficients by processing” the signal. *Id.* at 2:66-3:9, 11:28-42. Thus, Genossar discloses a method for creating a “profile” associated

with a transmission from a specific channel for future use (i.e., a “profile”), as disclosed in Claim [16.pre].

- xiv. Claim 16, [16.A]: responsive to reception at the receiving station of an initial burst of the first burst data signal transmitted upon the first channel, determining a value of at least one signal-related parameter and at least one channel-related parameter, wherein the signal-related and channel related parameters are collectively representative of communication of the first burst data signal over the first channel to the receiving station;**

90. Genossar discloses Claim [16.A]. As articulated above in the discussion of Claim 1, Genossar describes a system wherein the base station receives a “plurality of sequentially transmitted *bursts*” from a terminal station according to a time division multiple access (TDMA) protocol. Ex. 1005, 2:43-3:9. Genossar further discloses that each burst features a synchronization portion and that each of the sequentially transmitted bursts is denoted “ S_i ”, where “ i ” is an integer. *Id.* Genossar teaches that the plurality of sequentially transmitted bursts includes “at least a burst S_m and a burst S_n ” sent from a terminal station, where “ m ” and “ n ” are each integers, and “ m ’s” value is less than “ n ’s” value. *Id.*

91. Additionally, Genossar discloses that its system comprises a base station containing a “receiver unit for receiving the plurality of bursts S_i , including at least the burst S_m and the burst S_n ,” an equalizer for “equalizing each sampled digital signal according to each of a plurality of sets of equalizer coefficients,” and an equalizer controller for “determining each set of coefficients by processing a

portion of an equalized signal corresponding to the synchronization portion of a burst S_i according to an initialized coefficient adjustment procedure.” *Id.* In particular, Genossar teaches that the “[b]ase station modem 18 has two portions: a transmit portion 26 and a receive portion 28.” Ex. 1005, 9:66-67. Annotated Figure 2 (reproduced below) illustrates that the receive portion 28 (i.e., “profile parameter determiner”) is coupled to receive “I” and “Q” signal components for each upstream burst received by the radio-frequency receiver unit 24. *Id.* at 10:33-54. Thus, Genossar discloses a base station 12 (i.e., “receiving station”) that includes a receive portion 28 (i.e., “profile parameter determiner”) coupled to receive an indication of an initial burst (*e.g.*, “burst S_m ”) of a first burst data signal transmitted by a terminal station.

Ex. 1005, Figure 2 (annotated)

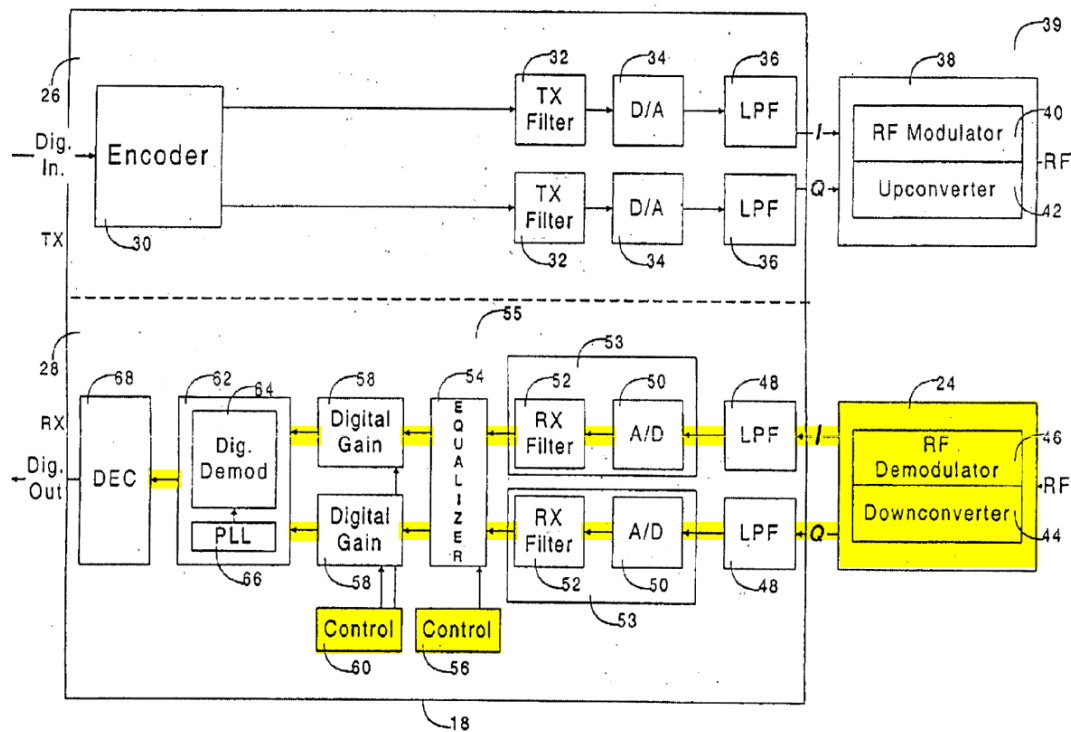


Figure 2

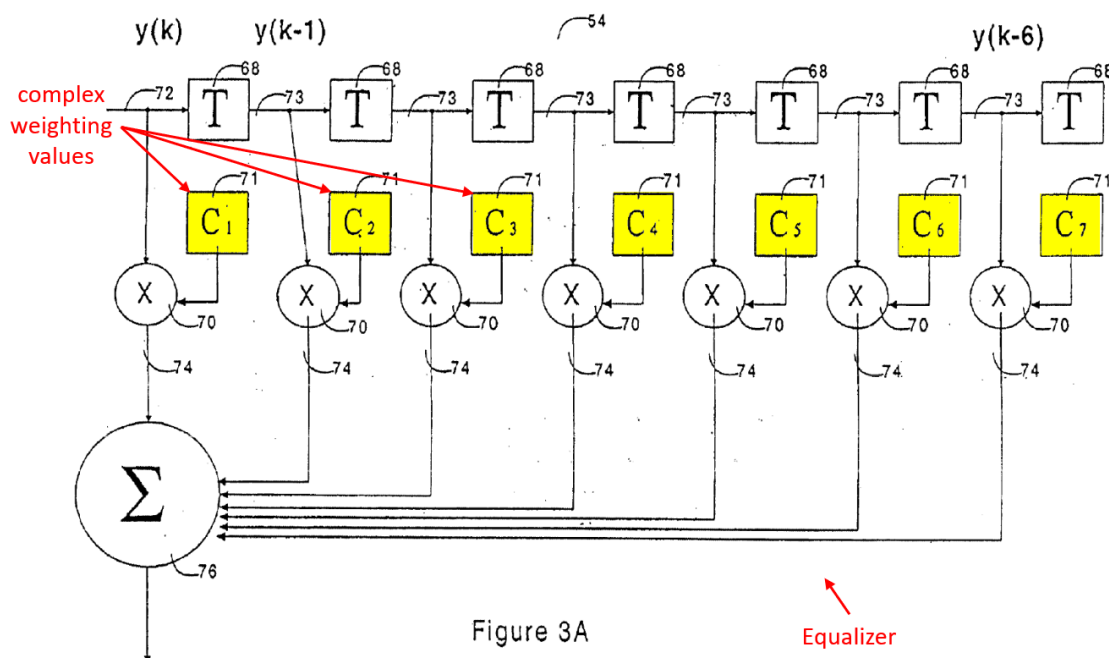
92. In addition, Genossar further discloses that the receive portion 28 (i.e., “profile parameter determiner”) determines and stores certain parameter values (*e.g.*, equalizer coefficients) for the signals received from each terminal station. Ex. 1005,11:27-43. For example, Genossar teaches that equalizer controller 56, which forms part of the receive portion 28 (as shown in Figure 2), “stores the values for the equalizer coefficients and then reuses these values as an initial estimate when a new signal is received” from the same terminal station. *Id.*

93. The parameter values include, for instance, “the carrier frequency offset” parameter, which reflects a change in frequency of the burst as received at the base station. *Id.* at 2:17-39, 11:22-65. For example, Genossar explains that “[t]he

frequencies by which the signal is modulated, upconverted, downconverted and demodulated will have some deviation from their ideal values. The sum of all these deviations is the carrier frequency offset.” Ex. 1005, 17:44-47.

94. The '477 Patent further states that “channel-related parameters” can include, for instance, “values of *equalization weighting*, antenna parameters,” etc. *Id.* Genossar teaches that the equalizer controller processes the burst data signals to determine the “*equalizer coefficients*,” which are a type of channel-related parameter because they comprise complex weighting values to be used by the equalizer during equalization operations, as illustrated in annotated Figure 3A (reproduced below). *Id.*; *Id.* at 12:19-67.

Ex. 1005, Figure 3A (annotated)



95. Because together these two categories of parameters comprise characteristics related to the burst signal and the channel, the parameters collectively represent a communication of the first burst data signal over the first channel to the receiving station. *Id.* Thus, Genossar discloses determining a value of at least one signal-related parameter (*e.g.*, “*carrier frequency offset*”) and at least one channel-related parameter (*e.g.*, “*equalizer coefficients*”), which are collectively representative of communication over the channel between the base station and the at least one terminal station.

- xv. ***Claim 16, [16.B]: storing values representative of the at least one signal-related parameter and the at least one channel-related parameter determined during said operation of determining; and***

96. Genossar discloses Claim [16.B]. As discussed above in the analysis of Claim 1, Genossar teaches that the parameter values comprising characteristics associated with a burst signal and its corresponding channel are stored at the base station on a “stored memory.” Ex. 1005, 11:22-42, 18:41-67. These values include representations of signal-related parameters and channel-related parameters, as discussed above in Claim [16.A]. *Id.* Thus, Genossar discloses storing values representative of at least one signal-related parameter and at least one channel-related parameter.

- xvi. Claim 16, [16.C]: using the values stored during said operation of storing to facilitate receive operations performed at the receiving station upon at least one subsequent burst of the first burst data signal.**

97. Genossar discloses Claim [16.C]. As discussed previously in Claim 1, Genossar teaches the reception and processing of signals at the base station, i.e., receiving station. Further, Genossar teaches that these stored values, as taught above in Claim [16.B], can be “reused when [the] terminal station [] is transmitting again,” which allows the components of the base station to begin processing the received signals “at a point which is much closer to convergence than simply starting at any arbitrary value.” Ex. 1005, 11:22-65. Thus, Genossar discloses using the values stored to facilitate receive operations performed at the receiving station upon at least one subsequent burst of the first data signal. *Id.*

- xvii. Claim 17: The method of claim 16 further comprising the operations of: detecting, at the receiving station, the at least one subsequent burst of the first burst data signal; responsive to detecting the at least one subsequent burst, updating the previously-determined value(s) of one or both of the at least one signal-related parameter and the at least one channel-related parameter.**

98. Genossar discloses Claim 17. As discussed above in the analysis of Claim 16, Genossar discloses that the base station (i.e., receiving station) detects a plurality of burst denoted as S_i , where “i” is an integer. Ex. 1005, 2:43-3:9. Genossar teaches that the plurality of sequentially transmitted bursts includes “at least a burst S_m and a burst S_n ” sent from a terminal station, where “m” and “n” are each integers,

and “m’s” value is less than “n’s” value. *Id.* Thus, Genossar teaches detecting at least one subsequent burst of the first burst data signal. *Id.*

99. Additionally, Genossar teaches that, upon receiving the plurality of sequential bursts at the receiver unit of the base station, the equalizer controller operates according to an “initialized coefficient adjustment procedure” to process the burst data signal. *Id.* Further, Genossar teaches that the “adjustments” are made recursively in an attempt to converge the coefficients to the optimal values. Ex. 1005, 11:7-42. Thus, Genossar discloses updating the previously-determined value(s) of one or both of at least one signal-related parameter and at least one channel-related parameter.

xviii. Claim 19: The method of claim 16 wherein the at least channel-related parameter comprises one or more of equalization weighting and antenna parameters.

100. Genossar discloses Claim 19. As discussed previously in Claim 5, Genossar teaches processing a signal received at a base station (i.e., receiving station”) to determine a plurality of equalizer coefficients. Ex. 1005, 2:43-3:9. Further, as discussed previously, the ’477 Patent states that “channel-related parameters” include “values of equalization weighting.” Ex. 1001, 11:56-63. A POSITA would have understood that values of equalization weighting are types of equalizer coefficients as disclosed in Genossar. *Id.*; Ex. 1005, 12:56-67. Thus, Genossar discloses Claim 19.

- xix. Claim 20: The method of claim 16 wherein the at least signal-related parameter comprises one or more of forward error correction (FEC) amount, frequency change, burst time change, and burst power level change.**

101. Genossar discloses Claim 20. As discussed previously in the analysis of Claim 9, Genossar teaches that certain parameters determined during the processing of burst signals at the base station include the “carrier *frequency* offset.” A POSITA would have understood that this value represents a frequency characteristic of the burst data signal because it includes a value associated with the change in frequency of a signal, i.e., the offset of the frequency. These changes in frequency are signal-related parameters, as the ’477 Patent states. Ex. 1001, 11:56-67. Thus, Genossar discloses Claim 20.

B. Ground 2: The combination of Genossar and WiMAX Renders Obvious Claims 2, 10-12, 14, and 18 of the ’477 Patent.

i. Motivation to Combine

102. A POSITA would have been motivated to combine Genossar and WiMAX for the following reasons. Like Genossar, the disclosures taught in WiMAX are directed towards transmissions procedures of data signals in a point-to-multipoint network. Ex. 1006, 6. Specifically, WiMAX discloses specifications for the air interface of a wireless broadband access network, including the physical layer and medium access control layer, of a fixed point-to-multipoint broadband wireless access system. *Id.* at 1.

103. Additionally, a POSITA in the telecommunications industry would have naturally looked to WiMAX, a draft standard for consideration and comment of the 802.16 Working Group, to find information related to data communication and signal transmission in a point-to-multipoint network. Adhering to IEEE standards and their draft documents would have provided interoperability of any developing technology with the rest of the network, as IEEE documents were well known and adopted in the industry. A POSITA would have known that adhering to IEEE standards was beneficial and necessary because it facilitated the integration of a variety of components from developed by different companies with different manufacturers thus making any product or device following the standard more useful and desirable. Indeed, a POSITA would have been motivated to combine the design of a system of processing data signals to determine associated parameters wherein an initial portion of such signals are transmitted during a contention period. A POSITA would have also been motivated to create a system capable of determining and storing values associated with time-shift characteristics in order to improve the speed and efficiency of processing transmissions. Moreover, a POSITA would have been motivated to create a system capable of determining and storing values associated with FEC characteristics and power levels of a transmitted signal in order to better process transmissions.

104. Further, a POSITA would have known that disclosures contained in IEEE standard draft documents were techniques and technologies developed by key innovators and leaders in the industry, thus making such documents crucial to the development of wireless access system technology. Therefore, a POSITA would have consulted WiMAX, and other similar documents, and had a reasonable expectation of success in combining the specifics of air interfaces for fixed broadband wireless access systems as disclosed in WiMAX with the system and method disclosed in Genossar.

- ii. ***Claim 2: The apparatus of claim 1 wherein the receiving station is operable in a communication system in which communication protocols include a contention period and wherein the initial burst of the first burst data signal, responsive to which said profile parameter determiner determines the at least one parameter, is communicated during the contention period.***

105. The combination of Genossar in view of WiMAX discloses Claim 2. As discussed above in Sections VIII.A.i-v., Genossar independently teaches the entirety of Claim 1. Genossar also discloses a fixed system containing a base station (i.e., “receiving station”) and multiple terminal stations (together a “communication system”) where transmissions upstream, from the terminal stations to the base station, can be transmitted as a series of bursts (“ S_i ”) starting, for example, with an initial burst “ S_m .” Ex. 1005, 2:17-29, 2:43-3:9. Genossar discloses an initial burst of a first burst data signal, “ S_m ,” a receiver unit “for receiving the plurality of bursts S_i ,

including at least the burst S_m and the burst S_n ,” and an equalizer controller (i.e., profile parameter determiner) for processing a portion of the signal. *Id.* at 2:43-3:9.

106. Additionally, like Genossar and the '477 Patent, WiMAX discloses a fixed wireless access system containing a base station (“BS”) and multiple subscriber stations (“SSs”) where uplink transmissions (to the base station) are transmitted in bursts. Ex. 1006, 115-116. WiMAX teaches “[t]here are three main classes of . . . messages transmitted by the SSs during the uplink frame,” one of which includes “[t]hose that are transmitted in *contention slots* reserved for station registration.” *Id.* Thus, WiMAX teaches that its communication protocols include a *contention period*, such as the one illustrated in annotated Figure 53 (reproduced below). *Id.*

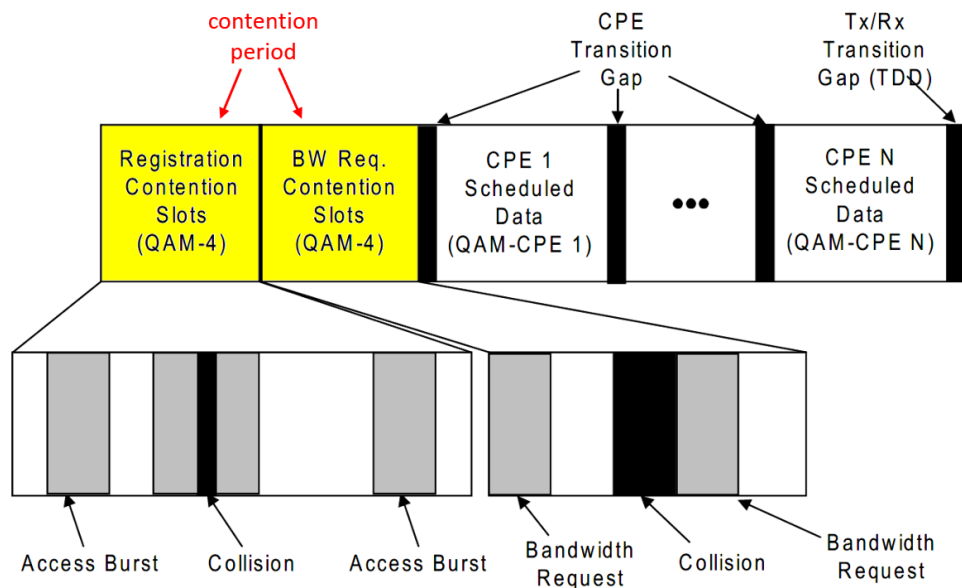
Ex. 1006, Figure 53 (annotated)

Figure 53—Uplink Subframe Structure

107. WiMAX teaches that the contention period is used during registration to perform an “Initial Ranging,” where “Ranging is the process of acquiring the correct timing offset such that the [SS]’s transmissions are aligned” with the base station. Ex. 1006, 141. When performing the Initial Ranging, the SS puts together a “Ranging Request message” and sends it within the contention period. *Id.* In some cases, this may result in a collision as illustrated above. *Id.* However, “[o]nce the BS has successfully received the Ranging Request message, it shall return a Ranging Response message addressed to the individual SS.” *Id.* “The message shall . . . contain information on RF *power level adjustment* and *offset frequency adjustment* as well as any *timing offset corrections*.” *Id.* Thus, like the 477 Patent, WiMAX discloses a fixed wireless system containing a base station that determines parameter

values (*e.g.*, “power level adjustment”) based on an initial burst communicated to the base station during a contention period.

108. A POSITA would have been motivated to combine the system of processing burst data signals to determine certain signal parameters in Genossar with the widely known concept of contention periods, discussed in WiMAX, in order to determine profile parameters associated with data signals from various terminal stations that transmit to the receiving station during a contention period so as to avoid collisions. A POSITA would have been inherently familiar with the basic concept of contention periods in a system wherein multiple transmitting stations are attempting to communicate with a single base station—a very common occurrence in wireless communication systems. A POSITA would have therefore been motivated to design a system of processing data signals to determine associated parameters wherein an initial portion of such signals are transmitted during a contention period when, for instance, a subscriber station has not yet registered with a new network or base station. Thus, the combination of Genossar and WiMAX renders obvious Claim 2. *See also* Ex. 1011, 23-24.

iii. Claim 10: The apparatus of claim 8 wherein the signal-related parameter determined by said profile parameter determiner comprises a value representative of a time-shift characteristic of the first burst data signal.

109. The combination of Genossar and WiMAX discloses Claim 10. As discussed above in Sections VIII.A.i-v. and VIII.A.ix., Genossar independently teaches the entirety of Claim 1 and Claim 8.

110. Further, as discussed above in the analysis of Claim 2, Further, as discussed above in the analysis of Claim 2, WiMAX discloses an Initial Ranging process where the “Ranging Response” message “contain[s] information on . . . *timing offset corrections.*” Ex. 1006, 141. Specifically, WiMAX teaches that the Ranging Response message contains a “*timing adjust information*” parameter indicating to the SS “[t]he time by which to offset frame transmission so that frames arrive [at the BS] at the expected . . . time.” *Id.* at 86. A POSITA would have understood that these timing offset adjustments denote time-shift characteristics because the purpose of ranging is to determine delay in the transmission, caused by distance or other factors affecting transmission, and compensate for said delay by adjusting the time at which subscriber stations transmit data signals upstream to the base station. *Id.* Thus, because a subscriber station uses the offset values to adjust its transmission time, these values comprise a time-shift characteristic of the upstream burst data signal.

111. A POSITA would have been motivated to combine the system of processing burst data signals to determine certain signal parameters in Genossar with the concept of compensating for delay by shifting timing of transmissions, as described in WiMAX, in order to determine parameters of time-shift characteristics associated with a transmitted burst data signal. A POSITA would have been motivated to create a system capable of determining and storing values associated with time-shift characteristics in order to improve the speed and efficiency with which the base station processes subsequent transmissions from the same subscriber stations. *Id.* As noted in Genossar, this can be particularly advantageous for fixed-wireless systems (such as WiMAX) where parameter values may “change relatively slowly between consecutive bursts,” since both the base station and terminals stations are stationary. Ex.1005, 2:17-39. Therefore, using the values obtained for a previous burst as the starting place for a subsequent burst can significantly improve the efficiency of the calculations. *Id.* Thus, the combination of Genossar and WiMAX renders obvious Claim 10. *See also* Ex. 1011, 45-46.

- iv. Claim 11: The apparatus of claim 8 wherein the first burst data signal includes forward error correction (FEC) and wherein the signal-related parameter determined by said profile parameter determiner comprises a value representative of the FEC included in the first burst data signal.***

112. The combination of Genossar and WiMAX discloses Claim 11. As discussed above in Sections VIII.A.i-v. and VIII.A.ix., Genossar independently teaches the entirety of the limitations claimed in Claim 1 and Claim 8.

113. Forward error correction generally refers to the idea of adding redundant information to a message so that the receiver can detect and, in some cases, correct errors that occur during transmission. Genossar discloses the use of such coding. *See* Ex. 1005, 9:66-10:6. For example, Genossar discloses that base station modem 18 (shown in Figure 2) includes an encoder 30 that “adds *redundant bits* to the digital input in order to permit *error correction* of the signal” at the receiving station. *Id.* Genossar notes that “[t]erminal station modem 22 is highly similar to base station modem 18 and is [therefore] not separately shown.” *Id.* at 12:5-6. Thus, a POSITA would have understood that Genossar discloses the use of forward error correction (FEC) and that this would involve the receiving station maintaining parameters related to the FEC, such as the FEC type used.

114. WiMAX teaches that uplink bandwidth allocations to individual SSs are made by sending the SS an Uplink Interval Usage Code (UIUC) which comprises a “Burst Descriptor” that specifies a “list of the Physical-layer attributes” that are to be used by the SS for the uplink transmission. Ex. 1006, 70. WiMAX teaches that the attributes included in each Burst Descriptor include, for instance, “FEC code type” and other FEC related parameters, as illustrated in the below excerpt from Table 9. *Id.* Prior to receiving each uplink transmission, the base station therefore knows in advance the exact FEC code type that was used for that signal and other related parameters. *Id.*

Ex. 1006, Table 9 (annotated)**Table 9—Uplink Physical Layer Burst Profile Parameters**

Name	Type (1 byte)	Length (1 byte)	Value (Variable Length)
Modulation Type	1	1	1 = QPSK, 2 = 16QAM, 3 = 64-QAM
Differential Encoding	2	1	1 = on, 2 = off
Preamble Length	3	2	Up to 1024 bits. The preamble must be an integer number of PSs (a multiple of 2 for QPSK and 4 for 16QAM and 6 for 64QAM)
Preamble Value Offset	4	2	Identifies the bits to be used for the preamble value. This is speci- fied as a starting offset into the Preamble Pattern (see Table 7). That is, a value of zero means that the first bit of the preamble for this burst type is the value of the first bit of the Preamble Pattern. A value of 100 means that the preamble is to use the 101st and succeeding bits from the Preamble Pattern. This value must be a multiple of the symbol size. The first bit of the Preamble Pattern is the firstbit transmitted in the uplink burst.
FEC code type	5	1	1 = Reed-Solomon only 2 = Reed-Solomon + Inner (9,8) Parity Check Code 3 = Reed-Solomon + Inner (24,16) Block Convolutional Code 4 = Block Turbo Code (Optional) 5-255 = Reserved
RS information bytes (K)	6	1	K=6-255
RS error correction capability (T)	7	1	T=0-16

115. Thus, because the system disclosed in Genossar processes an upstream signal in order to determine characteristics associated with a signal (i.e., “signal-related parameters”), and because the FEC code type is a characteristic of the upstream burst signal as disclosed in WiMAX, the combination of Genossar and WiMAX discloses Claim 11.

116. A POSITA would have been motivated to combine the system of processing burst data signals to determine certain signal parameters in Genossar with the characteristics of upstream burst signals, such as values representative of FEC,

as described in WiMAX in order to determine parameters of FEC associated with a transmitted burst data signal. A POSITA would have been motivated to create a system capable of determining and storing values associated with FEC characteristics in order to better process subsequent transmissions. Thus, the combination of Genossar and WiMAX renders obvious Claim 11. *See also* Ex. 1011, 46-52.

- v. ***Claim 12: The apparatus of claim 8 wherein the signal related parameter determined by said profile parameter determiner comprises a value related to power levels of the first burst data signal.***

117. The combination of Genossar and WiMAX discloses Claim 12. As discussed above in Sections VIII.A.i-v. and VIII.A.ix., Genossar independently teaches the entirety of the limitations claimed in Claim 1 and Claim 8.

118. Further, as discussed in the analysis of Claim 2, WiMAX discloses an Initial Ranging process where the “Ranging Response” message “contain[s] information on *RF power level adjustment*.” Ex. 1006, 141. Specifically, WiMAX teaches that the Ranging Response message contains a “*power adjust information*” parameter that “[s]pecifies the relative change in transmission power level that the SS is to make in order that transmissions arrive at the BS at the desired power.” *Id.* at 86.

119. As discussed above in the analysis of Claim 10, WiMAX discloses a ranging process which involves a user or subscriber station transmitting a “ranging

request” back to the base station in order to determine delay and request power and/or modulation adjustment. Ex. 1006, 82-84. The ranging request as disclosed in WiMAX not only determines delay, as discussed above in Claim 10, but also can be used to determine power adjustment, i.e., the adjusted power levels of the transmitted data signal. *Id.* A POSITA would have understood that this “ranging request” contains values, or parameters, related to power levels of the signal because one purpose of the ranging process is to determine, but transmitting a signal upstream to the base station, the appropriate transmitting power level of the signal. *Id.* Thus, because a subscriber station uses the ranging request process to adjust its power level, the processing of the subscriber station’s signal in accordance with the process disclosed in Genossar would include characteristics, or parameters, associated with the power level of the signal transmission.

120. A POSITA would have been motivated to combine the system of processing burst data signals to determine certain signal parameters in Genossar with the process of determining power adjustment levels, as described in WiMAX, in order to determine parameters of power levels associated with a transmitted burst data signal. A POSITA would have been motivated to create a system capable of determining and storing values associated with power levels of a transmitted signal in order to better process subsequent transmissions. Thus, the combination of Genossar and WiMAX renders obvious Claim 12. *See also* Ex. 1011, 52-53.

- vi. ***Claim 14: The apparatus of claim 13 wherein the receiving station is operable in a communication system in which communication protocols include a contention period and wherein the initial burst and the at least one additional burst of the first burst data signal, responsive to which said profile parameter determiner determines the at least one parameter is communicated during the contention period.***

121. The combination of Genossar in view of WiMAX discloses Claim 14.

As discussed above in Sections VIII.A.i-v. and VIII.A.xi., Genossar independently teaches the entirety of Claim 1 and Claim 13.

122. As discussed previously in the analysis of Claim 2, the combination of Genossar and WiMAX discloses a communication system containing a receiving station (or base station) operating according to communication protocols, that include a contention period where an initial Ranging Request message is communicated to the base station during a contention period, as illustrated in annotated Figure 53 (reproduced below). Ex. 1006, 27-28, Figure 53. During further operations, the SS may continue to communicate subsequent bursts during the contention period by which the base station determines parameter values (*e.g.*, RF power level). *Id.*

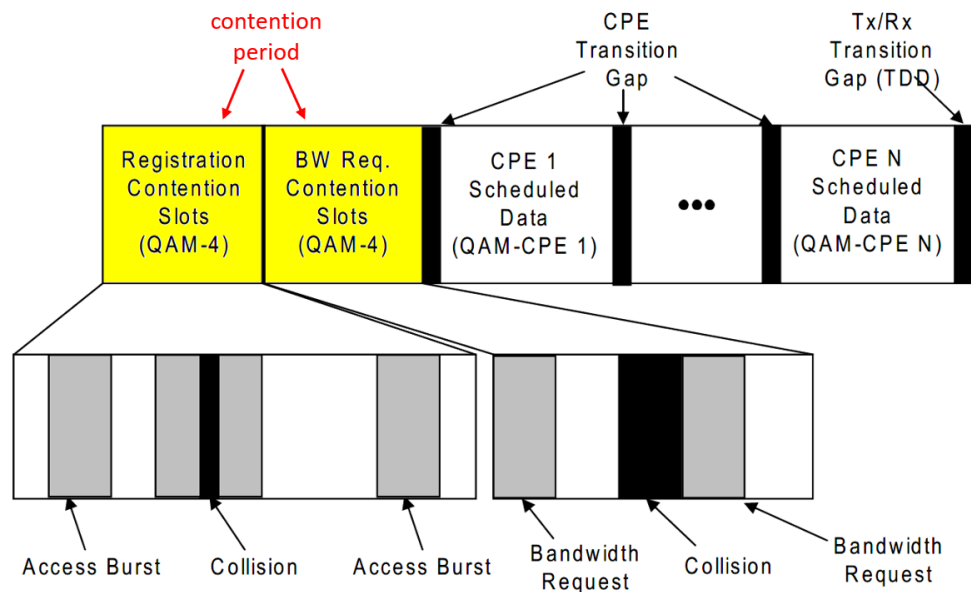
Ex. 1003, Figure 53 (annotated)

Figure 53—Uplink Subframe Structure

123. A POSITA would have been motivated to combine the system of processing burst data signals to determine certain signal parameters in Genossar with the widely known concept of contention periods, discussed in WiMAX, in order to determine profile parameters associated with data signals from various terminal stations that transmit to the receiving station during a contention period. A POSITA would have been inherently familiar with the basic concept of contention periods in a system wherein multiple transmitting stations are attempting to communicate with a single base station—a very common occurrence in wireless communication systems. A POSITA would have therefore been motivated to design a system of processing data signals to determine associated parameters wherein such signals were transmitted during contention periods of upstream transmission. Thus, the

combination of Genossar and WiMAX renders obvious Claim 14. *See also* Ex. 1011, 54-55.

- vii. ***Claim 18: The method of claim 16 wherein the receiving station is operable in a communication system in which communication protocols include a contention period and wherein the initial burst of the first burst data signal responsive to which the at least one signal-related parameter and the at least one channel-related parameter are determined is transmitted to the receiving station during the contention period.***

124. The combination of Genossar in view of WiMAX discloses Claim 18. As discussed above in Sections VIII.A.i-v. and VIII.A.xiii-xvi., Genossar independently teaches the entirety of Claim 1 and Claim 16.

125. Further, for the reasons established above in Section VII.B.ii., this claim is obvious over Genossar in view of WiMAX. Genossar discloses a fixed system containing a base station (i.e., “receiving station”) and multiple terminal stations (together a “communication system”) where transmissions upstream, from the terminal stations to the base station, can be transmitted as a series of bursts (“S_i”) starting, for example, with an initial burst “S_m.” Ex. 1005, 2:17-29, 2:43-3:9.

126. Additionally, like Genossar and the ’477 Patent, WiMAX discloses a fixed wireless access system containing a base station (“BS”) and multiple subscriber stations (“SSs”) where uplink transmissions (to the base station) are transmitted in bursts. Ex. 1006, 115-116. WiMAX teaches “[t]here are three main classes of . . . messages transmitted by the SSs during the uplink frame,” one of which includes “[t]hose that are transmitted in *contention slots* reserved for station

registration.” *Id.* Thus, WiMAX teaches that its communication protocols include a *contention period*, such as the one illustrated in annotated Figure 53 (reproduced below). *Id.*

Ex. 1006, Figure 53 (annotated)

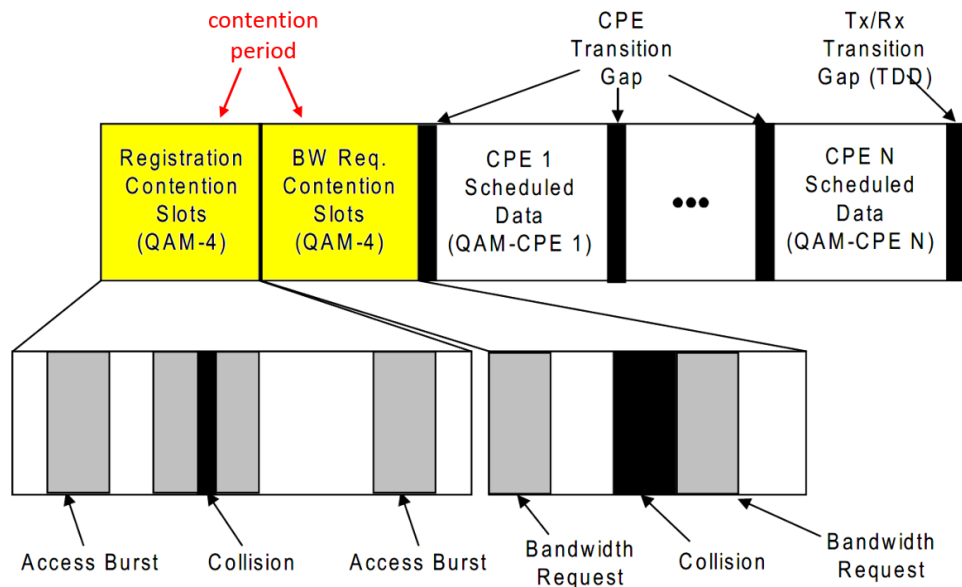


Figure 53—Uplink Subframe Structure

127. WiMAX teaches that the contention period is used during registration to perform an “Initial Ranging,” where “Ranging is the process of acquiring the correct timing offset such that the [SS]’s transmissions are aligned” with the base station. Ex. 1006, 141. When performing the Initial Ranging, the SS puts together a “Ranging Request message” and sends it within the contention period. *Id.* In some cases, this may result in a collision as illustrated above. *Id.* However, “[o]nce the BS has successfully received the Ranging Request message, it shall return a Ranging Response message addressed to the individual SS.” *Id.* “The message shall . . .

contain information on RF *power level adjustment* and *offset frequency adjustment* as well as any *timing offset corrections*.” *Id.* Thus, like the ’477 Patent, WiMAX discloses a fixed wireless system containing a base station that determines parameter values (*e.g.*, “power level adjustment”) based on an initial burst communicated to the base station during a contention period.

128. A POSITA would have been motivated to combine the system of processing burst data signals to determine certain signal and channel-related parameters in Genossar with the widely known concept of contention periods, discussed in WiMAX, in order to determine profile parameters associated with data signals from various terminal stations that transmit to the receiving station via specific channels during a contention period. A POSITA would have been inherently familiar with the basic concept of contention periods in a system wherein multiple transmitting stations are attempting to communicate with a single base station—a very common occurrence in wireless communication systems. A POSITA would have therefore been motivated to design a system of processing data signals to determine associated parameters wherein an initial portion of such signals are transmitted during a contention period when, for instance, a subscriber station has not yet registered with a new network or base station. Thus, the combination of Genossar and WiMAX renders obvious Claim 18.

C. Ground 3: Barratt '470 Anticipates Claims 1, 3-6, 8-10, 13, 15-17, and 19-20 of the '477 Patent.

129. Barratt '470 anticipates and/or renders obvious claims 1-6, 8-10, 13-14, and 16-20 of the '477 Patent.

- i. Claim 1, [1.pre]: Profile-creating apparatus for creating at least a first profile associated with transmission upon at least a first channel of at least a first burst-data signal transmitted in bursts to a receiving station, said profile-creating apparatus comprising:*

130. To the extent the preamble is limiting, Barratt '470 discloses Claim [1.pre]. Barratt '470 discloses a TDMA wireless communication system that comprises at least one base station (i.e., “receiving station”) and at least one remote terminal and where uplink transmissions from remote terminals are transmitted to the base station as a series of “bursts” within an assigned timeslot: “any particular remote terminal and a base station communicate in *bursts* in timeslots that are a frame apart.” Ex. 1007, 6:35-62, 8:11-35. For example, Barratt '470 teaches that “a burst is defined as the finite duration RF signal that is transmitted or received over the air during a single timeslot.” *Id.* Barratt '470 also teaches that in a TDMA system, each timeslot constitutes a communication “channel.” *Id.* at 2:8-12. Thus, Barratt '470 discloses a system where data communications sent to a base station (i.e., “receiving station”) constitute data signals transmitted in bursts.

131. Further, the '477 Patent broadly states that a “profile” can include any parameter values “created and stored during operation” that are “pertinent to the

implementation of the communication system.” Ex. 1001, 6:42-45. This can include, for instance, any “information required by the demodulators . . . to permit their operation to demodulate bursts of data received by the [base station].” *Id.* at 6:1-9.

132. Like the ’477 Patent, Barratt ’470 too discloses a system where base stations create and store various parameter values (*e.g.*, “frequency offset”) for each remote terminal communicating with the base station. Ex. 1007, 8:36-61, 16:17-17:7. Thus, Barratt ’470 further discloses a profile-creating apparatus (*e.g.*, base station) for creating at least a first set of parameter values (or “profiles”) associated with at least a first burst-data signal transmitted in bursts to the base station.

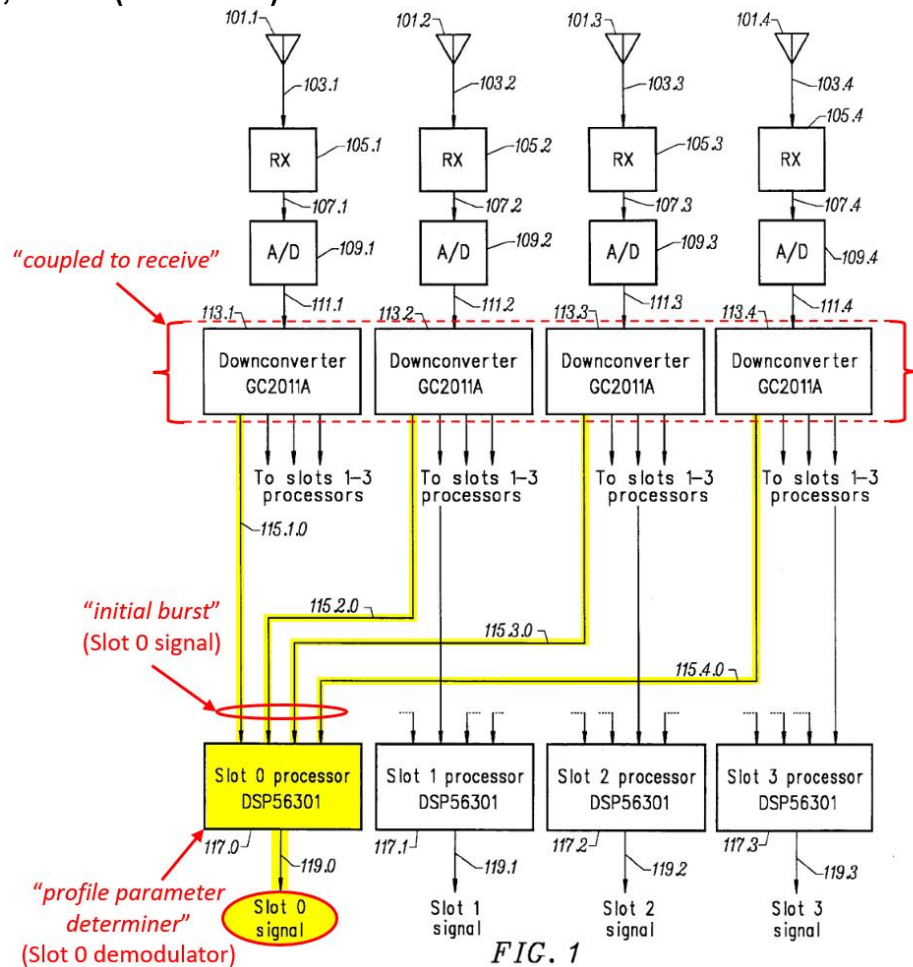
133. Therefore, Barratt ’470 discloses Claim [1.pre]. *See also* Ex. 1011, 2-8.

ii. Claim 1, [1.A]: a profile parameter determiner coupled to receive an indication of an initial burst of the first burst data signal transmitted upon the first channel to the receiving station,

134. Barratt ’470 discloses Claim [1.A]. As discussed above, Barratt ’470 discloses a wireless communication system that comprises at least one base station (*i.e.*, “receiving station”), containing an array of antennas, and at least one remote terminal that transmit burst signals upstream via transmission channels. Ex. 1007, 6:35-62; 8:11-35. Barratt ’470 states: “any particular remote terminal and a base station communicate in bursts in timeslots that are a frame apart,” where each *timeslot* constitutes a *channel*. *Id.*

135. Further, Barratt '470 discloses a DSP device (i.e., “profile parameter determiner”) contained in the base station and configured to process the received down-converted burst data signals. *Id.* at 10:60-67, 24:24-48. Annotated Figure 1 (reproduced below) illustrates a base station that includes four DSP processors 117, one for each timeslot (i.e., “channel”) in a frame. *Id.* at 9:60-67; 24:24-48. Each DSP 117 maintains values associated with the signals received during that timeslot, including: an initial weight matrix, frequency offset, and time alignment parameters. *Id.* at 8:36-61; 16:17-17:7; 24:24-48. Figure 1 also shows, for example, that the Slot 0 processor 117.0 (“profile parameter determiner”) is coupled to receive an initial burst of a first burst data signal transmitted to the base station upon the “Slot 0” channel.

Ex. 1007, FIG. 1 (annotated)



136. Thus, Barratt '470 discloses a “profile parameter determiner” that is coupled to the receiving components of the “receiving station” in order to receive “an indication of an initial burst of the first burst data signal” as is claimed in [1.A]. See also Ex. 1011, 8-16.

- iii. ***Claim 1, [1.B]: said profile parameter determiner for determining a value of at least one signal-related parameter and at least one channel-related parameter, wherein the signal related and channel-related parameters are collectively representative of communication of the first burst data signal over the first channel to the receiving station; and***

137. Barratt '470 discloses Claim [1.B]. As discussed above in Claim [1.A], Barratt '470 discloses a DSP (i.e., “profile parameter determiner”) that determines a plurality of values associated with a first burst data signal transmitted to a base station (i.e., “receiving station”). Ex. 1007, 10:60-67; 24:24-48. As discussed below, Barratt '470 teaches that the DSP 117 is capable of determining a value of “at least one signal-related parameter” and “at least one channel-related parameter.”

138. The '477 Patent states that “signal-related parameters” can include, for instance, “the amount of forward error correction (FEC) of the burst, *change in frequency of the burst*, changes in time of the burst,” etc. Ex. 1001, 11:56-63. Barratt '470 teaches that each DSP processes the burst data signal to determine values of “*frequency offset*,” which represents a change in frequency of the burst as between the transmitting station and the receiving station. Ex. 1007, 4:56-5:6, 8:36-61, 16:17-17:7. For example, Barratt '470 notes that “the RF frequency of a remote terminal may be *offset* relative to the base station carrier by as much as ± 5 kHz or more.” *Id.* at 8:51-53. Thus, “frequency offset” is a type of signal-related parameter in that it represents a frequency characteristic of the first burst data signal as transmitted over the channel.

139. The '477 Patent states that “signal-related parameters” can also include, for instance, “changes in *time of the burst*” such as “*timing adjustment* parameters.” Ex. 1001, 6:10-18, 11:56-63. Barratt '470 discloses various parameter values including, for example, “time alignment.” Ex. 1007, 8:48-61, 16:17-17:7. Barratt '470 explains that “[t]he [time] alignment problem is to synchronize exactly the initial timing of the symbols in the signals sent and the signals received in the base station.” Barratt '470 teaches that “[t]he first parameter thus determined is the time alignment, *a time shift* (expressed as a number of samples).” *Id.* at 11:39-41. These values represent an unwanted change in time (“time shift”) of the burst as received at the base station that is to be corrected by applying an appropriate timing adjustment value. Barratt '470 thus discloses a DSP (i.e., “profile parameter determiner”) for determining a value of at least one *signal-related parameter* (e.g., *frequency offset, time alignment, etc.*).

140. Additionally, the '477 Patent states that “channel-related parameters” can include, for instance, “values of equalization weighting, antenna parameters,” etc. Ex. 1001, 11:56-63.

141. The '477 Patent describes “antenna parameters” as including “antenna combining parameters when antenna diversity and/or beamforming is utilized.” *Id.* at 6:16-17, 12:45-46. Barratt '470 discloses such antenna parameters. For example, Barratt '470 discloses using “spatial processing” (or “space division multiple

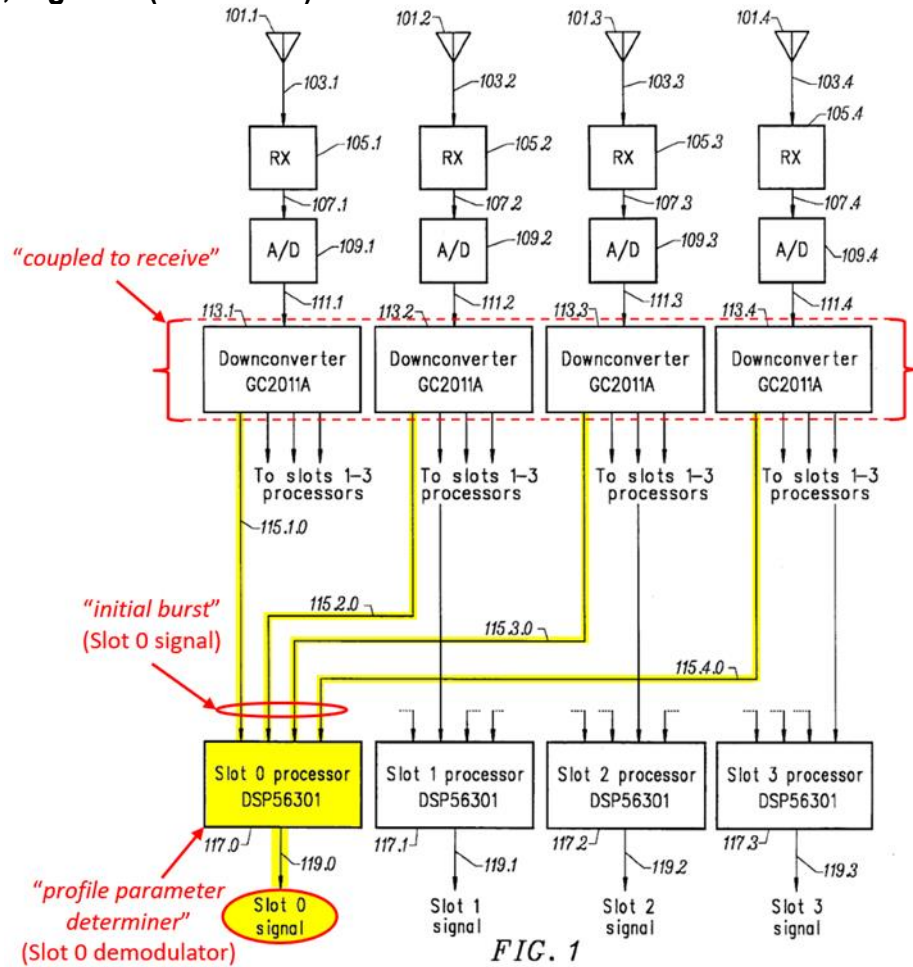
access,” SDMA) to improve performance where “[t]he general idea is to increase the quality of communication by using an antenna array [with multiple antennas] rather than a single antenna.” Ex. 1007, 1:35-2:14.

142. Barratt ’470 explains that “[w]ith multiple antennas, the relationship in both amplitude and phase of a signal of interest to the interfering co-channel signals will be different in each of the antenna signals (each of the m signals in an m antenna system) due to geometric considerations, both because the antennas are separated by some distance, and . . . because the different sources [*e.g.*, remote terminals] also are separated.” *Id.* at 2:47-51. Spatial processing/SDMA techniques takes advantage of this. For example, Barratt ’470 teaches that “[s]patial processing of the (complex valued) m signals at the m antennas comprises *each signal of interest* determining a *weighted sum of the antenna signals*. The complex valued *weights* can be represented by a vector called herein a *weight vector*.” *Id.* at 2:47-51.

143. These complex valued “*weights*” that are used for forming the “*weighted sum of the antenna signals*” are a type of antenna combining parameter because they are used to *combine* the different versions of each signal (*e.g.*, $m=4$) received by the base station’s multiple antennas, as illustrated in annotated Figure 1 (below). Thus, in addition to determining at least one signal-related parameter (*e.g.*, *frequency offset, time alignment, etc.*), Barratt ’470 also discloses determining a value of at least one channel-related parameter (*e.g.*, *antenna weights*), where

together these parameters are representative of communication of the first burst data signal over the transmission channel.

Ex. 1007, Figure 1 (annotated)



144. Thus, Barratt '470 discloses Claim [1.B]. See also Ex. 1011, 16-20.

- iv. ***Claim 1, [1.C]: a profile parameter storage device coupled to said profile parameter determiner, said profile parameter storage device for storing values representative of the at least one signal-related parameter and the at least one channel-related parameter determined by said profile parameter determiner,***

145. Barratt '470 discloses Claim [1.C]. As discussed above in the analysis of Claim [1.B], Barratt '470 discloses that the base station maintains various parameters (*e.g.*, antenna weights, frequency offset, time alignment, etc.) for each subscriber station in order to facilitate receive operations performed on subsequent bursts. *See* Ex. 1007, 8:48-62, 16:17-43, 16:44-17:7, 18:8-20, 18:39-45. Specifically, the values representing these parameters are stored for use in estimating the values of subsequent burst data signal transmissions. *Id.*; *Id.* at 24:24-48, 14:21-35, Fig. 4A. For example, Barratt '470 discloses that for each signal of interest “the method involves a recursive loop repeated every frame . . . On an ongoing basis, one starts the loop [*for the current frame*] with starting estimate of w_r and of the alignment and frequency offset obtained from the processing of the same signal *on the previous frame*.” Ex. 1006, 16:32-17:7. Thus, Barratt '470 discloses that the base station necessarily includes a “profile parameter storage device” for *storing* these parameter values *from one frame to next* for each signal of interest, as required by Claim [1.C]. *See also* Ex. 1011, 20-21.

- v. ***Claim 1, [1.D]: the values stored at said profile parameter storage device to be used to facilitate receive operations performed at the receiving station on subsequent bursts of the first burst data signal.***

146. Barratt '470 discloses Claim [1.D]. As discussed above in the analysis of Claim [1.C], Barratt '470 discloses a base station that maintains various parameter values to facilitate receive operations performed on subsequent bursts of the same signal. Ex. 1007, 8:48-62, 14:21-35, 16:17-18:45, 24:24-48, Fig. 4A. This is illustrated, for example, in annotated Figure 6 (reproduced below) which shows that certain values obtained in a *previous frame* ("frequency offset") are being used in receive operations performed on the *current frame*. *Id.* Thus, Barratt '470 discloses storing values to facilitate receive operations performed on *subsequent bursts* of the same burst data signal.

Ex. 1007, Fig. 6 (annotated)

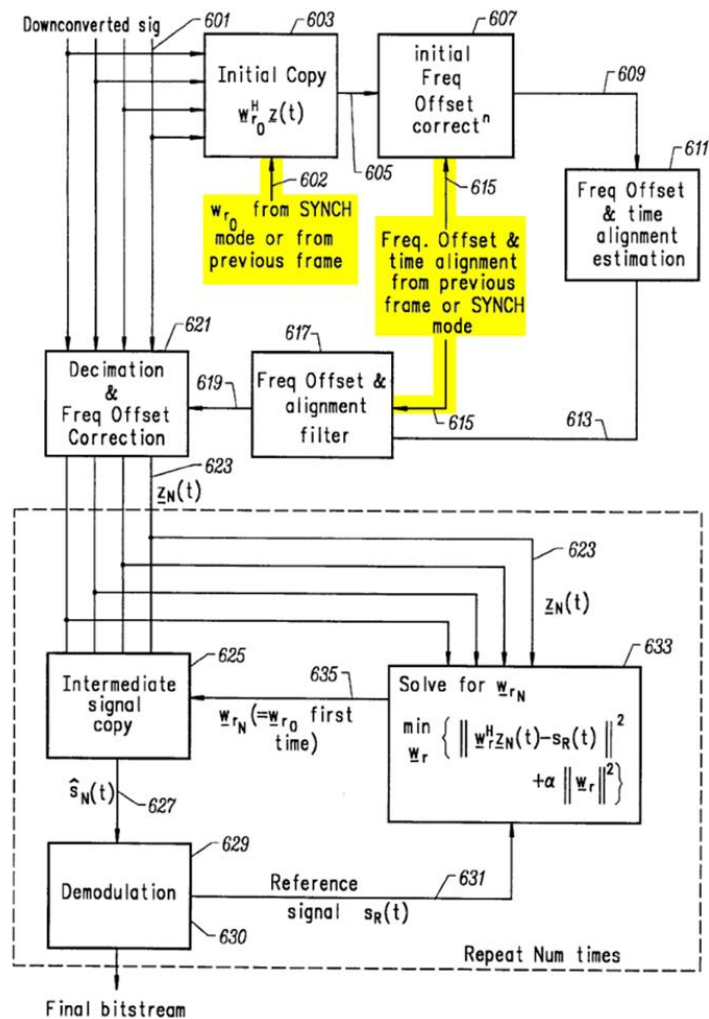


FIG. 6

147. Thus, a POSITA would have understood that Barratt '470 teaches a “profile parameter storage device” that stores values in order to “facilitate receive operations” on subsequent burst data signals and disclose Claim [1.D]. See also Ex. 1011, 22.

vi. Claim 3: The apparatus of claim 1 wherein the channel-related parameter is representative of a channel condition of the first channel.

148. Barratt '470 discloses Claim 3. As discussed above in Sections VIII.C.i-v., Barratt '470 discloses the apparatus described in Claim 1. As discussed above in the analysis of Claim 1, the '477 Patent states that “channel-related parameters” can include, for instance, “*antenna parameters*.” Ex. 1001, 11:56-63. Barratt '470 teaches that the base station determines at least one “channel-related parameter” for each signal of interest including, *e.g.*, *antenna weights* that are used in forming a “*weighted sum of the antenna signals*” received at the base station. *Id.* These antenna “weights” (or “weight vector”) are representative of a channel condition of the first channel, in that they provide the base station with information on the channel conditions for each remote terminal.

149. Additionally, the '477 Patent states that “channel-related parameters” can also include, for instance, “values of *equalization weighting*.” Ex. 1001, 11:56-63. In describing the “weight vector,” Barratt '470 explains that “[t]he more general situation is that the received antenna signals need also to be temporally *equalized*, and in that situation, rather than a weighted sum, for each signal of interest, a sum of convolutions of the antenna signals is determined. That is, the *weight vector* is generalized, for the linear time invariant *equalization* situation, to a vector of complex valued impulse responses.” Ex. 1007, 2:51-57. As a result, Barratt '470 states that “[f]or the purposes of this invention, the term *weight vector* shall apply

either to a vector of complex weights or to a vector of impulse responses, depending on whether temporal *equalization is included*.” *Id.* at 2:51-57.

150. Therefore, Barratt ’470 discloses determining *equalization weighting* values, *e.g.*, in those instances where “temporal equalization is included” at the base station. *Id.* As with the “antenna parameters” discussed above, these *equalization weighting* values are representative of a channel condition of the first channel, in that they provide the base station with information on the channel conditions for each remote terminal.

151. Thus, Barratt ’470 teaches an apparatus that processes a “channel-related parameter” that is representative of a “channel condition” of a first channel as disclosed in Claim 3. *Id.*; *see also* Ex. 1011, 24-25.

vii. Claim 4: The apparatus of claim 3 wherein the channel-related parameter determined by said profile parameter determiner comprises a value representative of fading exhibited upon the first channel.

152. Barratt ’470 discloses Claim 4. As discussed above in Sections VIII.C.i-v. and VIII.C.vii., Barratt ’470 discloses the apparatus described in Claims 1 and 3. Additionally, as discussed above in the analysis of Claims 1 and 3, Barratt ’470 discloses a DSP (i.e., “profile parameter determiner”) that processes burst data signals at the base station in order to determine and store values associated with the signals and transmission channels. Ex. 1007, 10:60-67; 24:24-48. Barratt ’470

teaches that these values can comprise values associated with the transmission channel (i.e., “channel-related parameters”). *Id.*

153. Specifically, as discussed, Barratt ’470 teaches determining *antenna parameters* (e.g., antenna “weights” used for forming a “weighted sum of the antenna signals”) and *equalization weighting* values (e.g., in those instances when “temporal equalization is included”). Ex. 1007, 2:51-57, 11:56-63. These values, which are based on measurements and estimates of the propagation environment between the base station and the remote terminal, are representative of fading exhibited upon the channel.

154. For example, Barratt ’470 teaches that after call initialization, “the base station and remote terminal enter synchronization (“SYNCH”) mode . . . during which each sends to the other *known synchronization bursts*.” Ex. 1007, 8:36-61. These “*known*” sequences allow each side to measure and estimate the effects of the communication channel formed between the base station and the remote terminal. *Id.* These estimated values (e.g., “weight vector”) are therefore representative of any fading and other types of destructive interference and noise that may be exhibited upon the channel. *Id.*; *see also* Ex. 1011, 25.

155. Thus, the apparatus disclosed in Barratt ’470 determines channel-related parameters comprising values representative of fading exhibited on a first channel.

- viii. Claim 5: The apparatus of claim 4 wherein the receiving station comprises an equalizer for performing equalization operations when the at least the first burst data signal and wherein the value representative of fading exhibited when the first channel comprises an equalizer weighting value to be used by the equalizer during the equalization operations.**

156. Barratt '470 discloses Claim 5. As discussed above in Sections VIII.C.i-v., VIII.C.vii., and VIII.C.viii., Barratt '470 discloses the apparatus described in Claims 1, 3, and 4. Additionally, as discussed above in the analysis of Claims 1 and 3, Barratt '470 discloses a DSP (i.e., “profile parameter determiner”) that processes data signals in order to determine and store values associated with the signals and transmission channels. Ex. 1007, 10:60-67; 24:24-48. Barratt '470 teaches that these values can comprise values associated with the transmission channel (i.e., “channel-related parameters”). *Id.*

157. As also discussed above, it was explained in Claims 3-4 that Barratt '470 teaches determining *equalization weighting* values that are representative of fading exhibited upon the communication channel. Ex. 1007, 2:51-57. Barratt '470 also states that its disclosed estimation techniques are beneficial “to all processing of signals which require producing a reference signal, such as . . . decision feedback *equalization systems*.” *Id.* at 6:5-16. Barratt '470 teaches that when “the received antenna signals need also to be temporally *equalized*, . . . the [spatial] *weight vector* is generalized, for the linear time invariant *equalization* situation.” *Id.* at 2:51-57. As a result, Barratt '470 states that “[f]or the purposes of this invention, the term *weight*

vector shall apply either to a vector of complex weights or to a vector of impulse responses, depending on whether temporal *equalization* is included.” *Id.* Thus, Barratt ’470 discloses a receiving station that comprises an equalizer for performing equalization operations, where the equalization weighting values are representative of fading exhibited upon the channel as disclosed in Claim 5. *See also* Ex. 1011, 26.

ix. Claim 6: The apparatus of claim 3 wherein the receiving station comprises an antenna assembly and wherein the channel-related parameter determined by said profile parameter determiner comprises an antenna parameter related to the antenna assembly.

158. Barratt ’470 discloses Claim 6. As discussed above in Sections VIII.C.i-v. and VIII.C.vii., Barratt ’470 discloses the apparatus described in Claims 1 and 3. Barratt ’470 discloses a wireless communication system involving a base station (i.e., “receiving station”) connected to a plurality of remote terminals that transmit burst data signals upstream. Ex. 1007, Abstract. Barratt ’470 further discloses a base station that determines a set of complex valued *antenna weights* (or “*weight vector*”) that are used in forming a “*weighted sum of the antenna signals*” received by the base station’s “*m antennas*” (as illustrated in Figure 1). *Id.* at 2:51-57, 11:56-63, Fig. 1. Thus, Barratt ’470 discloses a base station that comprises an antenna assembly, and where the at least one “channel-related parameter” (e.g., *antenna weights*) comprises an antenna parameter related to the assembly as disclosed in Claim 6. *See also* Ex. 1011, 27-41.

- x. ***Claim 8: The apparatus of claim 1 wherein the signal-related parameter is representative of a signal characteristic of the first burst data signal transmitted over the first channel.***

159. Barratt '470 discloses Claim 8. As discussed above in Sections VIII.C.i-v., Barratt '470 discloses the apparatus described in Claim 1. Further, as discussed above in the analysis of Claim [1.B], Barratt '470 discloses that the DSP of the base station determines values (i.e., “parameters”) associated with the burst data signal transmitted upstream. Ex. 1007, 10:60-67; 24:24-48. Barratt '470 teaches discloses determining a value of at least one “signal-related parameter,” including “*frequency offset*” and “*time alignment*,” which, as stated in the '477 Patent, are types of “signal-related parameters.” Ex. 1001, 11:56-63; Ex. 1007, 4:56-5:6, 8:36-61, 16:17-17:7. A POSITA would have understood that these values are representative of a signal characteristic of the first burst data signal transmitted over the channel, in that they describe a *change in frequency* and a *change in time* of the burst as received at the base station as described in Claim 8. *See also* Ex. 1011, 44.

- xi. ***Claim 9: The apparatus of claim 8 wherein the signal-related parameter determined by said profile parameter determiner comprises a value representative of a frequency characteristic of the first burst data signal.***

160. Barratt '470 discloses Claim 9. As discussed previously in the analysis of Claim 1 and again in the analysis of Claim 8, Barratt '470 teaches that certain parameters determined during the processing of burst signals by the DSP (i.e., “profile parameter determiner”) include values of “*frequency offset*” for each signal

of interest. Ex. 1007, 1:19-24, 5:19-22, 5:45-52, 6:10-16. A POSITA would have understood that the “*frequency offset*” comprises a value representative of a frequency characteristic of the burst data signal because it involves a value associated with the frequency of the signal. *Id.* Thus, because Barratt ’470 discloses a “profile parameter determiner” that determines a “signal-related parameter” representative of a “frequency characteristic” of an initial burst data signal, Barratt ’470 discloses Claim 9. *See also* Ex. 1011, 44-45.

xii. *Claim 10: The apparatus of claim 8 wherein the signal-related parameter determined by said profile parameter determiner comprises a value representative of a time-shift characteristic of the first burst data signal.*

161. Barratt ’470 discloses Claim 10. As discussed previously in the analysis of Claim 1 and again in the analysis of Claim 8, Barratt ’470 teaches that certain parameters determined during the processing of burst signals by the DSP (i.e., “profile parameter determiner”) include values of “time alignment” for each signal of interest. Ex. 1007, 1:19-24, 5:19-22, 5:45-52, 6:10-16. A POSITA would have understood that “time alignment” values comprise a time shift characteristic of a burst data to align its transmission for processing. *Id.* In addition, Barratt ’470 teaches that “[t]he first parameter thus determined is the time alignment, a ***time shift*** (expressed as a number of samples).” *Id.* at 11:39-41. Thus, because Barratt ’470 discloses a “profile parameter determiner” that determines a “signal-related

parameter” representative of a “time-shift characteristic” of an initial burst data signal, Barratt ’470 discloses Claim 10. *See also* Ex. 1011, 45-46.

- xiii. Claim 13: The apparatus of claim 1 wherein said profile parameter determiner is further coupled to receive an indication of at least one additional burst of the first burst data signal, said profile parameter determiner further for determining an updated value of the at least one parameter responsive to the at least one additional burst of the first burst signal.**

162. Barratt ’470 discloses Claim 13. As discussed above in Sections VIII.C.i-v., Barratt ’470 discloses the apparatus described in Claim 1. Barratt ’470 discloses a base station (i.e., “receiving station”) containing a DSP (i.e., “profile parameter determiner”) that processes signals received via a plurality of antennas at the base station. Ex. 1007, Abstract, 10:60-67. Barratt ’470 teaches that the plurality of antennas receives burst data signals from the remote terminals transmitting upstream to the base station and sends the signals to the DSP for processing. *Id.*; *Id.* at 2:32-61.

163. Further, Barratt ’470 discloses a parameter estimation method that “involves a recursive loop repeated every frame.” Ex. 1007, 16:32-17:7. “On an ongoing basis [for each frame], one starts the loop with starting estimate of [weight vector] w_r and of the [time] alignment and frequency offset obtained from the processing of the same signal on the previous frame.” *Id.* This is illustrated in annotated Figure 6 (reproduced below), which shows that certain parameter values obtained in a previous frame (e.g., “frequency offset”) are being used for

determining an *updated value* of those parameters in the current frame. *Id.* Thus, Barratt '470 discloses determining an *updated value* of at least one parameter (e.g., “frequency offset”) responsive to at least one *additional burst* of the same signal.

Ex. 1007, Fig. 6 (annotated)

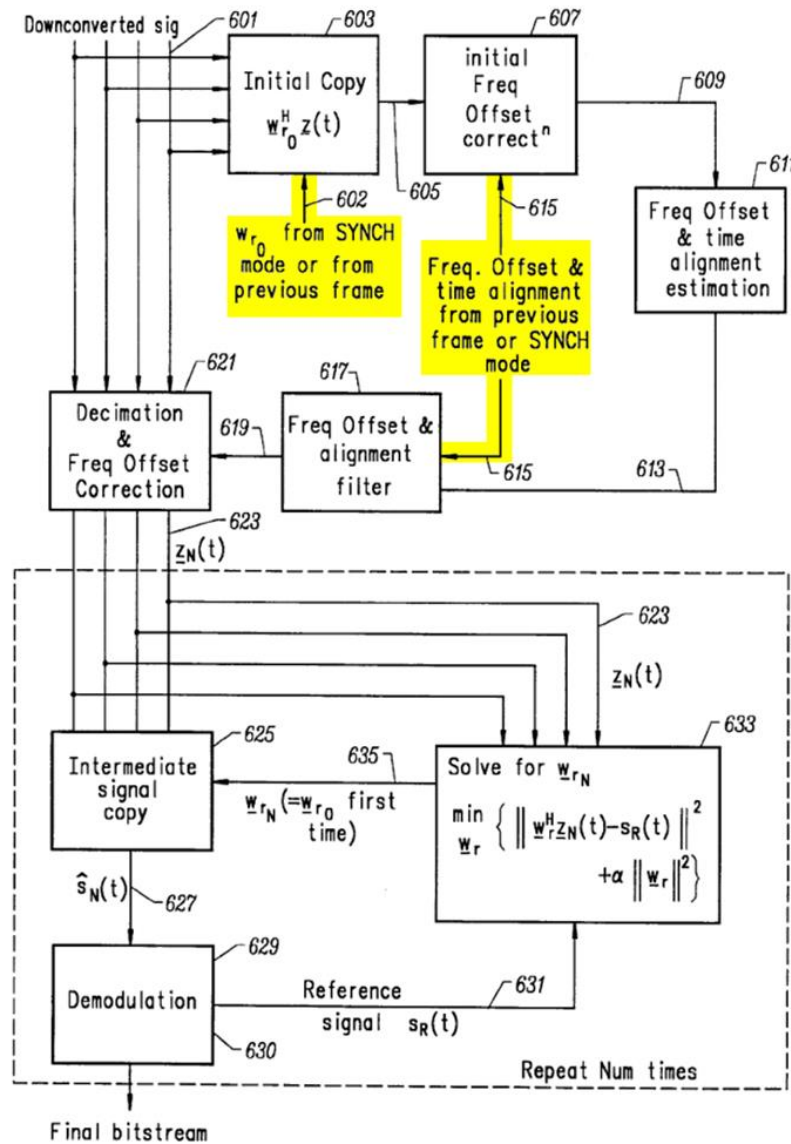


FIG. 6

164. Thus, because Barratt '470 discloses a “profile parameter determiner” coupled to receive indication of “at least one additional burst” and determining an “updated value” of at least one parameter responsive to the additional burst, Barratt '470 discloses Claim 13. *See also* Ex. 1011, 53-54.

- xiv. Claim 15: The apparatus of claim 1 wherein at least the first burst data signal transmitted upon the at least the first channel comprises a plurality of burst data signals transmitted upon a plurality of channels and wherein said profile parameter determiner determines a value of a plurality of parameters representative of communication of the plurality of burst data signals and each of the plurality of channels.**

165. Barratt '470 discloses Claim 15. Barratt '470 discloses a base station operable to receive a *plurality of burst data signals* transmitted by a plurality of remote terminals, where the paths from each of the remote terminals to the base station comprise a *plurality of channels*. Ex. 1007, 1:27-48. For example, Barratt '470 teaches that “[w]ithin its cell, a radio base station can communicate simultaneously *with many remote terminals* by using different conventional communication *channels for each remote terminal*.” *Id.* Such conventional communication channels “may be distinguished by frequency, by time, by code, or by some combination of the above.” *Id.*

166. Further, as discussed in Claim 1, Barratt '470 teaches that for *each* burst data signal received at the base station, the base station determines various parameter values (*e.g.*, “weights,” “frequency offset,” “time alignment,” etc.) that are representative of communication of the signal on that channel. *See id.* at 8:48-62,

16:17-43, 16:44-17:7, 18:8-20, 18:39-45. Thus, Barratt '470 discloses a base station operable to receive a first burst data signal transmitted upon the first channel with a *plurality of burst data signals* transmitted on a *plurality of channels*, and where the base station (i.e., “profile parameter determiner”) further determines a value of a plurality of parameters representative of communication of the plurality of burst data signals transmitted on the plurality of channels. *See also* Ex. 1011, 55-59.

167. In addition, Barratt '470 further discloses the idea of “adding *spatial multiplexing* to conventional channels so that *several users can communicate simultaneously on the same conventional channel*” – also called “SDMA for spatial division multiple access.” Ex. 1007, 1:66-2:14. For example, in the case of a TDMA system, this means that “*several remote terminals* may communicate with [the base station] on *the same frequency channel and the same time slot*, that is, on the same conventional channel.” Thus, for this reason as well, Barratt '470 discloses Claim 15. *See also* Ex. 1011, 55-59.

- xv. ***Claim 16, [16.pre]: A method for creating at least a first profile associated with transmission upon at least a first channel of at least a first burst data signal in bursts to a receiving station, said method comprising:***

168. To the extent the preamble is limiting, Barratt '470 discloses Claim [16.pre]. Barratt '470 discloses a TDMA wireless communication system that comprises at least one base station (i.e., “receiving station”) and at least one remote terminal and where uplink transmissions from remote terminals are transmitted to

the base station as a series of “bursts” within an assigned timeslot: “any particular remote terminal and a base station communicate in *bursts* in timeslots that are a frame apart.” Ex. 1007, 6:35-62, 8:11-35. For example, Barratt ’470 teaches that “a burst is defined as the finite duration RF signal that is transmitted or received over the air during a single timeslot.” *Id.* Barratt ’470 also teaches that in a TDMA system, each timeslot constitutes a communication “channel.” *Id.* at 2:8-12. Thus, Barratt ’470 discloses a system where data communications sent to a base station (i.e., “receiving station”) constitute data signals transmitted in bursts.

169. Further, the ’477 Patent broadly states that a “profile” can include any parameter values “created and stored during operation” that are “pertinent to the implementation of the communication system.” Ex. 1001, 6:42-45. This can include, for instance, any “information required by the demodulators . . . to permit their operation to demodulate bursts of data received by the [base station].” *Id.* at 6:1-9.

170. Like the ’477 Patent, Barratt ’470 too discloses a system where base stations create and store various parameter values (*e.g.*, “frequency offset”) for each remote terminal communicating with the base station. Ex. 1007, 8:36-61, 16:17-17:7. Thus, Barratt ’470 further discloses a profile-creating apparatus (*e.g.*, base station) for creating at least a first set of parameter values (or “profiles”) associated with at least a first burst-data signal transmitted in bursts to the base station. Therefore, Barratt ’470 discloses Claim [16.pre].

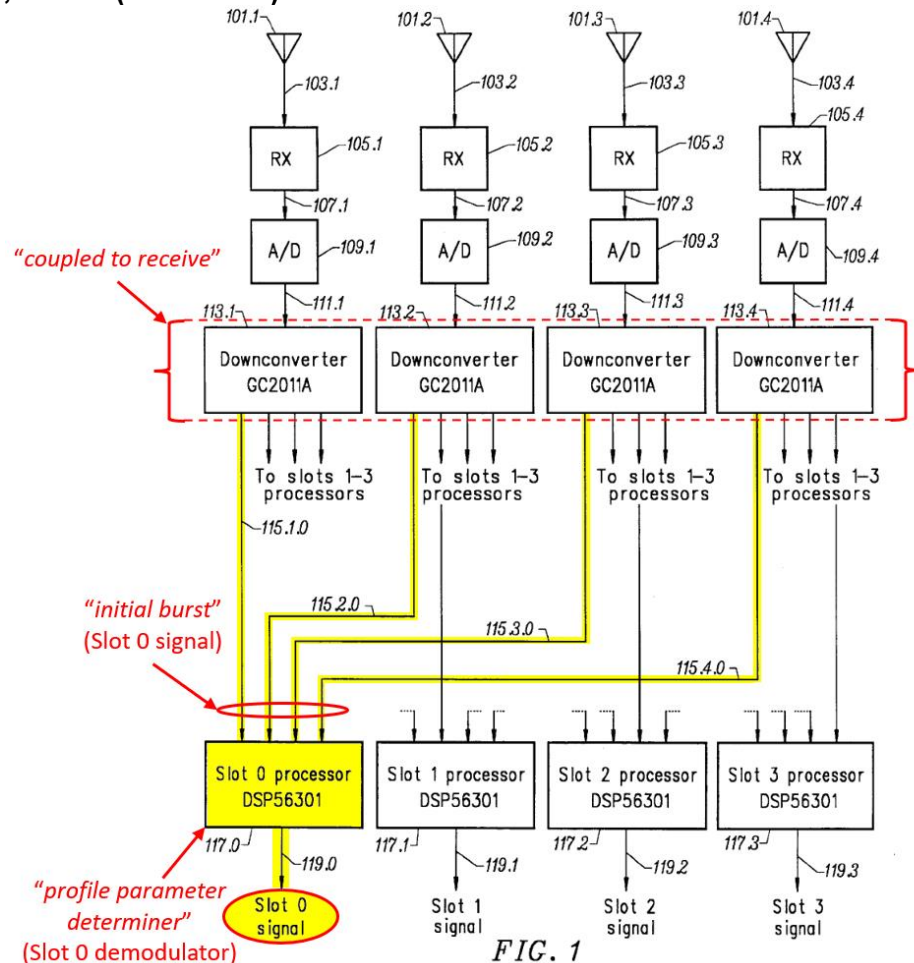
- xvi. ***Claim 16, [16.A]: responsive to reception at the receiving station of an initial burst of the first burst data signal transmitted upon the first channel, determining a value of at least one signal-related parameter and at least one channel-related parameter, wherein the signal-related and channel related parameters are collectively representative of communication of the first burst data signal over the first channel to the receiving station;***

171. Barratt '470 discloses Claim [16.A]. As discussed above, Barratt '470 discloses a wireless communication system that comprises at least one base station (i.e., "receiving station"), containing an array of antennas, and at least one remote terminal that transmit burst signals upstream via transmission channels. Ex. 1007, 6:35-62; 8:11-35. Barratt '470 states: "any particular remote terminal and a base station communicate in bursts in timeslots that are a frame apart," where each *timeslot* constitutes a *channel*. *Id.*

172. Further, Barratt '470 discloses a DSP device (i.e., "profile parameter determiner") contained in the base station and configured to process the received down-converted burst data signals. *Id.* at 10:60-67, 24:24-48. Annotated Figure 1 (reproduced below) illustrates a base station that includes four DSP processors 117, one for each timeslot (i.e., "channel") in a frame. *Id.* at 9:60-67; 24:24-48. Each DSP 117 maintains values associated with the signals received during that timeslot, including: an initial weight matrix, frequency offset, and time alignment parameters. *Id.* at 8:36-61; 16:17-17:7; 24:24-48. Figure 1 also shows, for example, that the Slot 0 processor 117.0 ("profile parameter determiner") is coupled to receive an initial

burst of a first burst data signal transmitted to the base station upon the “Slot 0” channel.

Ex. 1007, FIG. 1 (annotated)



173. Barratt '470 teaches that the DSP 117 is capable of determining a value of “at least one signal-related parameter” and “at least one channel-related parameter.”

174. The '477 Patent states that “signal-related parameters” can include, for instance, “the amount of forward error correction (FEC) of the burst, *change in*

frequency of the burst, changes in time of the burst,” etc. Ex. 1001, 11:56-63. Barratt ’470 teaches that each DSP processes the burst data signal to determine values of “*frequency offset*,” which represents a change in frequency of the burst as between the transmitting station and the receiving station. Ex. 1007, 4:56-5:6, 8:36-61, 16:17-17:7. For example, Barratt ’470 notes that “the RF frequency of a remote terminal may be *offset* relative to the base station carrier by as much as ± 5 kHz or more.” *Id.* at 8:51-53. Thus, “frequency offset” is a type of signal-related parameter in that it represents a frequency characteristic of the first burst data signal as transmitted over the channel.

175. The ’477 Patent states that “signal-related parameters” can also include, for instance, “changes in *time of the burst*” such as “*timing adjustment* parameters.” Ex. 1001, 6:10-18, 11:56-63. Barratt ’470 discloses various parameter values including, for example, “time alignment.” Ex. 1007, 8:48-61, 16:17-17:7. Barratt ’470 explains that “[t]he [time] alignment problem is to synchronize exactly the initial timing of the symbols in the signals sent and the signals received in the base station.” Barratt ’470 teaches that “[t]he first parameter thus determined is the time alignment, *a time shift* (expressed as a number of samples).” *Id.* at 11:39-41. These values represent an unwanted change in time (“time shift”) of the burst as received at the base station that is to be corrected by applying an appropriate timing adjustment value. Barratt ’470 thus discloses a DSP (i.e., “profile parameter

determiner”) for determining a value of at least one *signal-related parameter* (e.g., *frequency offset, time alignment, etc.*).

176. Additionally, the ’477 Patent states that “channel-related parameters” can include, for instance, “values of equalization weighting, antenna parameters,” etc. Ex. 1001, 11:56-63.

177. The ’477 Patent describes “antenna parameters” as including “antenna combining parameters when antenna diversity and/or beamforming is utilized.” *Id.* at 6:16-17, 12:45-46. Barratt ’470 discloses such antenna parameters. For example, Barratt ’470 discloses using “spatial processing” (or “space division multiple access,” SDMA) to improve performance where “[t]he general idea is to increase the quality of communication by using an antenna array [with multiple antennas] rather than a single antenna.” Ex. 1007, 1:35-2:14.

178. Barratt ’470 explains that “[w]ith multiple antennas, the relationship in both amplitude and phase of a signal of interest to the interfering co-channel signals will be different in each of the antenna signals (each of the *m* signals in an *m* antenna system) due to geometric considerations, both because the antennas are separated by some distance, and . . . because the different sources [e.g., remote terminals] also are separated.” *Id.* at 2:47-51. Spatial processing/SDMA techniques takes advantage of this. For example, Barratt ’470 teaches that “[s]patial processing of the (complex valued) *m* signals at the *m* antennas comprises for *each signal of interest* determining

a *weighted sum of the antenna signals*. The complex valued *weights* can be represented by a vector called herein a *weight vector*.” *Id.* at 2:47-51.

179. These complex valued “*weights*” that are used for forming the “*weighted sum of the antenna signals*” are a type of antenna combining parameter because they are used to *combine* the different versions of each signal (*e.g.*, $m=4$) received by the base station’s multiple antennas, as illustrated in annotated Figure 1 (above). Thus, in addition to determining at least one signal-related parameter (*e.g.*, *frequency offset, time alignment, etc.*), Barratt ’470 also discloses determining a value of at least one channel-related parameter (*e.g.*, *antenna weights*), where together these parameters are representative of communication of the first burst data signal over the transmission channel.

180. Thus, because Barratt ’470 discloses “determining a value of at least on signal-related parameter and at least one channel-related parameter” that are “collectively representative” of burst data signals transmitted over a channel to a “receiving station,” Barratt ’470 discloses Claim [16.A].

xvii. Claim 16, [16.B]: storing values representative of the at least one signal-related parameter and the at least one channel-related parameter determined during said operation of determining; and

181. Barratt ’470 discloses Claim [16.B]. Barratt ’470 teaches that the parameter values discussed in the analysis of Claim [16.A]—specifically, the values representing the “signal-related parameters” and “channel-related parameters,” as

defined above—are stored for use in estimating the values of subsequent burst data signal transmissions. Ex. 1007, 24:24-48, 14:21-35, Fig. 4A. For example, Barratt '470 discloses that for each signal of interest “the method involves a recursive loop repeated every frame . . . On an ongoing basis, one starts the loop [*for the current frame*] with starting estimate of w_r and of the alignment and frequency offset obtained from the processing of the same signal *on the previous frame*.” Ex. 1006, 16:32-17:7. Thus, Barratt '470 discloses a method that teaches *storing* these parameter values *from one frame to next* for each signal of interest, as required by Claim [16.B].

xviii. Claim 16, [16.C]: using the values stored during said operation of storing to facilitate receive operations performed at the receiving station upon at least one subsequent burst of the first burst data signal.

182. Barratt '470 discloses Claim [16.C]. As discussed above in the analysis of Claim [16.B], discloses a base station that maintains various parameter values to facilitate receive operations performed on subsequent bursts of the same signal. Ex. 1007, 8:48-62, 14:21-35, 16:17-18:45, 24:24-48, Fig. 4A. This is illustrated, for example, in annotated Figure 6 (reproduced below) which shows that certain values obtained in a *previous frame* (“frequency offset”) are being used in receive operations performed on the *current frame*. *Id.* Thus, Barratt '470 discloses storing values to facilitate receive operations performed on *subsequent bursts* of the same burst data signal.

Ex. 1007, Fig. 6 (annotated)

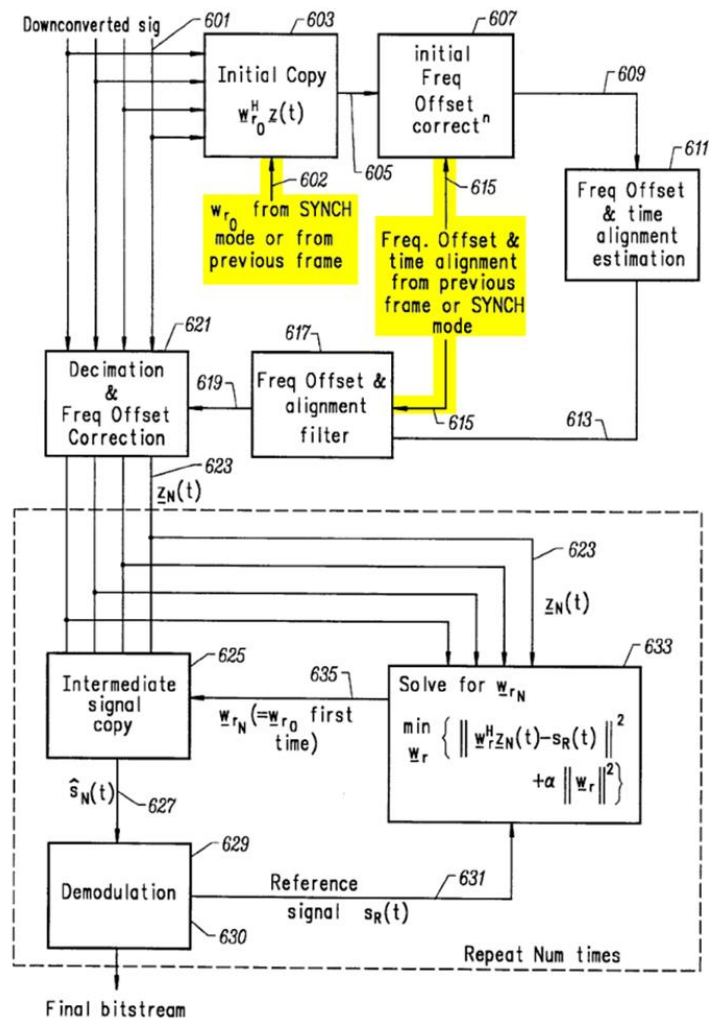


FIG. 6

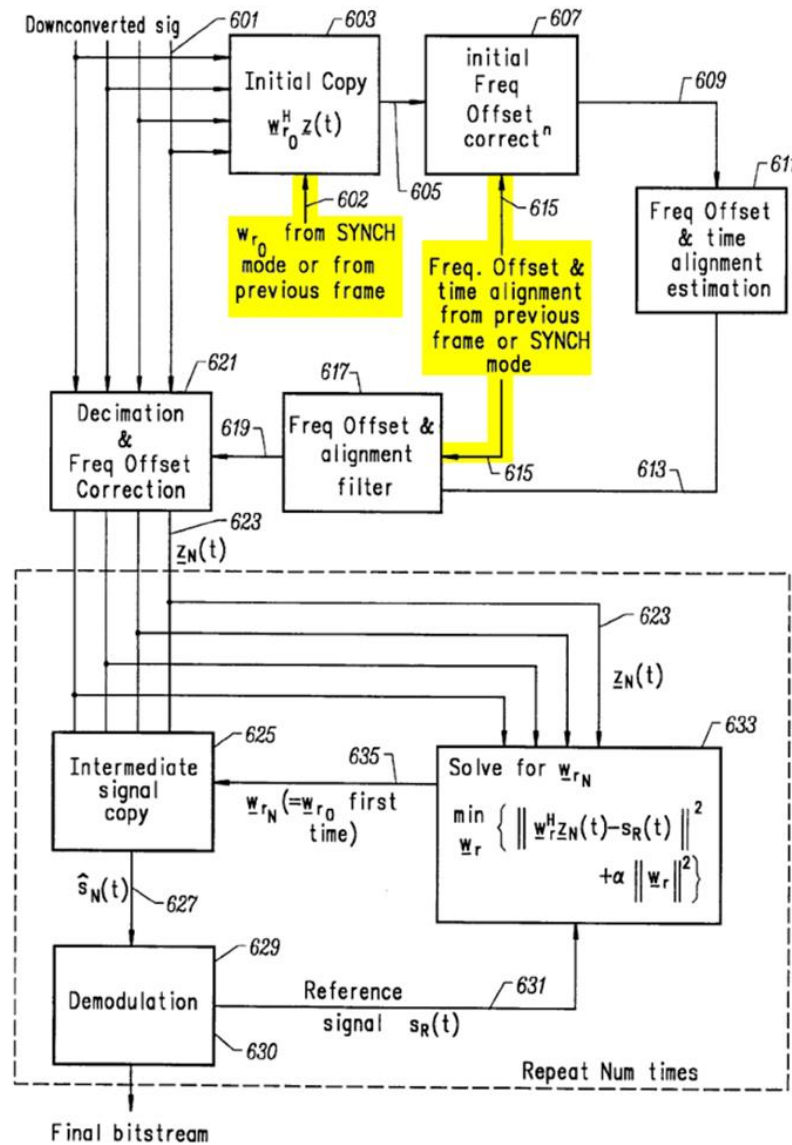
Thus, a POSITA would have understood that Barratt '470 teaches a “profile parameter storage device” that stores values in order to “facilitate receive operations” on subsequent burst data signals and disclose Claim [1.D].

- xix. Claim 17: The method of claim 16 further comprising the operations of: detecting, at the receiving station, the at least one subsequent burst of the first burst data signal; responsive to detecting the at least one subsequent burst, updating the previously-determined value(s) of one or both of the at least one signal-related parameter and the at least one channel-related parameter.**

183. Barratt '470 discloses Claim 17. As discussed above in Sections VIII.C.xvi-xix., Barratt '470 discloses the method described in Claim 16. Barratt '470 discloses a base station (i.e., “receiving station”) containing a DSP (i.e., “profile parameter determiner”) that processes signals received via a plurality of antennas at the base station. Ex. 1007, Abstract, 10:60-67. Barratt '470 teaches that the plurality of antennas receives burst data signals from the remote terminals transmitting upstream to the base station and sends the signals to the DSP for processing. *Id.*; *Id.* at 2:32-61.

184. Further, Barratt '470 discloses a parameter estimation method that “involves a recursive loop repeated every frame.” Ex. 1007, 16:32-17:7. “On an ongoing basis [for each frame], one starts the loop with starting estimate of [weight vector] w_r and of the [time] alignment and frequency offset obtained from the processing of the same signal on the previous frame.” *Id.* This is illustrated in annotated Figure 6 (reproduced below), which shows that certain parameter values obtained in a previous frame (e.g., “frequency offset”) are being used for determining an *updated value* of those parameters in the current frame. *Id.* Thus,

Barratt '470 discloses determining an *updated value* of at least one parameter (*e.g.*, “frequency offset”) responsive to at least one *additional burst* of the same signal.



185. Thus, because Barratt '470 discloses a “detecting at least one subsequent burst” and determining an “updated value” of at least one parameter responsive to the additional burst, Barratt '470 discloses Claim 17.

xx. ***Claim 19: The method of claim 16 wherein the at least channel-related parameter comprises one or more of equalization weighting and antenna parameters.***

186. Barratt '470 discloses Claim 19. As discussed above in Sections VIII.C.xvi-xix., Barratt '470 discloses the method described in Claim 16.

187. As discussed above in the analysis of Claim 1, the '477 Patent states that “channel-related parameters” can include, for instance, “*antenna parameters.*” Ex. 1001, 11:56-63. Barratt '470 teaches that the base station determines at least one “channel-related parameter” for each signal of interest including, *e.g.*, *antenna weights* that are used in forming a “*weighted sum of the antenna signals*” received at the base station. *Id.* These antenna “weights” (or “weight vector”) are representative of a channel condition of the first channel, in that they provide the base station with information on the channel conditions for each remote terminal.

188. Additionally, the '477 Patent states that “channel-related parameters” can also include, for instance, “values of *equalization weighting.*” Ex. 1001, 11:56-63. In describing the “weight vector,” Barratt '470 explains that “[t]he more general situation is that the received antenna signals need also to be temporally *equalized*, and in that situation, rather than a weighted sum, for each signal of interest, a sum

of convolutions of the antenna signals is determined. That is, the *weight vector* is generalized, for the linear time invariant *equalization* situation, to a vector of complex valued impulse responses.” Ex. 1007, 2:51-57. As a result, Barratt ’470 states that “[f]or the purposes of this invention, the term *weight vector* shall apply either to a vector of complex weights or to a vector of impulse responses, depending on whether temporal *equalization is included*.” *Id.* at 2:51-57.

189. Therefore, Barratt ’470 discloses determining *equalization weighting* values, *e.g.*, in those instances where “temporal equalization is included” at the base station. *Id.* As with the “antenna parameters” discussed above, these *equalization weighting* values are representative of a channel condition of the first channel, in that they provide the base station with information on the channel conditions for each remote terminal.

190. Thus, Barratt ’470 discloses determining parameters comprising values of “equalization weighting” and “antenna parameters” as described in Claim 19.

xxi. Claim 20: The method of claim 16 wherein the at least signal-related parameter comprises one or more of forward error correction (FEC) amount, frequency change, burst time change, and burst power level change.

191. Barratt ’470 discloses Claim 20. As discussed above in Sections VIII.C.xvi-xix., Barratt ’470 discloses the method described in Claim 16. First, Barratt ’470 teaches that certain parameters determined during the processing of burst signals by the DSP include values of “*frequency offset*.” Ex. 1007, 1:19-24,

5:19-22, 5:45-52, 6:10-16. A POSITA would have understood that the “frequency offset” comprises a value representative of a frequency change of the burst data signal because it involves a value associated with the frequency of the signal. *Id.* Thus, Barratt ’470 discloses that a determined “signal-related parameter” is representative of a “frequency change” of an initial burst data signal. *Id.*

192. Further, Barratt ’470 teaches that the disclosed DSP processes burst signals to determine values of “time alignment.” Ex. 1007, 1:19-24, 5:19-22, 5:45-52, 6:10-16. A POSITA would have understood that “time alignment” values comprise a time shift characteristic of a burst data to align its transmission for processing. *Id.* Thus, Barratt ’470 discloses determining a “signal-related parameter” representative of a “burst-time change” of an initial burst data signal.

D. Ground 4: Barratt ’470 in view of Barratt ’490 Renders Obvious Claims 7, 11, and 12 of the ’477 Patent.

i. Motivation to Combine

193. A POSITA would have been motivated to combine Barratt ’470 and Barratt ’490 for the following reasons. Like Barratt ’490, the disclosures taught in Barratt ’470 are directed towards a wireless communications system containing a plurality of remote terminals connected via a plurality of channels to a base station. Ex. 1007, Abstract, 2:32-46. In particular, both Barratt ’470 and Barratt ’490 are directed to communications between remote terminals and a base station, where the

base station includes a plurality of antennas for receiving uplink signals and transmitting downlink signals. *Id.*; Ex. 1008, Abstract.

194. Additionally, both Barratt '470 and Barratt '490 share the same, stated goals of using antenna arrays and signal processing to increase the capacity and performance of wireless communication systems, including increasing efficiency, capacity, signal quality, and coverage of wireless communication systems. Ex. 1008, 2:46-63; Ex. 1007, 6:19-33.

195. Further, a POSITA would have been motivated to combine Barratt '490 with Barratt '470 because Barratt '470 expressly references Barratt '490 in its specification, describing it as a patent that “previously disclosed spatial processing with antenna arrays to increase the spectrum efficiency of such systems.” Ex. 1007, 1:49-63. Barratt '470 expressly teaches building on the disclosures of Barratt '490 to increase performance of the system. *Id.* Therefore, a POSITA would have known to look to Barratt '490 to disclose a system and method that would operate with the invention disclosed in Barratt '470; thus, a POSITA would have been motivated to combine Barratt '490 and Barratt '470.

- ii. ***Claim 7: The apparatus of claim 3 wherein the first burst data signal is transmitted by a first sending station having an antenna assembly and wherein the channel-related parameter determined by said profile parameter determiner comprises an antenna parameter related to the antenna assembly.***

196. The combination of Barratt '470 and Barratt '490 discloses Claim 7. As discussed above in Sections VIII.C.i-v. and VIII.C.vii., Barratt '470 independently teaches the entirety of the limitations claimed in Claims 1 and 3. Like Barratt '470, Barratt '490 discloses *determining and maintaining* various parameter values for each remote terminal communicating with the base station.

197. For example, Barratt '490 states that “the invention comprises antenna arrays and signal processing means for *measuring, calculating, storing, and using spatial signatures* of receivers and transmitters in wireless communication systems to increase system capacity, signal quality, and coverage.” Ex. 1008, 2:64-3:2. In particular, Barratt '490 states that “[s]patial processor 13 *produces and maintains spatial signatures for each remote terminal* for each conventional frequency channel, and calculates *spatial multiplexing and demultiplexing weights* for use by spatial demultiplexers 20 and spatial multiplexers 23” (shown in FIG. 1 below). *Id.* at 7:60-64.

Ex. 1008 at Fig. 1 (annotated)

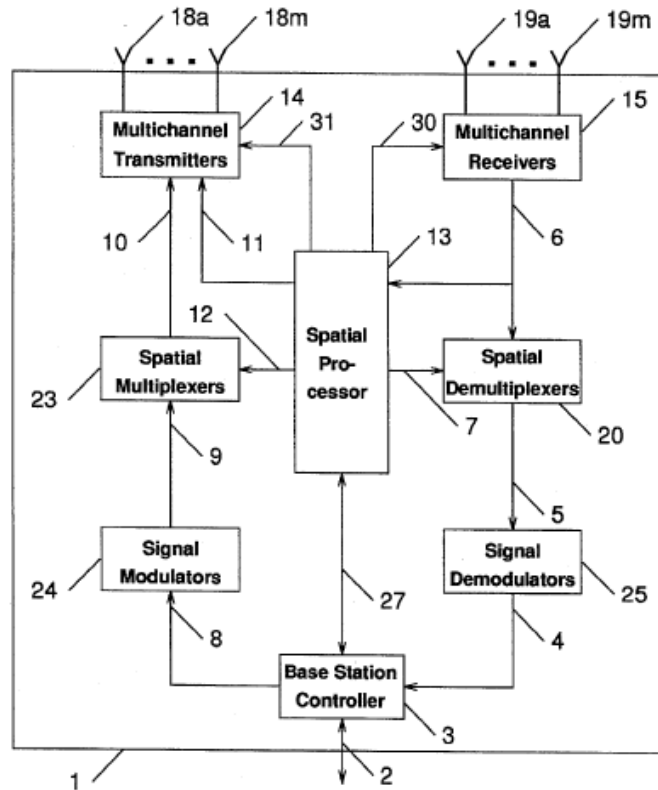


FIG. 1

198. Barratt '490 teaches that “there are two spatial signatures associated with each remote terminal/base station pair,” a “receive spatial signature” and a “transmit spatial signature.” *Id.* at 3:26-37. “The receive spatial signature characterizes how the base station antenna array receives signals from the particular remote unit”; and “[t]he *transmit spatial signature characterizes how the remote terminal receives signals* from each of the antenna array elements at the base

station.” *Id.* at 3:38-63. Barratt ’490 discloses that in certain embodiments, the transmit spatial signature “is a complex vector containing relative amounts (amplitude and phase...) of each [of] *the antenna element transmitter outputs that are contained in the remote terminal receiver output, i.e., for an m-element array ... of the remote terminal.*” *Id.* at 3:63-4:7, 11:25-42.

199. Barratt ’490 further notes that “[t]hese spatial signatures are calculated (estimated) and stored at each base station for each remote terminal in its cell and for each conventional channel.” *Id.* at 4:15-17. Thus, the combination of Barratt ’470 and Barratt ’490 discloses a remote terminal (“first sending station”) having an antenna assembly, and where a “channel-related parameter” determined by the base station (“profile parameter determiner”) comprises an antenna parameter (*e.g.*, “transmit spatial signature”) related to the antenna assembly of that remote terminal.

200. A POSITA would have been motivated to combine the system of processing burst data signals to determine certain channel-related parameters in Barratt ’470 with the antenna properties described in Barratt ’490 in order to determine profile parameters comprising values related to the antenna assembly associated with a burst transmission channel. A POSITA would have been motivated to create a system capable of determining and storing values associated with antenna parameters in order to better process subsequent transmissions. Thus, the

combination of Barratt '470 and Barratt '490 renders obvious Claim 7. *See also* Ex. 1011, 41-44.

- iii. Claim 11: The apparatus of claim 8 wherein the first burst data signal includes forward error correction (FEC) and wherein the signal-related parameter determined by said profile parameter determiner comprises a value representative of the FEC included in the first burst data signal.**

201. The combination of Barratt '470 and Barratt '490 discloses Claim 11. As discussed above in Sections VIII.C.i-v. and VIII.C.xi., Barratt '470 independently discloses the apparatus described in Claims 1 and 8.

202. Additionally, Barratt '490 discloses “*embodiments where channel coding of the signals sent by remote terminals is performed.*” Ex. 1008, 8:45-51. A POSITA would have understood “*channel coding*” to include (or at least strongly suggest) the use of forward error correction (FEC) because these two terms (“channel coding” and “FEC”) are often used interchangeably. *See* Ex. 1012 (“Forward error-correction coding (also called channel coding) is a type of signal processing that improves data reliability”); *see also* Ex. 1013 (“Forward Error Correction (or channel coding) is a technique that”). Further, a POSITA would have been motivated to combine the system of determining certain signal-related parameters in Barratt '470 with the channel coding techniques in Barratt '490 to determine a value representative of FEC. *Id.* A POSITA would have been motivated to create a system capable storing FEC values in order to better process thereby potentially avoiding the need to wait for a costly retransmission of the signal. *Id.*

This is particularly true in *wireless* systems where bit error rates are known to be much higher than in typical wireline or optical systems. *Id.* Thus, the combination of Barratt '470 and Barratt '490 renders obvious Claim 11. *See also* Ex. 1011, 46-52.

iv. Claim 12: The apparatus of claim 8 wherein the signal related parameter determined by said profile parameter determiner comprises a value related to power levels of the first burst data signal.

203. The combination of Barratt '470 and Barratt '490 discloses Claim 12. As discussed above in Sections VIII.C.i-v. and VIII.C.xi., Barratt '470 independently discloses the apparatus described in Claims 1 and 8.

204. As discussed above in Claim 7, Barratt '490 teaches that spatial processor 13 “produces and maintains” various parameter values for each remote terminal, including transmit and receive spatial processing “weights.” Ex. 1008, 7:60-64.

205. In addition, Barratt '490 teaches that “[s]patial processor 13 maintains an active remote terminal list 34 that catalogs which remote terminals are currently using each conventional communication channel as well as their current transmit power levels.” *Id.* at 12:49-60. Barratt '490 explains that “[s]patial processor 13 also maintains a spatial signature list in the remote terminal database 36, which in alternate embodiments includes remote terminals’ power control levels,” as well as other parameters. *Id.* Thus, the combination of Barratt '470 and Barratt '490

discloses determining a signal-related parameter (*e.g.*, “transmit power levels”) that comprises a value related to power levels of the first burst data signal.

206. A POSITA would have been motivated to combine the system of processing burst data signals to determine certain signal-related parameters in Barratt ’470 with the process of cataloging the transmit power levels of upstream signal transmissions in Barratt ’490 in order to determine parameters of power levels associated with a transmitted burst data signal. A POSITA would have been motivated to create a system capable of determining and storing values associated with power levels of a transmitted signal in order to better process subsequent transmissions. Thus, the combination of Barratt ’470 and Barratt ’490 renders obvious Claim 12. *See also* Ex. 1011, 52-53.

E. Ground 5: Barratt ’470 in view of PHS Renders Obvious Claims 2, 14, and 18 of the ’477 Patent.

i. Motivation to Combine

207. A POSITA would have been motivated to combine Barratt ’470 and PHS for the following reasons. Importantly, Barratt ’470 directly references and cites to PHS: “[t]he various preferred and alternate embodiments of the present invention *are for incorporation in a cellular system using the Personal Handyphone System’ (PHS).*” Ex. 1007, 7:58-61. A POSITA would have naturally looked to PHS for this reason. *Id.* Further, PHS was available to any POSITA and could have been easily found in most engineering libraries, such as the Engineering Library at

Stanford University—a place a POSITA would have naturally looked for relevant references. Ex. 1010, ¶¶19-21.

208. In addition, explicitly teaches that adding spatial multiplexing (or spatial division multiple access, SDMA) techniques to a “conventional” TDMA system like PHS is beneficial because it can increase spectrum efficiency by adding many more users to the same conventional channels. Ex. 1007, 1:35-2:14. Thus, a POSITA would have understood that combining Barratt ’470 with the “conventional” TDMA system described in PHS would have been advantageous.

209. Therefore, a POSITA would have consulted PHS, and other similar documents, and had a reasonable expectation of success in combining the specifics of a conventional communications system as disclosed in PHS with the system and method disclosed in Barratt ’470. *Id.*

- ii. ***Claim 2: The apparatus of claim 1 wherein the receiving station is operable in a communication system in which communication protocols include a contention period and wherein the initial burst of the first burst data signal, responsive to which said profile parameter determiner determines the at least one parameter, is communicated during the contention period.***

210. The combination of Barratt ’470 and PHS discloses Claim 2. Ex. As discussed above in Sections VII.C.i-v., Barratt ’470 teaches the entirety of Claim 1. Additionally, Barratt ’470 describes a system that includes a “contention period” (e.g., “LCCH”) in which remote terminals send uplink access requests to the base station in order to establish an initial link to the network. Ex. 1007, 7:58-8:47.

211. For example, Barratt '470 states that “embodiments of the invention are for incorporation in a cellular system using the ‘Personal Handyphone System’ (PHS).” Ex. 1007, 7:58-61. “The PHS system has a dedicated frequency and timeslot for a control channel *on which call initialization takes place*. Once a link is established, the call is handed to a service channel for regular communications.” *Id.* at 8:4-7. Barratt '470 explains that in PHS, “[t]wo types of logical channels exist, *logical control channels (LCCH) involved in initializing a communications link*, and service channels (SCH) involved in ongoing communications.” *Id.* at 8:26-31. Barratt '470 further states “the base station and the remote terminal communicate on [the LCCH] to establish the *timeslot and frequency* for the service channel,” which is used for further “ongoing” communications. *Id.* at 8:36-47.

212. The PHS standard expressly states that “[t]he LCCH uplink performs random access with slotted ALOHA,” which is a well-known contention-based access scheme that is used for handling shared resources like the LCCH in which collisions may occur. Ex. 1009, 59 (Section 4.2.7.3). Thus, a POSITA would have understood that each “LCCH uplink” period constitutes a “contention period.”

213. Thus, it would have been obvious to a POSITA that the combination of Barratt '470 and PHS disclose a communication system that includes a contention period (*e.g.*, “LCCH”) in which the initial burst of a first burst data signal is communicated to the base station during the contention period (*e.g.*, during “call

initialization”), and where the initial burst is used by the base station to determine the at least one parameter for the first burst data signal, including the “frequency” and “timeslot” of the SCH channel and other parameters described in the PHS standard. Ex. 1009, 124-135. Thus, the combination of Barratt ’470 and PHS renders obvious Claim 2. *Id.*; see also Ex. 1011, 23-24.

iii. Claim 14: The apparatus of claim 13 wherein the receiving station is operable in a communication system in which communication protocols include a contention period and wherein the initial burst and the at least one additional burst of the first burst data signal, responsive to which said profile parameter determiner determines the at least one parameter is communicated during the contention period.

214. The combination of Barratt ’470 and PHS discloses Claim 14. As discussed above in Sections VII.C.i-v. and VII.C.xiii, Barratt ’470 independently teaches Claims 1 and 13. Further, for the reasons discussed in the analysis of Claim 2, the combination of Barratt ’470 and PHS discloses a system that includes a contention period (*e.g.*, “LCCH”) in which an initial burst of a first burst data signal is communicated to the base station. Additionally, PHS teaches that remote terminals may continue to send subsequent requests to the base station during the “LCCH uplink” period (*i.e.*, “contention period”) by which the base station determines the at least one parameter. Ex. 1009, 107 (Section 4.3.2.1), 124-135. Thus, the combination of Barratt ’470 and PHS renders obvious Claim 14.

iv. Claim 18: The method of claim 16 wherein the receiving station is operable in a communication system in which communication protocols include a contention period and wherein the initial burst of the first burst

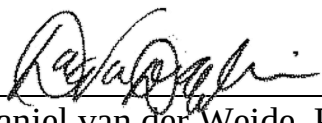
data signal responsive to which the at least one signal-related parameter and the at least one channel-related parameter are determined is transmitted to the receiving station during the contention period.

215. The combination of Barratt '470 and PHS renders obvious Claim 18 for the reasons discussed above for Claim 2.

IX. CONCLUSION

I declare that all statements made herein of my own knowledge are true, and that all statements made on information and belief are believed to be true, and that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code.

Dated: October 12, 2023



Daniel van der Weide, Ph.D.