

PATENT APPLICATION FEE DETERMINATION RECORD

Effective October 1, 2000

Application or Docket Number

WIFST14-00016

CLAIMS AS FILED - PART I

(Column 1)

(Column 2)

TOTAL CLAIMS	20	
FOR	NUMBER FILED	NUMBER EXTRA
TOTAL CHARGEABLE CLAIMS	20 minus 20 =	* 0
INDEPENDENT CLAIMS	2 minus 3 =	* 0
MULTIPLE DEPENDENT CLAIM PRESENT ☐		

SMALL ENTITY
TYPE ☐

OR

OTHER THAN
SMALL ENTITY

RATE	FEE
BASIC FEE	355.00
X\$ 9=	
X40=	
+135=	
TOTAL	355.00

OR

OR

OR

OR

OR

OR

OR

OR

OR

OR

OR

OR

OR

OR

OR

OR

OR

OR

OR

OR

OR

OR

OR

OR

OR

OR

OR

OR

OR

OR

* If the difference in column 1 is less than zero, enter "0" in column 2

CLAIMS AS AMENDED - PART II

(Column 1)

(Column 2)

(Column 3)

AMENDMENT A		CLAIMS REMAINING AFTER AMENDMENT		HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA
	Total	*	Minus	**	=
	Independent	*	Minus	***	=
	FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM ☐				

SMALL ENTITY

OR

OTHER THAN
SMALL ENTITY

RATE	ADDI- TIONAL FEE
X\$ 9=	
X40=	
+135=	
TOTAL	

OR

OR

OR

OR

OR

OR

OR

OR

OR

OR

OR

OR

OR

OR

OR

OR

OR

OR

OR

OR

OR

OR

RATE	ADDI- TIONAL FEE
X\$ 9=	
X40=	
+135=	
TOTAL	

OR

OR

OR

OR

OR

OR

OR

OR

OR

OR

OR

OR

OR

OR

OR

OR

RATE	ADDI- TIONAL FEE
X\$ 9=	
X40=	
+135=	
TOTAL	

OR

OR

OR

OR

OR

OR

OR

OR

OR

TOTAL	
-------	--

OR

OR

OR

OR

OR

OR

TOTAL	
-------	--

OR

OR

OR

OR

OR

TOTAL	
-------	--

OR

OR

OR

OR

AMENDMENT B		CLAIMS REMAINING AFTER AMENDMENT		HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA
	Total	*	Minus	**	=
	Independent	*	Minus	***	=
	FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM ☐				

AMENDMENT C		CLAIMS REMAINING AFTER AMENDMENT		HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA
	Total	*	Minus	**	=
	Independent	*	Minus	***	=
	FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM ☐				

* If the entry in column 1 is less than the entry in column 2, write "0" in column 3.

** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, enter "20."

*** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 3, enter "3."

The "Highest Number Previously Paid For" (Total or Independent) is the highest number found in the appropriate box in column 1.

CLAIMS ONLY

SERIAL NO.

09839719

FILING DATE

04-20-01

APPLICANT(S)

CLAIMS

	AS FILED		AFTER 1st AMENDMENT		AFTER 2nd AMENDMENT			☆		☆		☆	
	IND.	DEP.	IND.	DEP.	IND.	DEP.		IND.	DEP.	IND.	DEP.	IND.	DEP.
1	1						51						
2		1					52						
3		1					53						
4		1					54						
5		1					55						
6		1					56						
7		1					57						
8		1					58						
9		1					59						
10		1					60						
11		1					61						
12		1					62						
13		1					63						
14		1					64						
15		1					65						
16	1						66						
17		1					67						
18		1					68						
19		1					69						
20		1					70						
21							71						
22							72						
23							73						
24							74						
25							75						
26							76						
27							77						
28							78						
29							79						
30							80						
31							81						
32							82						
33							83						
34							84						
35							85						
36							86						
37							87						
38							88						
39							89						
40							90						
41							91						
42							92						
43							93						
44							94						
45							95						
46							96						
47							97						
48							98						
49							99						
50							100						
TOTAL IND.	2	↓		↓		↓	TOTAL IND.	↓		↓		↓	
TOTAL DEP.	15	←		←		←	TOTAL DEP.	←		←		←	
TOTAL CLAIMS	20						TOTAL CLAIMS						

* MAY BE USED FOR ADDITIONAL CLAIMS OR ADMENDMENTS

FORM PTO-2022 (1-98)

U.S. DEPARTMENT OF COMMERCE
Patent and Trademark Office

*U.S. Government Printing Office: 1998 - 433-214/70303

BEST AVAILABLE COPY

Ex.1002.00002

PATENT APPLICATION SERIAL NO. _____

U.S. DEPARTMENT OF COMMERCE
PATENT AND TRADEMARK OFFICE
FEE RECORD SHEET

04/25/2001 HMOHAMM1 00000041 09839719

01 FC:201

355.00 OP

PTO-1556
(5/87)

*U.S. GPO: 2000-468-987/39595

Ex.1002.00003

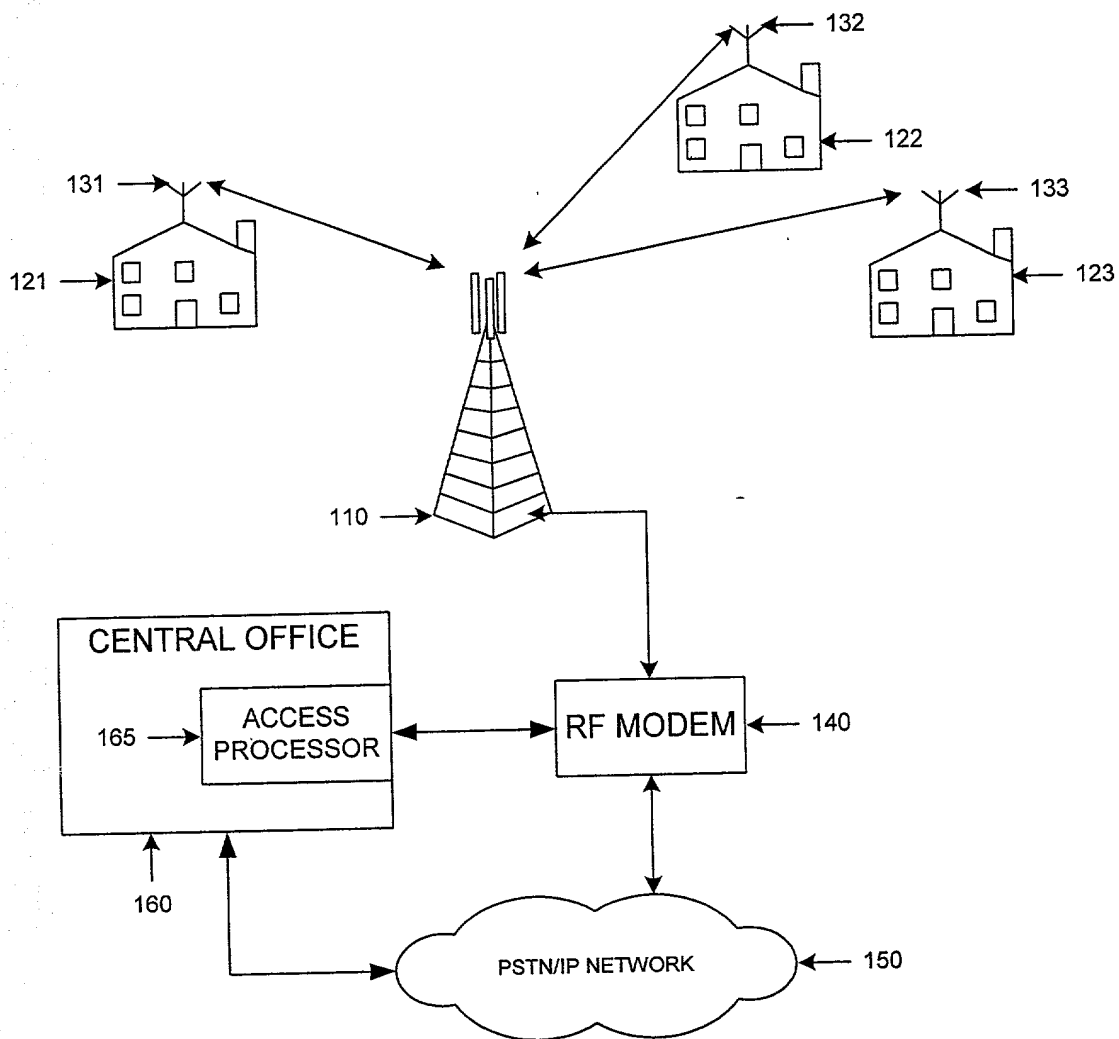


FIGURE 1

100

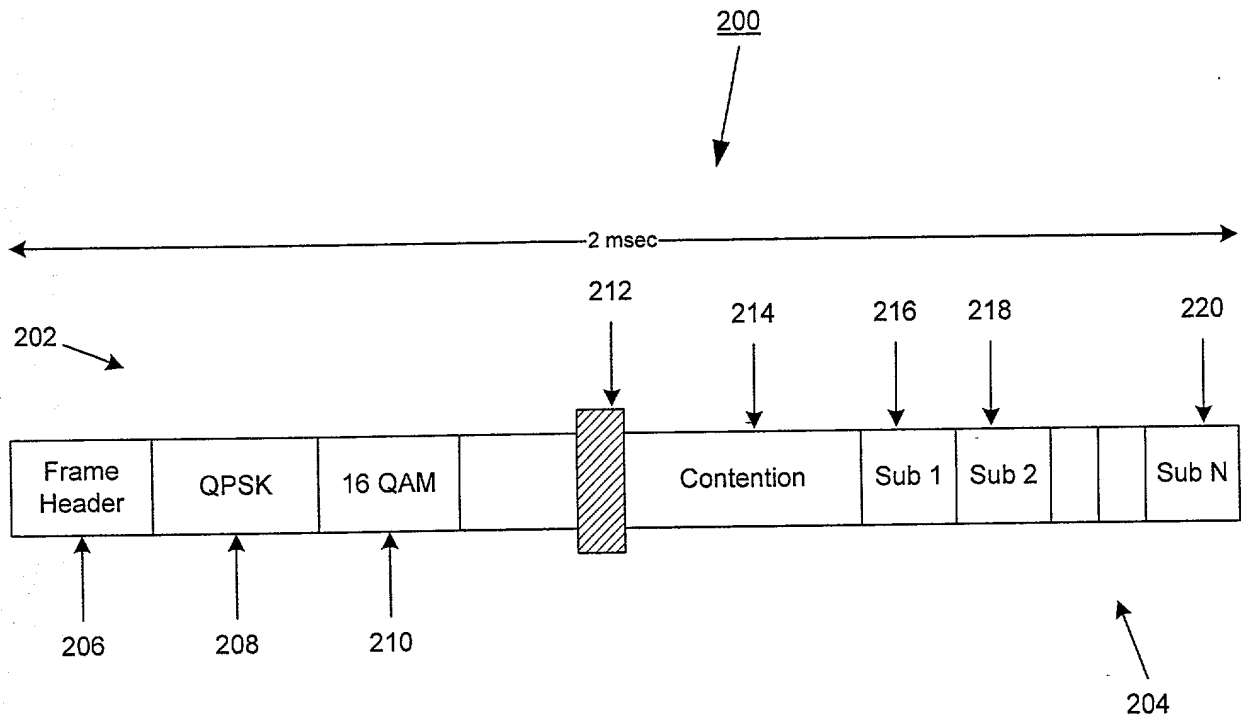


FIGURE 2

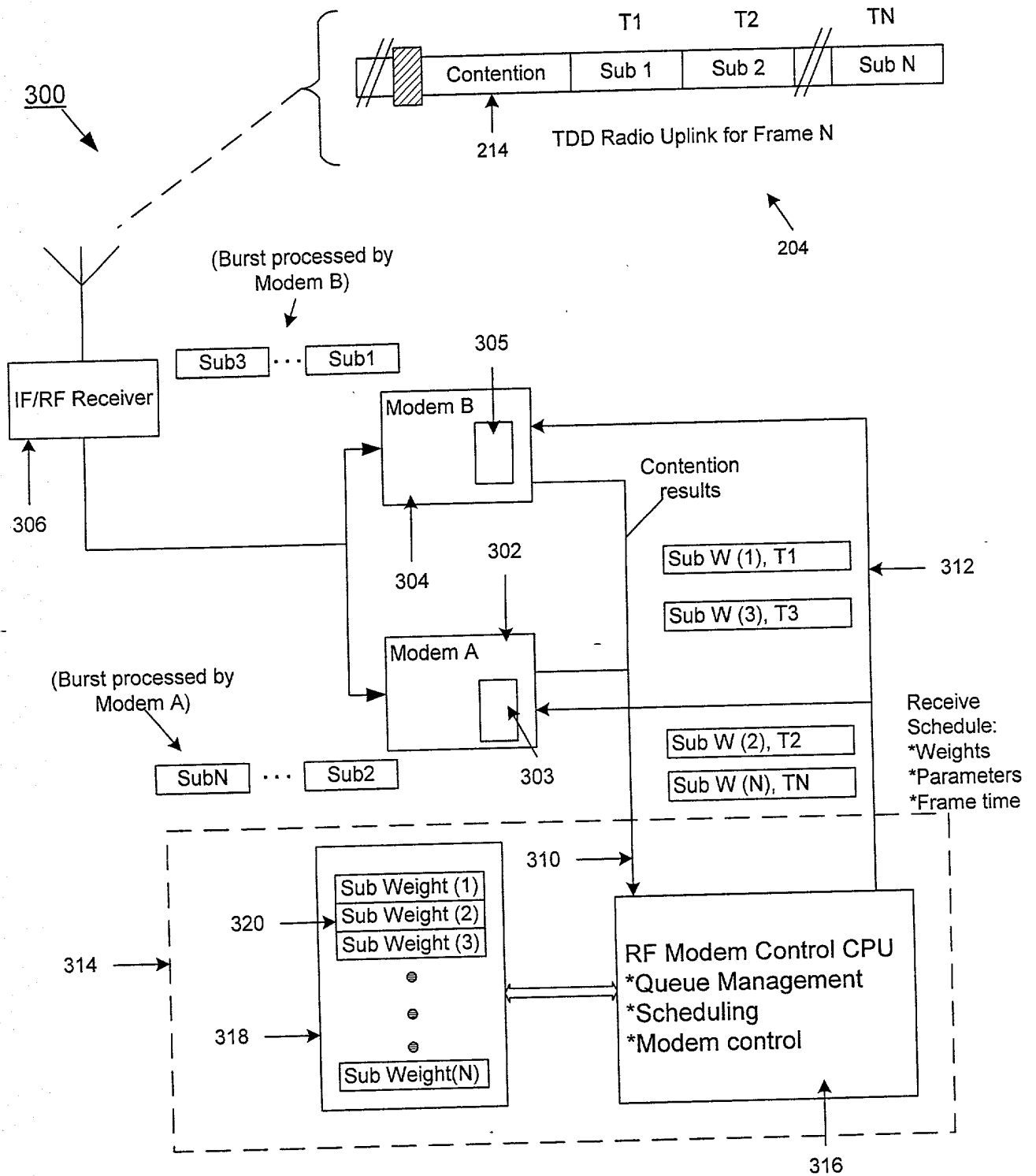


FIGURE 3

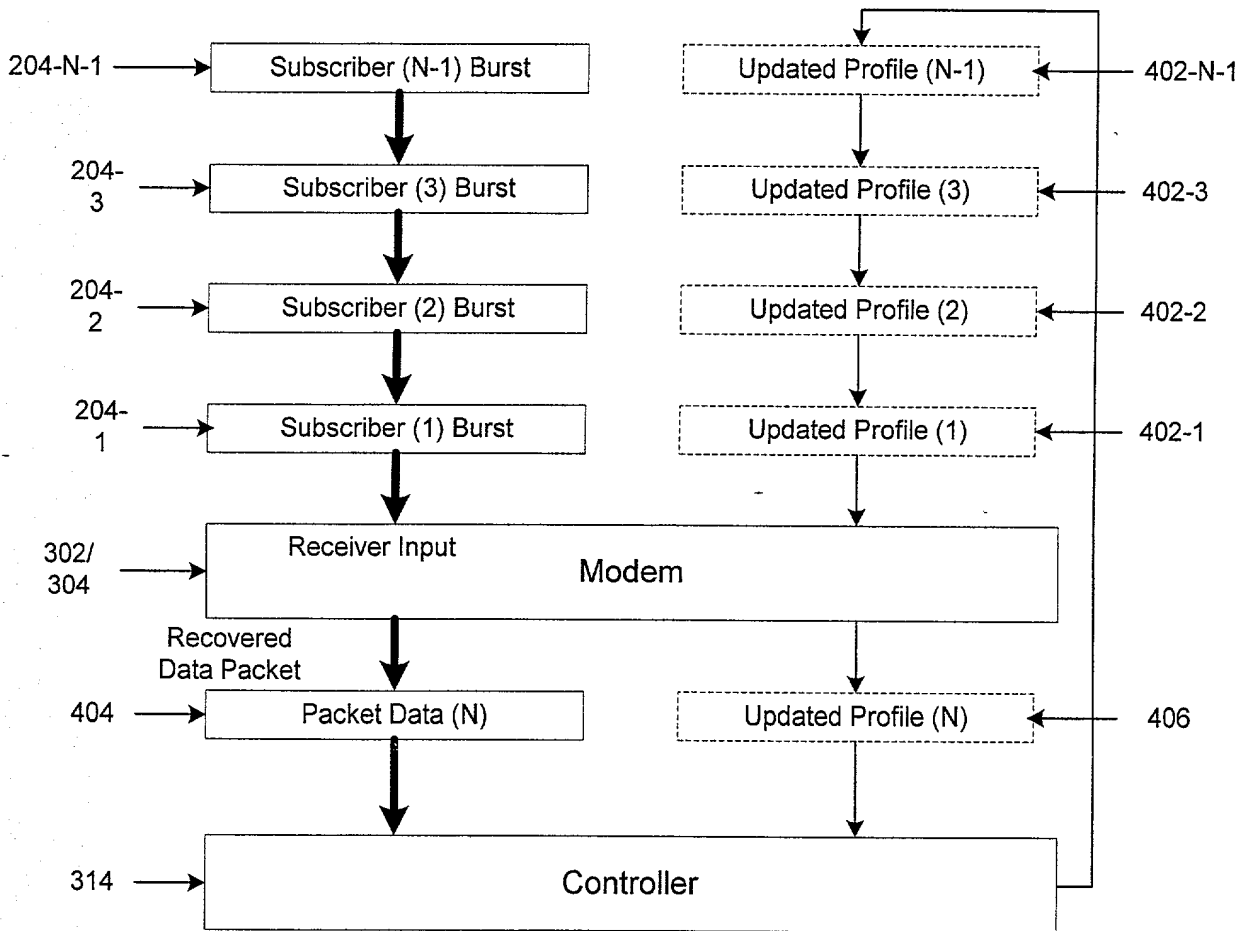


FIGURE 4

500

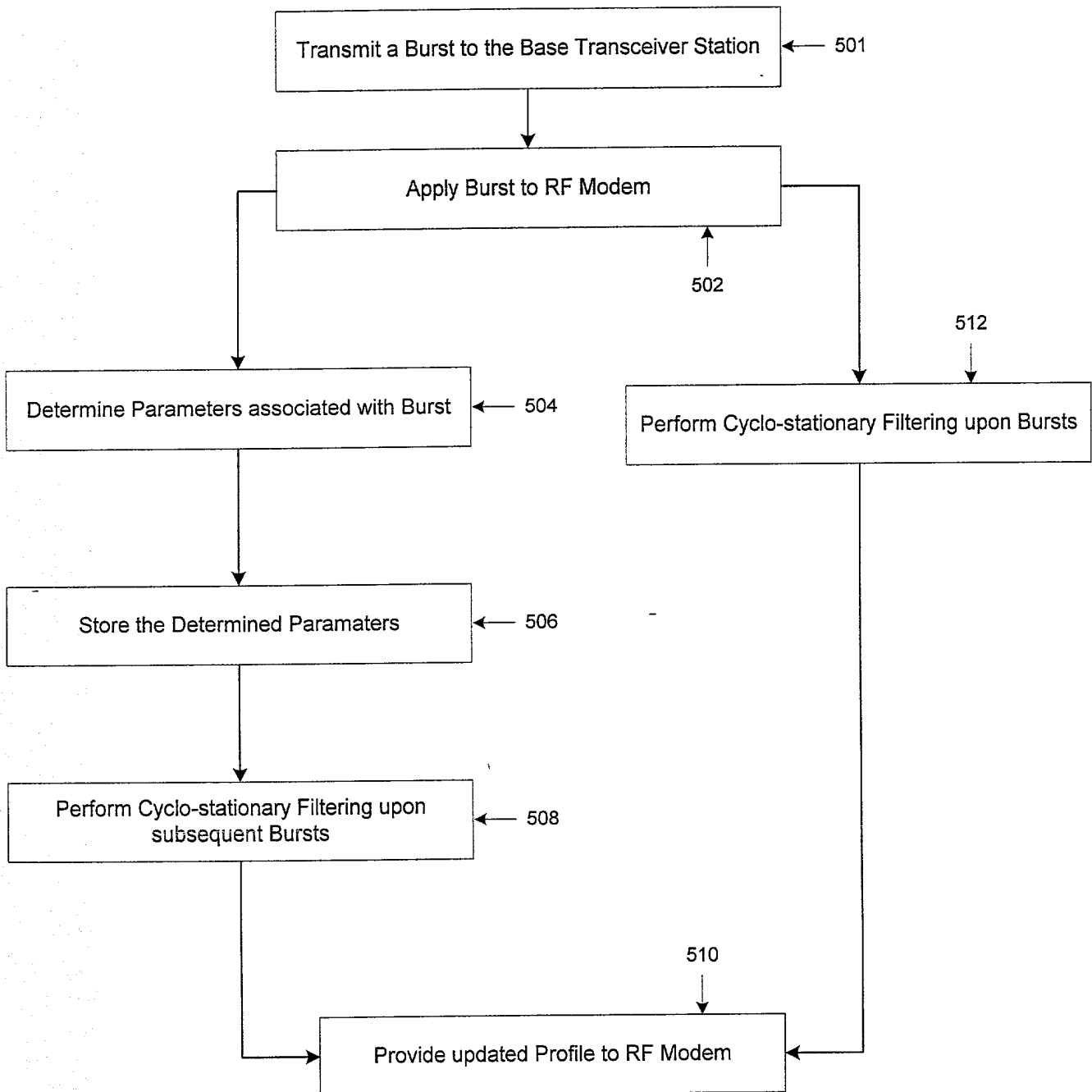


FIGURE 5

APPARATUS AND METHOD FOR CREATING SIGNAL AND
PROFILES AT A RECEIVING STATION

ABSTRACT

Apparatus, and an associated method, for creating a profile
5 associated with burst data signals communicated to a base station
of a fixed wireless access communication system. The profile is
created to facilitate receive operations performed upon subsequent
bursts of the burst data signal. The profile is stored at a
storage device and retrieved when subsequent bursts of the bursts
10 data signal are received at the base station.

DECLARATION AND POWER OF ATTORNEY

As a below named joint inventor, I hereby declare that:

My residence, post office address and citizenship are as stated below next to my name.

I believe I am an original, first and joint inventor of the subject matter which is claimed and for which a patent is sought on the invention, design or discovery entitled:

“APPARATUS AND METHOD FOR CREATING SIGNAL AND
PROFILES AT A RECEIVING STATION”

the specification of which is attached hereto.

I have reviewed and understand the contents of the above-identified specification, including the claims, as amended by any amendment referred to above;

I acknowledge the duty to disclose to the Office all information known to me to be material to the patentability of this application as defined by Title 37, Code of Federal Regulations, § 1.56.

I hereby claim no foreign priority benefits under 35 U.S.C. §119 of any foreign application(s) for patent or inventor's certificate on which priority is claimed.

I hereby claim the benefit under Title 35, United States Code, §119(e) of any United States application(s) listed below and, insofar as the subject matter of each of the claims of this application is not disclosed in the prior United States application(s) in the manner provided by the first paragraph of Title 35, United States Code, §112, I acknowledge the duty to disclose to the Office all information known to me to be material to patentability as defined in § 1.56 which became available between the filing date of any prior application(s) and the national or PCT international filing date of this application.

APPLICATION SERIAL NO.	DATE FILED	STATUS
60/262,827	January 19, 2001	Pending

additional United States applications listed on the attached Appendix A.

I hereby claim the benefit under Title 35, United States Code, § 120 of any United States application(s) listed below and, insofar as the subject matter of each of the claims of this application is not disclosed in the prior United States application(s) in the manner provided by the first paragraph of Title 35, United States Code, § 112, I acknowledge the duty to disclose to the Office all information known to me to be material to patentability as defined in § 1.56 which became available between the filing date of any prior application(s) and the national or PCT international filing date of this application.

APPLICATION SERIAL NO.	DATE FILED	STATUS
09/713,684	November 15, 2000	Pending

I hereby appoint:

William A. Munck, Registration No. 39,308
John T. Mockler, Registration No. 39,775

all of the firm of NOVAKOV DAVIS & MUNCK, P.C. my attorneys with full power of substitution and revocation, to prosecute this application and to transact all business in the United States Patent and Trademark Office connected therewith, and to file and prosecute any international patent applications filed thereon before any international authorities under the Patent Cooperation Treaty.

Send correspondence to: William A. Munck, Esq.
NOVAKOV DAVIS & MUNCK, P.C.
900 Three Galleria Tower
13155 Noel Road
Dallas, Texas 75240

Direct telephone calls to: William A. Munck, Esq.
(214) 922-9221

Atty. Docket No.: WEST14-00016

I hereby 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 further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under § 1001 of Title 18 of the United States Code, and that such willful false statements may jeopardize the validity of the application or any patent issuing thereon.

Full name of first inventor: Paul F. Struhsaker

Inventor's signature:



Date:

19 April 2001

Residence (City, County, State): Plano, Collin County, Texas

Citizenship: United States of America

Post Office Address: 5304 Brouette Court
Plano, Texas 75023

Full name of second inventor:

Russell C. McKown

Inventor's signature:

Russell C. McKown
4/19/01

Date:

Residence (City, County, State):

Richardson, Collin County, Texas

Citizenship:

United States of America

Post Office Address:

1104 Pittsburg Landing
Richardson, Texas 75080

APPENDIX A

Application Serial No.	Dated Filed	Status
60/262,712	January 19, 2001	Pending
60/262,825	January 19, 2001	Pending
60/262,698	January 19, 2001	Pending
60/262,826	January 19, 2001	Pending
60/262,951	January 19, 2001	Pending
60/262,824	January 19, 2001	Pending
60/263,101	January 19, 2001	Pending
60/263,097	January 19, 2001	Pending
60/273,579	March 5, 2001	Pending
60/262,955	January 19, 2001	Pending
60/262,708	January 19, 2001	Pending
60/273,689	March 5, 2001	Pending
60/273,757	March 5, 2001	Pending
60/270,378	February 21, 2001	Pending
60/270,385	February 21, 2001	Pending
60/270,430	April 17, 2001	Pending

APPARATUS AND METHOD FOR CREATING SIGNAL AND
PROFILES AT A RECEIVING STATION

Inventor(s):

Paul F. Struhsaker
5304 Brouette Court
Plano
Collin County
Texas 75023
United States Citizen

Russell McKown
1104 Pittsburg Landing
Richardson
Collin County
Texas 75080
United States Citizen

Assignee:

Raze Technologies, Inc.
2540 East Plano Parkway Suite 188
Plano, Texas 75074-7460

CERTIFICATE OF EXPRESS MAIL	
I hereby certify that this correspondence, including the attachments listed, is being mailed in an envelope addressed to Commissioner of Patents and Trademarks, Washington, DC 20231, using the Express Mail Post Office to Addressee service of the United States Postal Service on the date shown below.	
<u>Laura Zavala</u> Printed Name of Person Mailing	<u>EL7495935109US</u> Express Mail Receipt No.
<u>Laura Zavala</u>	<u>4-20-01</u>

William A. Munck
John T. Mockler
Novakov Davis & Munck, P.C.
Three Galleria Tower
13155 Noel Road, Suite 900
Dallas, Texas 75240
(214) 922-9221

APPARATUS AND METHOD FOR CREATING SIGNAL AND
PROFILES AT A RECEIVING STATION

CROSS-REFERENCE TO RELATED APPLICATIONS

The present invention is related to those disclosed in the
following United States Provisional and Non-Provisional Patent
Applications:

1. Serial No. 09/713,684, filed on November 15, 2000, entitled
"SUBSCRIBER INTEGRATED ACCESS DEVICE FOR USE IN WIRELESS AND
WIRELINE ACCESS SYSTEMS";
2. [Docket No. WEST14-00005] filed concurrently herewith,
entitled "WIRELESS COMMUNICATION SYSTEM USING BLOCK FILTERING
AND FAST EQUALIZATION-DEMODULATION AND METHOD OF OPERATION";
3. [Docket No. WEST14-00014], filed concurrently herewith,
entitled "APPARATUS AND ASSOCIATED METHOD FOR OPERATING UPON
DATA SIGNALS RECEIVED AT A RECEIVING STATION OF A FIXED
WIRELESS ACCESS COMMUNICATION SYSTEM";
4. [Docket No. WEST14-00015], filed concurrently herewith,
entitled "APPARATUS AND METHOD FOR OPERATING A SUBSCRIBER
INTERFACE IN A FIXED WIRELESS SYSTEM";
5. [Docket No. WEST14-00017], filed concurrently herewith,
entitled "SYSTEM AND METHOD FOR INTERFACE BETWEEN A SUBSCRIBER

MODEM AND SUBSCRIBER PREMISES INTERFACES";

6. [Docket No. WEST14-00018], filed concurrently herewith, entitled "BACKPLANE ARCHITECTURE FOR USE IN WIRELESS AND WIRELINE ACCESS SYSTEMS";

7. [Docket No. WEST14-00019], filed concurrently herewith, entitled "SYSTEM AND METHOD FOR ON-LINE INSERTION OF LINE REPLACEABLE UNITS IN WIRELESS AND WIRELINE ACCESS SYSTEMS" ;

8. [Docket No. WEST14-00020], filed concurrently herewith, entitled "SYSTEM FOR COORDINATION OF TDD TRANSMISSION BURSTS WITHIN AND BETWEEN CELLS IN A WIRELESS ACCESS SYSTEM AND METHOD OF OPERATION";

9. [Docket No. WEST14-00021], filed concurrently herewith, entitled "REDUNDANT TELECOMMUNICATION SYSTEM USING MEMORY EQUALIZATION APPARATUS AND METHOD OF OPERATION";

10. [Docket No. WEST14-00022], filed concurrently herewith, entitled "WIRELESS ACCESS SYSTEM FOR ALLOCATING AND SYNCHRONIZING UPLINK AND DOWNLINK OF TDD FRAMES AND METHOD OF OPERATION";

11. [Docket No. WEST14-00023], filed concurrently herewith, entitled "TDD FDD AIR INTERFACE";

12. [Docket No. WEST14-00024], filed concurrently herewith, entitled "APPARATUS, AND AN ASSOCIATED METHOD, FOR PROVIDING

WLAN SERVICE IN A FIXED WIRELESS ACCESS COMMUNICATION SYSTEM";

13. [Docket No. WEST14-00026], filed concurrently herewith,
entitled "WIRELESS ACCESS SYSTEM USING MULTIPLE MODULATION";

14. [Docket No. WEST14-00027], filed concurrently herewith,
entitled "WIRELESS ACCESS SYSTEM AND ASSOCIATED METHOD USING
MULTIPLE MODULATION FORMATS IN TDD FRAMES ACCORDING TO
SUBSCRIBER SERVICE TYPE";

15. [Docket No. WEST14-00028], filed concurrently herewith,
entitled "APPARATUS FOR ESTABLISHING A PRIORITY CALL IN A
FIXED WIRELESS ACCESS COMMUNICATION SYSTEM";

16. [Docket No. WEST14-00029], filed concurrently herewith,
entitled "APPARATUS FOR REALLOCATING COMMUNICATION RESOURCES
TO ESTABLISH A PRIORITY CALL IN A FIXED WIRELESS ACCESS
COMMUNICATION SYSTEM";

17. [Docket No. WEST14-00030], filed concurrently herewith,
entitled "METHOD FOR ESTABLISHING A PRIORITY CALL IN A FIXED
WIRELESS ACCESS COMMUNICATION SYSTEM";

18. [Docket No. WEST14-00033], filed concurrently herewith,
entitled "SYSTEM AND METHOD FOR PROVIDING AN IMPROVED COMMON
CONTROL BUS FOR USE IN ON-LINE INSERTION OF LINE REPLACEABLE
UNITS IN WIRELESS AND WIRELINE ACCESS SYSTEMS";

19. Serial No. 60/262,712, filed on January 19, 2001, entitled

"WIRELESS COMMUNICATION SYSTEM USING BLOCK FILTERING AND FAST EQUALIZATION-DEMODULATION AND METHOD OF OPERATION" [Docket No. WEST14-00005];

20. Serial No. 60/262,825, filed on January 19, 2001, entitled
5 "APPARATUS AND ASSOCIATED METHOD FOR OPERATING UPON DATA SIGNALS RECEIVED AT A RECEIVING STATION OF A FIXED WIRELESS ACCESS COMMUNICATION SYSTEM" [Docket No. WEST14-00014];

21. Serial No. 60/262,698, filed on January 19, 2001, entitled
10 "APPARATUS AND METHOD FOR OPERATING A SUBSCRIBER INTERFACE IN A FIXED WIRELESS SYSTEM" [Docket No. WEST14-00015];

22. Serial No. 60/262,826, filed on January 19, 2001, entitled
15 "SYSTEM AND METHOD FOR INTERFACE BETWEEN A SUBSCRIBER MODEM AND SUBSCRIBER PREMISES INTERFACES" [Docket No. WEST14-00017];

23. Serial No. 60/262,951, filed on January 19, 2001, entitled
"BACKPLANE ARCHITECTURE FOR USE IN WIRELESS AND WIRELINE ACCESS SYSTEMS" [Docket No. WEST14-00018];

24. Serial No. 60/262,824, filed on January 19, 2001, entitled
20 "SYSTEM AND METHOD FOR ON-LINE INSERTION OF LINE REPLACEABLE UNITS IN WIRELESS AND WIRELINE ACCESS SYSTEMS" [Docket No. WEST14-00019];

25. Serial No. 60/263,101, filed on January 19, 2001, entitled
"SYSTEM FOR COORDINATION OF TDD TRANSMISSION BURSTS WITHIN AND

BETWEEN CELLS IN A WIRELESS ACCESS SYSTEM AND METHOD OF OPERATION" [Docket No. WEST14-00020];

26. Serial No. 60/263,097, filed on January 19, 2001, entitled
"REDUNDANT TELECOMMUNICATION SYSTEM USING MEMORY EQUALIZATION
APPARATUS AND METHOD OF OPERATION" [Docket No. WEST14-00021];

27. Serial No. 60/273,579, filed March 5, 2001, entitled "WIRELESS
ACCESS SYSTEM FOR ALLOCATING AND SYNCHRONIZING UPLINK AND
DOWNLINK OF TDD FRAMES AND METHOD OF OPERATION" [Docket No.
WEST14-00022];

28. Serial No. 60/262,955, filed January 19, 2001, entitled "TDD
FDD AIR INTERFACE" [Docket No. WEST14-00023];

29. Serial No. 60/262,708, filed on January 19, 2001, entitled
"APPARATUS, AND AN ASSOCIATED METHOD, FOR PROVIDING WLAN
SERVICE IN A FIXED WIRELESS ACCESS COMMUNICATION SYSTEM"
[Docket No. WEST14-00024];

30. Serial No. 60/273,689, filed March 5, 2001, entitled "WIRELESS
ACCESS SYSTEM USING MULTIPLE MODULATION" [Docket No. WEST14-
00026];

31. Serial No. 60/273,757, filed March 5, 2001, entitled "WIRELESS
ACCESS SYSTEM AND ASSOCIATED METHOD USING MULTIPLE MODULATION
FORMATS IN TDD FRAMES ACCORDING TO SUBSCRIBER SERVICE TYPE"
[Docket No. WEST14-00027];

32. Serial No. 60/270,378, filed February 21, 2001, entitled
"APPARATUS FOR ESTABLISHING A PRIORITY CALL IN A FIXED
WIRELESS ACCESS COMMUNICATION SYSTEM" [Docket No. WEST14-
00028];

5 33. Serial No. 60/270,385, filed February 21, 2001, entitled
"APPARATUS FOR REALLOCATING COMMUNICATION RESOURCES TO
ESTABLISH A PRIORITY CALL IN A FIXED WIRELESS ACCESS
COMMUNICATION SYSTEM" [Docket No. WEST14-00029]; and

34. Serial No. 60/270,430, filed February 21, 2001, entitled
"METHOD FOR ESTABLISHING A PRIORITY CALL IN A FIXED WIRELESS
ACCESS COMMUNICATION SYSTEM" [Docket No. WEST14-00030].

The above applications are commonly assigned to the assignee
of the present invention. The disclosures of these related patent
applications are hereby incorporated by reference for all purposes
as if fully set forth herein.

TECHNICAL FIELD OF THE INVENTION

The present invention relates generally to a manner by which
to operate upon burst data signals received at a receiving station,

such as a base station of a fixed wireless access (FWA) communication system. More particularly, the present invention relates to apparatus, and an associated method, by which to create a profile representative of expected signal characteristics of a burst data signal and of expected characteristics of the channel upon which the burst data signal is communicated. The profile is used at the receiving station to facilitate processing of the burst data signals received at the receiving station.

BACKGROUND OF THE INVENTION

Telecommunications access systems provide for voice, data, and multimedia transport and control between the central office (CO) of the telecommunications service provider and the subscriber (customer) premises. Prior to the mid-1970s, the subscriber was provided phone lines (e.g., voice frequency (VF) pairs) directly from the Class 5 switching equipment located in the central office of the telephone company. In the late 1970s, digital loop carrier (DLC) equipment was added to the telecommunications access architecture. The DLC equipment provided an analog phone interface, voice CODEC, digital data multiplexing, transmission interface, and control and alarm remotely from the central office to cabinets located within business and residential locations for

approximately 100 to 2000 phone line interfaces. This distributed access architecture greatly reduced line lengths to the subscriber and resulted in significant savings in both wire installation and maintenance. The reduced line lengths also improved communication
5 performance on the line provided to the subscriber.

By the late 1980s, the limitations of data modem connections over voice frequency (VF) pairs were becoming obvious to both subscribers and telecommunications service providers. ISDN (Integrated Services Digital Network) was introduced to provide
10 universal 128 kbps service in the access network. The subscriber interface is based on 64 kbps digitization of the VF pair for digital multiplexing into high speed digital transmission streams (e.g., T1/T3 lines in North America, E1/E3 lines in Europe). ISDN was a logical extension of the digital network that had evolved throughout the 1980s. The rollout of ISDN in Europe was highly
15 successful. However, the rollout in the United States was not successful, due in part to artificially high tariff costs which greatly inhibited the acceptance of ISDN.

More recently, the explosion of the Internet and deregulation
20 of the telecommunications industry have brought about a broadband revolution characterized by greatly increased demands for both voice and data services and greatly reduced costs due to

5 technological innovation and intense competition in the telecommunications marketplace. To meet these demands, high speed DSL (digital subscriber line) modems and cable modems have been developed and introduced. The DLC architecture was extended to provide remote distributed deployment at the neighborhood cabinet level using DSL access multiplexer (DSLAM) equipment. The increased data rates provided to the subscriber resulted in upgrade DLC/DSLAM transmission interfaces from T1/E1 interfaces (1.5/2.0 Mbps) to high speed DS3 and OC3 interfaces. In a similar fashion, the entire telecommunications network backbone has undergone and is undergoing continuous upgrade to wideband optical transmission and switching equipment.

10 Similarly, wireless access systems have been developed and deployed to provide broadband access to both commercial and residential subscriber premises. Initially, the market for wireless access systems was driven by rural radiotelephony deployed solely to meet the universal service requirements imposed by government (i.e., the local telephone company is required to serve all subscribers regardless of the cost to install service). The cost of providing a wired connection to a small percentage of rural subscribers was high enough to justify the development and expense of small-capacity wireless local loop (WLL) systems.

20

Deregulation of the local telephone market in the United States (e.g., Telecommunications Act of 1996) and in other countries shifted the focus of fixed wireless access (FWA) systems deployment from rural access to competitive local access in more urbanized areas. In addition, the age and inaccessibility of much of the older wired telephone infrastructure makes FWA systems a cost-effective alternative to installing new, wired infrastructure. Also, it is more economically feasible to install FWA systems in developing countries where the market penetration is limited (i.e., the number and density of users who can afford to pay for services is limited to small percent of the population) and the rollout of wired infrastructure cannot be performed profitably. In either case, broad acceptance of FWA systems requires that the voice and data quality of FWA systems must meet or exceed the performance of wired infrastructure.

Wireless access systems must address a number of unique operational and technical issues including:

1) Relatively high bit error rates (BER) compared to wire line or optical systems; and

2) Transparent operation with network protocols and protocol time constraints for the following protocols:

a) ATM;

b) Class 5 switch interfaces (domestic GR-303 and international V5.2);

c) TCP/IP with quality-of-service QoS for voice over IP (VoIP) (i.e., RTP) and other H.323 media services;

d) Distribution of synchronization of network time out to the subscribers;

3) Increased use of voice, video and/or media compression and concentration of active traffic over the air interface to conserve bandwidth;

4) Switching and routing within the access system to distribute signals from the central office to multiple remote cell sites containing multiple cell sectors and one or more frequencies of operation per sector; and

5) Remote support and debugging of the subscriber equipment, including remote software upgrade and provisioning.

Unlike physical optical or wire systems that operate at bit error rates (BER) of 10^{-11} , wireless access systems have time varying channels that typically provide bit error rates of 10^{-3} to 10^{-6} . The wireless physical (PHY) layer interface and the media access control (MAC) layer interface must provide modulation, error correction and ARQ protocol that can detect and, where required,

correct or retransmit corrupted data so that the interfaces at the network and at the subscriber site operate at wire line bit error rates.

5 The wide range of equipment and technology capable of providing either wireline (i.e., cable, DSL, optical) broadband access or wireless broadband access has allowed service providers to match the needs of a subscriber with a suitable broadband access solution. However, in many areas, the cost of cable modem or DSL service is high. Additionally, data rates may be slow or coverage incomplete due to line lengths. In these areas and in areas where the high cost of replacing old telephone equipment or the low density of subscribers makes it economically unfeasible to introduce either DSL or cable modem broadband access, fixed wireless broadband systems offer a viable alternative. Fixed wireless broadband systems use a group of transceiver base stations to cover a region in the same manner as the base stations of a cellular phone system. The base stations of a fixed wireless broadband system transmit forward channel (i.e., downstream) signals in directed beams to fixed location antennas attached to
10 the residences or offices of subscribers. The base stations also receive reverse channel (i.e., upstream) signals transmitted by the broadband access equipment of the subscriber.
15
20

Unfortunately, the diversity of broadband access technology has resulted in a lack of standardization in the broadband access equipment. Cable modems and DSL routers are incompatible with each other and with fiber optic equipment. Different service providers
5 locate broadband access equipment in different locations on the subscriber premises. Often this equipment is located inside the office or residence of the subscriber, which makes it inaccessible to maintenance workers unless the subscriber is present to admit the workers to the premises. The lack of standardization of
10 broadband access equipment and the frequent inaccessibility of such equipment adds to the cost and complexity of broadband access.

Therefore, there is a need in the art for broadband access equipment that can be readily and inexpensively deployed in the large domestic and international markets that are not currently
15 served by wired or wireless broadband access technology. Further, there is a need for an apparatus to compensate for distortion introduced upon data signals transmitted on a wireless communication channel.

Additionally, the base stations of a FWA system must be able
20 to quickly and accurately to operate upon data bursts received from a potentially large number of subscribers.

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, or other infrastructure, would therefore be advantageous.

SUMMARY OF THE INVENTION

The present invention provides apparatus and an associated method by which to operate upon bursts data signals received at a receiving station, such as a base station of a fixed wireless access communication system.

Through operation of an embodiment of the present invention, an increase in the speed and accuracy by which bursts of burst data signals are operated upon, when received at the receiving station, is possible.

Characteristics of data bursts and the channels by which the data bursts are received are stored in memory as signal and channel profiles at the receiving station. The profiles are updated, as appropriate, and include the information required by the demodulators (typically the demodulators are contained in radio frequency (RF) modems and demodulators and modems will be referred to interchangeably hereinafter) to permit their operation to demodulate bursts of data received by the demodulators.

The profiles further selectably include other parameters, such as the modulation index of the data signals communicated by the subscriber stations to the base station, the modulation orthogonalizations of the bursts of data signals of the bursts of

data signals, parameters associated with FEC (forward error correction) of the data bursts sent to the base station by the subscriber stations, antenna combining parameters when antenna diversity and/or beamforming is utilized, timing adjustment parameters, as well as other values.

When a burst of data is provided to a demodulator, a profile associated with the channel upon which the burst is communicated to the base station and utilized in the demodulation of the burst of data. As the burst of data is demodulated, the values of the profile associated with the channel upon which the data burst is communicated are updated as appropriate. The updated profile is stored to be retrieved thereafter, when subsequent data bursts are received at the base station and demodulated at a demodulator thereof.

During operation of an embodiment of the present invention, data signals are processed at a receiving station, such as a base station in a fixed wireless access communication system. The data signals are transmitted to the receiving stations by any of a plurality of subscriber stations. Improved uplink capacity of data signals sent by the subscriber stations to the base station is possible as a result of operation of an embodiment of the present invention. Additionally, better compensation is made to counteract

the effects of distortion of the data signals communicated during operation of a communication system in which an embodiment of the present invention is implemented.

Elements of the profile created and stored during operation of an embodiment of the present invention are selected, e.g., to be values pertinent to the implementation of the communication system. Upgrades, or other changes in the operation of the communication system, are readily implemented, as necessary, thereby to adapt operation of an embodiment of the present invention corresponding to the changes in operation of the communication system.

In one implementation, an embodiment of the present invention is implemented at the base station of a fixed wireless access communication system. Data bursts of data signals are communicated to the base station. The data bursts are generated by a plurality of subscriber stations positioned within the coverage area defined by the base station. Alternating ones of the bursts are provided to a pair of modems forming part of the receive portion of the base station. The modems are controlled by a controller, such as a base station central processing unit (CPU), to control demodulation operations thereat. The controller maintains profiles associated with the channels wherein separate ones of the data bursts are communicated. The profiles are retrieved and values of the

elements of such profiles are utilized in the demodulation of the respective data bursts.

In these and other aspects, therefore, profile-creating apparatus and an associated method, is provided for creating at least a first profile associated with at least a first channel. At least a first burst data signal is transmitted in bursts upon the at least the first channel to a receiving station. A profile parameter determiner is coupled to receive an indication of an initial burst of the first burst data signal transmitted upon the first channel to the receiving station. The profile parameter determiner determines a value of at least one parameter representative of communication of the burst data signal to the receiving station. A profile parameter storage device is coupled to the profile parameter determiner. The profile parameter storage device stores values representative of the at least one parameter determined by the profile parameter determiner. The values stored at the profile parameter storage device are used to facilitate receive operations performed at the receiving station of subsequent bursts of the first burst data signal.

The present invention will be better understood when read in light of the accompanying drawings which are described in the detailed description hereinbelow and in light of the claims

ATTY. DOCKET NO. WEST14-00016

PATENT

appended hereto.

BRIEF DESCRIPTION OF THE DRAWINGS

For a more complete understanding of the present invention, and the advantages thereof, reference is now made to the following descriptions taken in conjunction with the accompanying drawings, wherein like numbers designate like objects, and in which:

FIGURE 1 illustrates a functional representation an exemplary fixed wireless access network according to an embodiment of the present invention;

FIGURE 2 illustrates an exemplary data frame, as defined by the fixed wireless access network in FIGURE 1, according to an embodiment of the present invention;

FIGURE 3 illustrates a functional block diagram of a portion of an embodiment the present invention comprising two modems and a controller in an embodiment of the present invention;

FIGURE 4 illustrates a high-level block diagram of the controller and one modem in the base station of FIGURE 2 if an embodiment of the present invention; and

FIGURE 5 illustrates a method flow diagram listing the method of operation of embodiment of the present invention by which to create and update a profile used to facilitate receive operations during operation of the fixed wireless access communication system.

DETAILED DESCRIPTION OF THE INVENTION

FIGURES 1 through 5, discussed below, and the various embodiments used to describe the principles of the present invention in this patent document are by way of illustration only and should not be construed in any way to limit the scope of the invention. Those skilled in the art will understand that the principles of the present invention may be implemented in any suitably arranged subscriber integrated access device.

FIGURE 1 illustrates exemplary fixed wireless access network 100 according to one embodiment of the present invention. Fixed wireless network 100 comprises a plurality of transceiver base stations, including exemplary transceiver base station 110, that transmit forward channel (i.e., downlink or downstream) broadband signals to a plurality of subscriber premises, including exemplary subscriber premises 121, 122 and 123, and receive reverse channel (i.e., uplink or upstream) broadband signals from the plurality of subscriber premises. Subscriber premises 121-123 transmit and receive via fixed, externally-mounted antennas 131-133, respectively. Subscriber premises 121-123 may comprise many different types of residential and commercial buildings, including single family homes, multi-tenant offices, small business

enterprises (SBE), medium business enterprises (MBE), and so-called "SOHO" (small office/home office) premises.

5 The transceiver base stations, including transceiver base station 110, receive the forward channel (i.e., downlink) signals from external network 150 and transmit the reverse channel (i.e., uplink) signals to external network 150. External network 150 may be, for example, the public switched telephone network (PSTN) or one or more data networks, including the Internet or proprietary Internet protocol (IP) wide area networks (WANs) and local area networks (LANs). Exemplary transceiver base station 110 is coupled to RF modem shelf 140, which, among other things, up-converts baseband data traffic received from external network 150 to RF signals transmitted in the forward channel to subscriber premises 121-123. RF modem shelf 140 also down-converts RF signals received in the reverse channel from subscriber premises 121-123 to baseband data traffic that is transmitted to external network 150.

10
15
20 RF modem shelf 140 comprises a plurality of RF modems capable of modulating (i.e., up-converting) the baseband data traffic and demodulating (i.e., down-converting) the reverse channel RF signals. In an exemplary embodiment of the present invention, each of the transceiver base stations covers a cell site area that is divided into a plurality of sectors. In an advantageous embodiment

of the present invention, each of the RF modems in RF modem shelf 140 may be assigned to modulate and demodulate signals in a particular sector of each cell site. By way of example, the cell site associated with transceiver base station 110 may be partitioned into six sectors and RF modem shelf 140 may comprise six primary RF modems (and, optionally, a seventh spare RF modem), each of which is assigned to one of the six sectors in the cell site of transceiver base station 110. In another advantageous embodiment of the present invention, each RF modem in RF modem shelf 140 comprises two or more RF modem transceivers which may be assigned to at least one of the sectors in the cell site. For example, the cell site associated with transceiver base station 110 may be partitioned into six sectors and RF modem shelf 140 may comprise twelve RF transceivers that are assigned in pairs to each one of the six sectors. The RF modems in each RF modem pair may alternate modulating and demodulating the downlink and uplink signals in each sector.

RF modem shelf 140 is located proximate transceiver base station 110 in order to minimize RF losses in communication line 169. RF modem shelf 140 may receive the baseband data traffic from external network 150 and transmit the baseband data traffic to external network 150 via a number of different paths. In one

embodiment of the present invention, RF modem shelf 140 may transmit baseband data traffic to, and receive baseband data traffic from, external network 150 through central office facility 160 via communication lines 166 and 167. In such an
5 embodiment, communication line 167 may be a link in a publicly owned or privately owned backhaul network. In another embodiment of the present invention, RF modem shelf 140 may transmit baseband data traffic to, and receive baseband data traffic from, external network 150 directly via communication line 168 thereby bypassing
10 central office facility 160.

Central office facility 160 comprises access processor shelf 165. Access processor shelf 165 provides a termination of data traffic for one or more RF modem shelves, such as RF modem shelf 140. Access processor shelf 165 also provides termination to the network switched circuit interfaces and/or data packet
15 interfaces of external network 150. One of the principal functions of access processor shelf 165 is to concentrate data traffic as the data traffic is received from external network 150 and is transferred to RF modem shelf 140. Access processor shelf 165
20 provides data and traffic processing of the physical layer interfaces, protocol conversion, protocol management, and programmable voice and data compression.

It should be noted that network 100 was chosen as a fixed wireless network only for the purposes of simplicity and clarity in explaining a subscriber integrated access device according to the principles of the present invention. The choice of a fixed wireless network should not be construed in any manner that limits the scope of the present invention in any way. As will be explained below in greater detail, in alternate embodiments of the present invention, a subscriber integrated access device according to the principles of the present invention may be implemented in other types of broadband access systems, including wireline systems (i.e, digital subscriber line (DSL), cable modem, fiber optic, and the like) in which a wireline connected to the subscriber integrated access device carries forward and reverse channel signals.

FIGURE 2 illustrates an exemplary data frame as defined by fixed wireless access network 100 according to an embodiment of the present invention. The time division duplex (TDD) data frame 200 is comprised of downlink portion 202 and uplink portion 204 and is propagated along an independent propagation channel, as illustrated in FIGURE 1. Downlink portion 202 is comprised of at least frame header 206, modulation segment 208 which signals low complexity modulation, modulation segment 210 which dictates the next highest

modulation and contention segment 214. These parameters are managed between both the up link and the down link under control of the basestation RF modem. Boundary 212 is a variable boundary between the uplink and downlink and system monitors and optimize these parameters adaptively and continuously by monitoring the received signal quality optimizing the operating parameters to increase the data throughput. Though only two levels of modulation are indicated in FIGURE 2 for ease of explanation, the number of modulations of increasing complexity is arbitrary and may be dictated by the conditions imposed by the system and/or operator.

Unlike the downlink, where each subscriber receives only the base station signal, the base station receives a burst of data on a demand basis from the subscribers on the uplink and the base station has to process each channel. As shown in FIGURE 1, the system includes multiple modems connected to access processor 165 for covering the subscribers associated with each base station. Uplink portion 204 of data frame 200 is received by a base station modem and comprises multiple segments: contention period 214 at which access is given to the subscriber stations to communicate the data bursts of uplink data, modulation level, forward Error Correction (FEC) and power level designation from antenna (1) 216, modulation level, forward Error Correction (FEC) and power level

designation from antenna (2) 218, and modulation level, forward Error Correction (FEC) and power level designation from antenna (n) 220, where n is the number of antennas transmitting from a subscriber premises.

5 FIGURE 3 illustrates a functional block diagram of a portion of the present invention comprising two modems and a controller in an embodiment of the present invention. Modem 302 and modem 304 are selectively coupled to receive uplink signals sent by different ones of subscriber stations to the base station (not shown). Here, 10 IF/RF (intermediate frequency/radio frequency) receive circuitry 306 of the base station is shown to pass the uplink signals to the modems. Circuitry 306 is operable to down-convert in frequency uplink signals received from receive circuitry 304. Thereafter, the down-converted signals, bursts sub3...sub1 and bursts subN...sub2, are operated upon by modems 304 and 302 respectively. The modems are shown to be functionally coupled to controller 308 via lines 310, for receiving contention results, and 312 for passing parameters, frame times and weight values for the modems to apply to the received signals. Controller 314 includes control CPU 20 316 and memory device 318.

Control CPU 316 is operable, amongst other things, to perform queue management, scheduling operations, as well as to exert

control over operation of modems 302 and 304. Profiles (not shown) are created and maintained by controller 314 in a memory such as memory device 318. The profiles include values which represent channel characteristics upon which uplink signals are transmitted as well as characteristics of the uplink signals. The profiles are stored at memory device 318 and are updated as conditions warrant.

Modem 302 includes equalizer 303 which performs equalization functions, and modem 304 includes equalizer 305, also operable to perform equalization functions. The profiles associated with the various communication channels stored at memory device 318 include weighting values 320 by which to weight equalizers 303 and 305. Values 320 are utilized to weight equalizers 303 or 305, as appropriate, when data signals sent to the base station on the corresponding channel are to be operated upon by the selected modem. As channel conditions change, changes to values 318 are calculated and stored. Other values of the profiles, while not separately shown, are analogously stored at memory device 318.

Because changes in the channel condition typically vary at a rate much slower than the rate of data transmission of the uplink data signals, the update rates at which the values of the profiles need to be applied to the modems are a mere fraction of the data transmission rates. For instance, fading rates are typically of a

level of approximately 1 to 2 Hz while frame updates of the frames are on the order of approximately 500 Hz. Updates are typically needed at approximately five to ten times the channel rate, i.e. of about 5 to 20 Hz. The updates are common in one implementation are made in conjunction with a status polling mechanism. Additionally, a demand access mechanism permits scheduling of traffic bursts, i.e., bursts of uplink signals that may be anticipated to arrive from a particular subscriber station. A demand access burst within contention period portion 214 of uplink portion 204 of a frame is of a relatively brief duration and utilizes relatively robust FEC and modulation short orthogonalization codes when utilizing a spread spectrum arrangement. The modem at which the burst of the uplink data signal is to be operated cyclically adapts equalization functions performed by the equalizer.

FIGURE 4 illustrates a high-level block diagram of the controller and one modem set in the base station of FIGURE 2 in an embodiment of the present invention. Uplink data signal bursts transmitted to the base station by various subscriber stations are represented by the blocks 204-1 through 204-N-1. As a burst of data transmitted by selected subscriber station is applied to modem 302 and 304, a corresponding profile is retrieved from the memory device of the controller and applied to modem 302 or 304. The

profiles are represented in the figure by the blocks 402-1 through 402-N-1.

The demodulator portion of modem 302 or 304 operates upon the burst of data received and a resultant packet of data, here represented by the block 404, is generated in which, amongst other things, the values of the data packet have been compensated for the effects of distortion generated thereon.

The controller 314 is here again shown to include the memory device 318 and the control CPU 316. Here, the control CPU is operable to form a profile parameter determiner and updater, and the memory here forms a profile storage device.

Updates are made to the profile as appropriate (indicated by block 406) and the updated profile is stored at the memory device of the controller. When subsequent bursts generated by the same subscriber station are received at the base station and applied to the modem, the updated profile is retrieved and utilized when the subsequent burst of data is to be operated upon by the modem. Compensation for distortion introduced on the uplink data signal is improved because the profile was updated as the data signal's channel conditions changed.

Cyclo-stationary adaptive filtering (CSAF) is performed upon the uplink data burst signal. CSAF is a signal processing

technique to allow adaptive filters to operate in environments that exhibit cyclic/deterministic channel environments. Each burst of the data signal transmitted by a subscriber station forms a separate and distinct stationary channel environment. Each of the channels is processed by configuring the receive portion of the base station with a matched filter forming the equalizer, such as equalizers 303 and 305 (shown in FIGURE 3) for the specific channel. The values forming the profiles stored at the memory device of the controller are used to weight the equalizer, as appropriate.

Figure 5 illustrates a method flow diagram, shown generally at 500, of a method by which to create, and update, profiles associated with signal characteristics of burst data signals communicated to a base station and the channel characteristics of the channels upon which the burst data signals are transmitted. By creating, updating, and using the profiles, the speed and accuracy of the operations performed upon the bursts of the burst signal data are improved.

First, and as indicated by the block 501, a subscriber station transmits a burst of a burst data signal to the base station which serves the cell, or the cell sector, in which the subscriber station is positioned. The burst is applied to an RF modem located

at the base station, as indicated by the block 502. If the burst is an initial burst communicated during a contention period a path is taken to the block 504 at which operations are performed upon the burst to determine the parameters associated with the burst as well as determinations of the channel characteristics of the channel upon which the burst was transmitted. The parameters include, for instance, 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 equalization weighting, antenna parameters, either at the subscriber station or at the base station, etc. The calculated parameters are stored, indicated by the block 506, and the stored parameters form the initial profile to be used to perform receive operations upon the burst of the burst of data signal.

Then, and as indicated by the block 508, cyclo-stationary adaptive filtering is performed upon subsequent bursts of the burst of the data signal to update the values of the calculated parameters responsive to calculations performed upon subsequent bursts of the burst data signal during the contention period.

By the end of the contention period, a profile is created, stored in memory, and updated if appropriate. The profile is thereafter provided to an RF modem, indicated at the block 510, to facilitate receive operations performed upon subsequent bursts of the burst data signal during scheduled transmission of the bursts.

Another path extending from the block 502 extends to the block 512 to indicate that during scheduled transmissions of bursts of the burst data signal, additional cyclo-stationary adaptive filtering is performed upon the bursts, also to update the profiles created, and stored in memory.

In an exemplary implementation, two separate modems are utilized to demodulate separate bursts of uplink data signals. By utilizing at least two separate modems, alternating ones of the modems are utilized to demodulate successive bursts of data. During a time period in which a demodulator is not being utilized to operate upon a data burst, values associated with another channel upon which data is expected to be subsequently transmitted is applied to the unused modem. Thereby, when the subsequent burst of data is received at the base station, the modem is immediately operable to operate upon the burst of the uplink data signal.

In another implementation, different types of modems operable upon different types of signals form the separate modems. When a

signal generated by a subscriber station is received at the base station, the signal burst is applied to the modem which is capable of operating upon the particular signal. Modem-types are upgradeable while maintaining the backward compatibility of the base station. Additional modems are added, as needed, thereby to permit continued operation of the base station as new types of technology are made available.

In addition to the values associated with weighting of the equalizers, either in the time domain or transformed weights in the frequency domain, additional profile values include, for instance, the modulation index of the uplink data signal, the modulation orthogonalization thereof, parameters associated with forward error correction of the uplink data signal, antenna combining parameters when antenna diversity and/or beamforming is utilized, and residual carrier or baud timing adjustments.

Thereby, through operation of an embodiment of the present invention, a manner is provided by which to operate upon data signals received at a receiving station, such as a base station of a fixed wireless access communication system. The distortion introduced upon the data signals during their communication upon non-ideal communication channels is better compensated for, thereby permitting improved quality of communications as well as increased

throughput rates to increase the capacity of the communication system.

The previous descriptions are of preferred examples for implementing the invention, and the scope of the invention should not necessarily be limited by this description. The scope of the present invention is defined by the following claims.

jc960 U.S. PTO
04/20/01

04-23-01

A
jc903 U.S. PTO
09/839719
04/20/01

NOVAKOV DAVIS & MUNCK

A PROFESSIONAL CORPORATION
900 THREE GALLERIA TOWER
13155 NOEL ROAD
DALLAS, TEXAS 75240
(214) 922-9221

ATTORNEYS AND
COUNSELORS

April 20, 2001

Telecopier
(214) 969-7557

Box Patent Application
Commissioner of Patents
and Trademarks
Washington, D.C. 20231

EXPRESS MAIL RECEIPT No. EL 749593569 US

Re: U.S. Patent Application for "APPARATUS AND METHOD FOR CREATING
SIGNAL AND PROFILES AT A RECEIVING STATION"
Our File: WEST14-00016

Dear Sir:

Enclosed please find the following documents for filing:

Express Mail Certificate of Mailing;
Patent Application (46 pages including cover sheet);
Informal Drawings (5 sheets);
Declaration and Power of Attorney;
Assignment and Recordation Form Cover Sheet;
a check in the amount of \$395.00 for the filing fee (\$355.00) and Assignment Recordal
Fee (\$40.00); and
a postcard receipt.

FOR:	NO. FILED	NO. EXTRA	RATE	FEE
BASIC FEE			\$355	\$355.00
TOTAL CLAIMS	20 - 20=	-0-	\$ 9	\$ -0-
INDEP. CLAIMS	2 - 3=	-0-	\$ 40	\$ -0-
MULTIPLE DEPENDENT CLAIM PRESENTED				\$ -0-

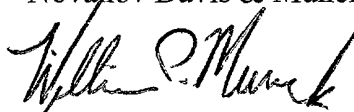
TOTAL \$355.00

Commissioner of Patents
and Trademarks
April 20, 2001
Page 2

If any problems arise in the filing of the enclosed documents, please contact me at (214) 922-9221 . The Commissioner is hereby authorized to charge any additional fees which may be required, or credit any overpayment to Novakov Davis Deposit Account No. 50-0208.

Very truly yours,

Novakov Davis & Munck, P.C.

A handwritten signature in black ink, appearing to read "William A. Munck", written over a horizontal line.

William A. Munck

WAM/kl
Enclosures

1002.00051

WHAT IS CLAIMED IS:

1 1. Profile-creating apparatus for creating at least a first
2 profile associated with transmission upon at least a first channel
3 of at least a first burst-data signal transmitted in bursts to a
4 receiving station, said profile-creating apparatus comprising:

5 a profile parameter determiner coupled to receive an
6 indication of an initial burst of the first burst data signal
7 transmitted upon the first channel to the receiving station, said
8 profile parameter determiner for determining a value of at least
9 one parameter representative of communication of the burst data
10 signal to the receiving station; and

11 a profile parameter storage device coupled to said
12 profile parameter determiner, said profile parameter storage device
13 for storing values representative of the at least one parameter
14 determined by said profile parameter determiner, the values stored
15 at said profile parameter storage device to be used to facilitate
16 receive operations performed at the receiving station of subsequent
17 bursts of the first burst data signal.

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

1 3. The apparatus of Claim 1 wherein the at least one
2 parameter determined by said profile parameter determiner comprises
3 a channel-related parameter, the channel-related parameter
4 representative of a channel condition of the first channel.

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

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

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

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

1 8. The apparatus of Claim 1 wherein the at least one
2 parameter determiner by said profile parameter determiner comprises
3 a signal-related parameter, the signal-related parameter
4 representative of a signal characteristic of the first burst data
signal transmitted when the first channel.

1 9. The apparatus of Claim 8 wherein the signal-related
2 parameter determined by said profile parameter determiner comprises
3 a value representative of a frequency characteristic of the first
4 burst data signal.

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

1 11. The apparatus of Claim 8 wherein the first burst data
2 signal includes forward error correction (FEC) and wherein the
3 signal-related parameter determined by said profile parameter
4 determiner comprises a value representative of the FEC included in
5 the first burst data signal.

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

1 13. The apparatus of Claim 1 wherein said profile parameter
2 determiner is further coupled to receive an indication of at least
3 one additional burst of the first burst data signal, said profile
4 parameter determiner further for determining an updated value of
5 the at least one parameter responsive to the at least one
6 additional burst of the first burst signal.

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

1 15. The apparatus of Claim 1 wherein at least the first burst
2 data signal transmitted upon the at least the first channel
3 comprises a plurality of burst data signals transmitted upon a
4 plurality of channels and wherein said profile parameter determiner
5 determines a value of a plurality of parameters representative of
6 communication of the burst data signals and each of the plurality
of channels.

1 16. A method for creating at least a first profile associated
2 with transmission upon at least a first channel of at least a
3 first burst data signal in bursts to a receiving station, said
4 method comprising:

5 responsive to reception at the receiving station of an
6 initial burst of the first burst data signal transmitted upon the
7 first channel, determining a value of at least one parameter
8 representative of communication of the burst data signal to the
9 receiving station;

10 storing values representative of the at least one
11 parameter determined during said operation of determining; and

12 using the values stored during said operation of storing
13 to facilitate receive operations performed at the receiving station
14 upon at least one subsequent burst of the first burst data signal.

1 17. The method of Claim 16 further comprising the operations
2 of:

3 detecting, at the receiving station the at least one
4 subsequent burst of the first burst data signal;

5 updating the value of the at least one parameter
6 determined during said operation of determining responsive to the
7 at least one subsequent burst detected during said operation of
detecting.

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
parameter is determined during said operation of determining is
transmitted to the receiving station during the contention period.

1 19. The method of Claim 16 wherein the at least one parameter
2 determined during said operation of determining comprises a
3 channel-related parameter.

1 20. The method of Claim 16 wherein the at least one parameter
2 determined during said operation of determining comprises a signal-
3 related parameter.

SUPPLEMENTAL DECLARATION AND POWER OF ATTORNEY

#3

I, below named joint inventor, I hereby declare that:

My residence, post office address and citizenship are as stated below next to my name.

I believe I am an original, first and joint inventor of the subject matter which is claimed and for which a patent is sought on the invention, design or discovery entitled:

“APPARATUS AND METHOD FOR CREATING SIGNAL AND PROFILES
AT A RECEIVING STATION”

the specification of which was filed on April 20, 2001 and assigned U.S. Serial No. 09/839,719.

I have reviewed and understand the contents of the above-identified specification, including the claims, as amended by any amendment referred to above;

I acknowledge the duty to disclose to the Office all information known to me to be material to the patentability of this application as defined by Title 37, Code of Federal Regulations, § 1.56.

I hereby claim no foreign priority benefits under 35 U.S.C. § 119 of any foreign application(s) for patent or inventor's certificate on which priority is claimed.

I hereby claim the benefit under Title 35, United States Code, § 119(e) of any United States application(s) listed below and, insofar as the subject matter of each of the claims of this application is not disclosed in the prior United States application(s) in the manner provided by the first paragraph of Title 35, United States Code, § 112, I acknowledge the duty to disclose to the Office all information known to me to be material to patentability as defined in § 1.56 which became available between the filing date of any prior application(s) and the national or PCT international filing date of this application.

APPLICATION SERIAL NO.	DATE FILED	STATUS
60/262,827	January 19, 2001	Pending

I hereby claim the benefit under Title 35, United States Code, § 120 of any United States application(s) listed below and, insofar as the subject matter of each of the claims of this application is not disclosed in the prior United States application(s) in the manner provided by the first paragraph of Title 35, United States Code, § 112, I acknowledge the duty to disclose to the Office all information known to me to be material to patentability as defined in § 1.56 which became available between the filing date of any prior application(s) and the national or PCT international filing date of this application.

APPLICATION SERIAL NO.	DATE FILED	STATUS
N/A		

I hereby appoint:

William A. Munck, Registration No. 39,308
John T. Mockler, Registration No. 39,775

all of the firm of NOVAKOV DAVIS & MUNCK, P.C. my attorneys with full power of substitution and revocation, to prosecute this application and to transact all business in the United States Patent and Trademark Office connected therewith, and to file and prosecute any international patent applications filed thereon before any international authorities under the Patent Cooperation Treaty.

Send correspondence to: Docket Clerk
P.O. Drawer 800889
Dallas, Texas 75380

Direct telephone calls to: William A. Munck, Esq.
(214) 922-9221

Atty. Docket No.: WEST14-00016

I hereby 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 further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under § 1001 of Title 18 of the United States Code, and that such willful false statements may jeopardize the validity of the application or any patent issuing thereon.

Full name of first inventor: Paul F. Struhsaker

Inventor's signature:



Date:

9 Nov 2001

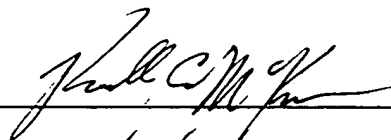
Residence (City, County, State): Plano, Collin County, Texas

Citizenship: United States of America

Post Office Address: 5304 Brouette Court
Plano, Texas 75023

Full name of second inventor: Russell C. McKown

Inventor's signature:



Date:

11/09/61

Residence (City, County, State): Richardson, Collin County, Texas

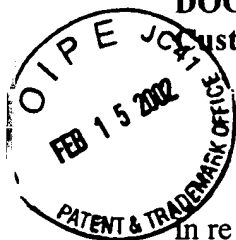
Citizenship: United States of America

Post Office Address: 1104 Pittsburg Landing
Richardson, Texas 75080

DOCKET NO. WEST14-00016
Customer No. 23990

COPY OF PAPERS
ORIGINALLY FILED

PATENT



IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

#2A
DEWIA
3-9-02

In re application of : Paul F. Struhsaker, et al.

U.S. Serial No. : 09/839,719

Filed : April 20, 2001

For : APPARATUS AND METHOD FOR CREATING SIGNAL AND
PROFILES AT A RECEIVING STATION

Group No. : 2681

Examiner : (Not Yet Assigned)

BOX NON-FEE AMENDMENT

Commissioner for Patents
Washington, D. C. 20231

RECEIVED

FEB 25 2002

Technology Center 2600

Sir:

PRELIMINARY AMENDMENT

Before examination of the above-identified application, please amend it as follows:

IN THE SPECIFICATION

Page 1, prior to "Cross-Reference to Related Application" please insert the following:

-- The present invention claims priority to United States Provisional Application Serial No.

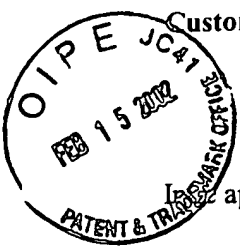
60/262,827 filed January 19, 2001. --

2681

DOCKET NO. WEST14-00016
Customer No. 23990

COPY OF PAPERS
ORIGINALLY FILED

PATENT



IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

RECEIVED

FEB 25 2002

Technology Center 2600

Inventor application of : Paul F. Struhsaker, et al.
U.S. Serial No. : 09/839,719
Filed : April 20, 2001
For : APPARATUS AND METHOD FOR CREATING SIGNAL AND
PROFILES AT A RECEIVING STATION
Group No. : 2681
Examiner : (Not Yet Assigned)

BOX NON-FEE AMENDMENT

Commissioner for Patents
Washington, D.C. 20231

CERTIFICATE OF MAILING BY FIRST CLASS MAIL

Sir:

The undersigned hereby certifies that the following documents:

1. Preliminary Amendment;
2. Supplemental Declaration and Power of Attorney; and
3. A postcard receipt;

relating to the above application, were deposited as "First Class Mail" with the United States Postal Service, addressed to Box NON-FEE AMENDMENT, Commissioner for Patents, Washington, D.C. 20231, on _

1/18/02

Date: 1/18/02

Date: Jan 18, 2002

Kathy Longenecker
Mailer/
William A. Munck
William A. Munck
Reg. No. 39,308

P.O. Drawer 800889
Dallas, Texas 75380
Phone: (214) 922-9221
Fax: (214) 969-7557
E-mail: wmunck@novakov.com

Please delete Page 1, line 3 through Page 6, line 11, in its entirety, and insert the following:

-- CROSS-REFERENCE TO RELATED APPLICATIONS

The present invention is related to those disclosed in the following United States Provisional and Non-Provisional Patent Applications:

- AD
- 1) Serial No. 09/713,684, filed on November 15, 2000, entitled "SUBSCRIBER INTEGRATED ACCESS DEVICE FOR USE IN WIRELESS AND WIRELINE ACCESS SYSTEMS" (Docket No. WEST14-00004);
 - 2) Serial No. 09/838,810, filed April 20, 2001, entitled "WIRELESS COMMUNICATION SYSTEM USING BLOCK FILTERING AND FAST EQUALIZATION-DEMODULATION AND METHOD OF OPERATION" (Docket No. WEST14-00005);
 - 3) Serial No. 09/839,726, filed April 20, 2001, entitled "APPARATUS AND ASSOCIATED METHOD FOR OPERATING UPON DATA SIGNALS RECEIVED AT A RECEIVING STATION OF A FIXED WIRELESS ACCESS COMMUNICATION SYSTEM" (Docket No. WEST14-00014);
 - 4) Serial No. 09/839,729, filed April 20, 2001, entitled "APPARATUS AND METHOD FOR OPERATING A SUBSCRIBER INTERFACE IN A FIXED WIRELESS SYSTEM" (Docket No. WEST14-00015);

- AD
CDN's
- 5) Serial No. 09/838,910, filed April 20, 2001, entitled "SYSTEM AND METHOD FOR INTERFACE BETWEEN A SUBSCRIBER MODEM AND SUBSCRIBER PREMISES INTERFACES" (Docket No. WEST14-00017);
 - 6) Serial No. 09/839,509, filed April 20, 2001, entitled "BACKPLANE ARCHITECTURE FOR USE IN WIRELESS AND WIRELINE ACCESS SYSTEMS" (Docket No. WEST14-00018);
 - 7) Serial No. 09/839,514, filed April 20, 2001, entitled "SYSTEM AND METHOD FOR ON-LINE INSERTION OF LINE REPLACEABLE UNITS IN WIRELESS AND WIRELINE ACCESS SYSTEMS" (Docket No. WEST14-00019);
 - 8) Serial No. 09/839,512, filed April 20, 2001, entitled "SYSTEM FOR COORDINATION OF TDD TRANSMISSION BURSTS WITHIN AND BETWEEN CELLS IN A WIRELESS ACCESS SYSTEM AND METHOD OF OPERATION" (Docket No. WEST14-00020);
 - 9) Serial No. 09/839,259, filed April 20, 2001, entitled "REDUNDANT TELECOMMUNICATION SYSTEM USING MEMORY EQUALIZATION APPARATUS AND METHOD OF OPERATION" (Docket No. WEST14-00021);
 - 10) Serial No. 09/839,457, filed April 20, 2001, entitled "WIRELESS ACCESS SYSTEM FOR ALLOCATING AND SYNCHRONIZING UPLINK AND DOWNLINK OF TDD FRAMES AND METHOD OF OPERATION" (Docket No. WEST14-00022);

- 11) Serial No. 09/839,075, filed April 20, 2001, entitled "TDD FDD AIR INTERFACE" (Docket No. WEST14-00023);
- 12) Serial No. 09/839,499, filed April 20, 2001, entitled "APPARATUS, AND AN ASSOCIATED METHOD, FOR PROVIDING WLAN SERVICE IN A FIXED WIRELESS ACCESS COMMUNICATION SYSTEM" (Docket No. WEST14-00024);
- 13) Serial No. 09/839,458, filed April 20, 2001, entitled "WIRELESS ACCESS SYSTEM USING MULTIPLE MODULATION" (Docket No. WEST14-00026);
- AD
CDN's 14) Serial No. 09/839,456, filed April 20, 2001, entitled "WIRELESS ACCESS SYSTEM AND ASSOCIATED METHOD USING MULTIPLE MODULATION FORMATS IN TDD FRAMES ACCORDING TO SUBSCRIBER SERVICE TYPE" (Docket No. WEST14-00027);
- 15) Serial No. 09/838,924, filed April 20, 2001, entitled "APPARATUS FOR ESTABLISHING A PRIORITY CALL IN A FIXED WIRELESS ACCESS COMMUNICATION SYSTEM" (Docket No. WEST14-00028);
- 16) Serial No. 09/839,727, filed April 20, 2001, entitled "APPARATUS FOR REALLOCATING COMMUNICATION RESOURCES TO ESTABLISH A PRIORITY CALL IN A FIXED WIRELESS ACCESS COMMUNICATION SYSTEM" (Docket No. WEST14-00029);

- 17) Serial No. 09/839,734, filed April 20, 2001, entitled "METHOD FOR ESTABLISHING A PRIORITY CALL IN A FIXED WIRELESS ACCESS COMMUNICATION SYSTEM" (Docket No. WEST14-00030);
- 18) Serial No. 09/839,513, filed April 20, 2001, entitled "SYSTEM AND METHOD FOR PROVIDING AN IMPROVED COMMON CONTROL BUS FOR USE IN ON-LINE INSERTION OF LINE REPLACEABLE UNITS IN WIRELESS AND WIRELINE ACCESS SYSTEMS" (Docket No. WEST14-00033);
- AD
con' -
19) Serial No. 60/262,712, filed on January 19, 2001, entitled "WIRELESS COMMUNICATION SYSTEM USING BLOCK FILTERING AND FAST EQUALIZATION-DEMODULATION AND METHOD OF OPERATION" (Docket No. WEST14-00005);
- 20) Serial No. 60/262,825, filed on January 19, 2001, entitled "APPARATUS AND ASSOCIATED METHOD FOR OPERATING UPON DATA SIGNALS RECEIVED AT A RECEIVING STATION OF A FIXED WIRELESS ACCESS COMMUNICATION SYSTEM" (Docket No. WEST14-00014);
- 21) Serial No. 60/262,698, filed on January 19, 2001, entitled "APPARATUS AND METHOD FOR OPERATING A SUBSCRIBER INTERFACE IN A FIXED WIRELESS SYSTEM" (Docket No. WEST14-00015);

- 22) Serial No. 60/262,826, filed on January 19, 2001, entitled "SYSTEM AND METHOD FOR INTERFACE BETWEEN A SUBSCRIBER MODEM AND SUBSCRIBER PREMISES INTERFACES" (Docket No. WEST14-00017);
- 23) Serial No. 60/262,951, filed on January 19, 2001, entitled "BACKPLANE ARCHITECTURE FOR USE IN WIRELESS AND WIRELINE ACCESS SYSTEMS" (Docket No. WEST14-00018);
- 24) Serial No. 60/262,824, filed on January 19, 2001, entitled "SYSTEM AND METHOD FOR ON-LINE INSERTION OF LINE REPLACEABLE UNITS IN WIRELESS AND WIRELINE ACCESS SYSTEMS" (Docket No. WEST14-00019);
- 25) Serial No. 60/263,101, filed on January 19, 2001, entitled "SYSTEM FOR COORDINATION OF TDD TRANSMISSION BURSTS WITHIN AND BETWEEN CELLS IN A WIRELESS ACCESS SYSTEM AND METHOD OF OPERATION" (Docket No. WEST14-00020);
- 26) Serial No. 60/263,097, filed on January 19, 2001, entitled "REDUNDANT TELECOMMUNICATION SYSTEM USING MEMORY EQUALIZATION APPARATUS AND METHOD OF OPERATION" (Docket No. WEST14-00021);
- 27) Serial No. 60/273,579, filed March 5, 2001, entitled "WIRELESS ACCESS SYSTEM FOR ALLOCATING AND SYNCHRONIZING UPLINK AND DOWNLINK OF TDD FRAMES AND METHOD OF OPERATION" (Docket No. WEST14-00022);

- 28) Serial No. 60/262,955, filed January 19, 2001, entitled "TDD FDD AIR INTERFACE" (Docket No. WEST14-00023);
- 29) Serial No. 60/262,708, filed on January 19, 2001, entitled "APPARATUS, AND AN ASSOCIATED METHOD, FOR PROVIDING WLAN SERVICE IN A FIXED WIRELESS ACCESS COMMUNICATION SYSTEM" (Docket No. WEST14-00024);
- 30) Serial No. 60/273,689, filed March 5, 2001, entitled "WIRELESS ACCESS SYSTEM USING MULTIPLE MODULATION" (Docket No. WEST14-00026);
- 31) Serial No. 60/273,757, filed March 5, 2001, entitled "WIRELESS ACCESS SYSTEM AND ASSOCIATED METHOD USING MULTIPLE MODULATION FORMATS IN TDD FRAMES ACCORDING TO SUBSCRIBER SERVICE TYPE" (Docket No. WEST14-00027);
- 32) Serial No. 60/270,378, filed February 21, 2001, entitled "APPARATUS FOR ESTABLISHING A PRIORITY CALL IN A FIXED WIRELESS ACCESS COMMUNICATION SYSTEM" (Docket No. WEST14-00028);
- 33) Serial No. 60/270,385, filed February 21, 2001, entitled "APPARATUS FOR REALLOCATING COMMUNICATION RESOURCES TO ESTABLISH A PRIORITY CALL IN A FIXED WIRELESS ACCESS COMMUNICATION SYSTEM" (Docket No. WEST14-00029); and

- AD
CDN's
- 34) Serial No. 60/270,430, filed February 21, 2001, entitled "METHOD FOR ESTABLISHING
A PRIORITY CALL IN A FIXED WIRELESS ACCESS COMMUNICATION SYSTEM"
(Docket No. WEST14-00030).
-

REMARKS

This Preliminary Amendment is being submitted herein to amend the priority claim to the provisional patent applications, and also to indicate the serial numbers and filing dates of related applications. The serial numbers were not yet available when the present application was filed. A Supplemental Declaration and Power of Attorney is attached herewith to include the serial number and filing date to the provisional patent application in which Applicant claims priority.

Should it facilitate allowance of the application, the Examiner is invited to telephone the undersigned attorney. The Commissioner is hereby authorized to charge any additional payment that may be due or credit any overpayment to Novakov Davis Deposit Account No. 50-0208.

Respectfully submitted,

NOVAKOV DAVIS & MUNCK, P.C.

Date: Jan 18, 2012



William A. Munck
Registration No. 39,308

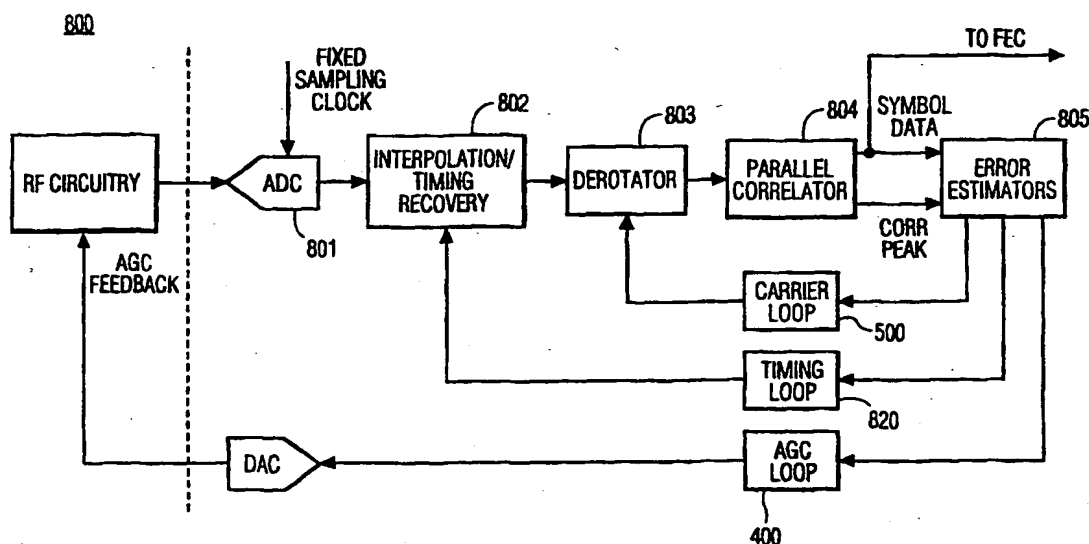
P.O. Drawer 800889
Dallas, Texas 75380
Tel.: (214) 922-9221
Fax: (214) 969-7557
E-mail: wmunck@novakov.com



INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(51) International Patent Classification ⁶ : H04L 1/12		A1	(11) International Publication Number: WO 99/31837
			(43) International Publication Date: 24 June 1999 (24.06.99)
(21) International Application Number: PCT/US98/18089 (22) International Filing Date: 1 September 1998 (01.09.98) (30) Priority Data: 60/069,345 12 December 1997 (12.12.97) US (71) Applicant (for all designated States except US): THOMSON CONSUMER ELECTRONICS, INC. [US/US]; 10330 North Meridian Street, Indianapolis, IN 46290-1024 (US). (72) Inventors; and (75) Inventors/Applicants (for US only): KNUTSON, Paul, Gothard [US/US]; 148 South Emerson Avenue, Indianapolis, IN 46219 (US). RAMASWAMY, Kumar [IN/US]; 9417 College Drive #B, Indianapolis, IN 46240 (US). SHIUE, Dong-Chang [-/US]; 3772 Bridger North Drive, Carmel, IN 46033 (US). (74) Agents: TRIPOLI, Joseph, S. et al.; GE & RCA Licensing Management Operation, Inc., P.O. Box 5312, Princeton, NJ 08540 (US).		(81) Designated States: AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CU, CZ, DE, DK, EE, ES, FI, GB, GE, GH, GM, HR, HU, ID, IL, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, UA, UG, US, UZ, VN, YU, ZW, ARIPO patent (GH, GM, KE, LS, MW, SD, SZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG). Published <i>With international search report.</i>	

(54) Title: TDMA WIRELESS TELEPHONE SYSTEM WITH INDEPENDENTLY TRACKED DEMODULATION PARAMETERS



(57) Abstract

A wireless telephone system comprises a base transceiver having a base receiver and a plurality of wireless handsets. Each handset comprises a handset transceiver for establishing a time-division multiple access (TDMA) link over a shared channel with the base unit via the base transceiver, in which each handset communicates during an exclusive time slot of a TDMA scheme that allocates time slots to handsets. The base receiver is characterized by a plurality of demodulation parameters and is for synchronizing with each handsets. The base receiver stores a set of demodulation parameters for each handset and switches to the set of demodulation parameters for a particular handset when the base unit is to synchronize with the particular handset.

FOR THE PURPOSES OF INFORMATION ONLY

Codes used to identify States party to the PCT on the front pages of pamphlets publishing international applications under the PCT.

AL	Albania	ES	Spain	LS	Lesotho	SI	Slovenia
AM	Armenia	FI	Finland	LT	Lithuania	SK	Slovakia
AT	Austria	FR	France	LU	Luxembourg	SN	Senegal
AU	Australia	GA	Gabon	LV	Latvia	SZ	Swaziland
AZ	Azerbaijan	GB	United Kingdom	MC	Monaco	TD	Chad
BA	Bosnia and Herzegovina	GE	Georgia	MD	Republic of Moldova	TG	Togo
BB	Barbados	GH	Ghana	MG	Madagascar	TJ	Tajikistan
BE	Belgium	GN	Guinea	MK	The former Yugoslav Republic of Macedonia	TM	Turkmenistan
BF	Burkina Faso	GR	Greece			TR	Turkey
BG	Bulgaria	HU	Hungary	ML	Mali	TT	Trinidad and Tobago
BJ	Benin	IE	Ireland	MN	Mongolia	UA	Ukraine
BR	Brazil	IL	Israel	MR	Mauritania	UG	Uganda
BY	Belarus	IS	Iceland	MW	Malawi	US	United States of America
CA	Canada	IT	Italy	MX	Mexico	UZ	Uzbekistan
CF	Central African Republic	JP	Japan	NE	Niger	VN	Viet Nam
CG	Congo	KE	Kenya	NL	Netherlands	YU	Yugoslavia
CH	Switzerland	KG	Kyrgyzstan	NO	Norway	ZW	Zimbabwe
CI	Côte d'Ivoire	KP	Democratic People's Republic of Korea	NZ	New Zealand		
CM	Cameroon			PL	Poland		
CN	China	KR	Republic of Korea	PT	Portugal		
CU	Cuba	KZ	Kazakhstan	RO	Romania		
CZ	Czech Republic	LC	Saint Lucia	RU	Russian Federation		
DE	Germany	LI	Liechtenstein	SD	Sudan		
DK	Denmark	LK	Sri Lanka	SE	Sweden		
EE	Estonia	LR	Liberia	SG	Singapore		

TDMA WIRELESS TELEPHONE SYSTEM WITH INDEPENDENTLY TRACKED DEMODULATION PARAMETERS

5

BACKGROUND OF THE INVENTION**Field of the Invention**

The present invention relates to multi-line wireless telephone systems and, in particular, to receiver subsystems in such systems designed to synchronize when communicating between transceivers of the system.

Description of the Related Art

The use of telephones and telephone systems, including wireless telephone systems, is widespread. In wireless telephone systems, such as digital 900MHz systems, a cordless or wireless telephone handset unit communicates via either analog or digital radio signals with a base unit, which is typically connected via a standard telephone line to an external telephone network. In this manner, a user may employ the wireless handset to engage in a telephone call with another user through the base unit and the telephone network.

Multi-line wireless telephone systems are also in use in various situations, such as businesses with many telephone users. Such systems employ a handset that communicates with up to N handsets simultaneously, typically with digital communications schemes, such as time division multiple access (TDMA). It is desirable to implement the features of current private branch exchange (PBX) systems in a multi-line wireless telephone system.

Wireless telephone systems, such as digital 900 MHz systems, are typically used to establish a wireless network between the base unit and several handsets. The base station transceiver must synchronize with each active handset. This synchronization can
5 require different demodulation and related parameters for each handset, since some handsets may be closer to the handset than others, giving rise to a large dynamic range difference between each handset-base station pair. For example, since the handsets and base station have independent local oscillators for frequency references,
10 and signal strengths, there will be carrier offsets and other demodulation parameters unique to each handset to station link. In addition, the system may be located in an indoor office environment, giving rise to unique multipath problems for each handset-base station link, which need to be addressed differently for each handset-
15 base unit pair.

One way to address this problem is to use an independent link for each handset. However, this approach is not without its own problems. For example, with over 100dB differences between close and far signals, it is difficult to use FDMA (frequency division multiple
20 access) techniques to establish the independent links. Similarly, CDMA (code division multiple access) methods require extremely tight power controls and/or many chips per symbol.

A time-division system like TDMA is often used in multi-line wireless phone systems. In such a system, a single RF channel is
25 used, and each handset transmits and receives data during a dedicated time slice within an overall cycle or epoch. In such a system, however, it can be difficult for the base unit to adequately synchronize with each handset at the beginning of its respective time

3

slice, since each operates on a link having potentially different characteristics than those of the other handsets. One possible solution is to use an extremely fast receiver that is able to re-synchronize at the beginning of each time slice, even if each time slice corresponds to a handset having a link with different characteristics than the last. This solution, however, requires a very fast receiver, with its attendant cost and complexity, and is not always the most efficient way to synchronize links.

10

SUMMARY

A wireless telephone system comprises a base transceiver having a base receiver and a plurality of wireless handsets. Each handset comprises a handset transceiver for establishing a time-division multiple access (TDMA) link over a shared channel with the base unit via the base transceiver, in which each handset communicates during an exclusive time slice of a TDMA scheme that allocates time slices to handsets. The base receiver stores a set of demodulation parameters for each handset and switches to the set of demodulation parameters for a particular handset when the base unit is to synchronize with the particular handset.

BRIEF DESCRIPTION OF THE DRAWINGS

Fig. 1 is a block diagram of TDMA multi-line digital wireless telephone system, in accordance with an embodiment of the present invention;

25

Fig. 2 is a schematic representation of the field, data packet, and audio packet structures used in the TDMA scheme of the system of Fig. 1;

4

Fig. 3 is a block diagram of an automatic gain control (AGC) integrator with a plurality of registers, in accordance with an embodiment of the present invention;

Fig. 4 is a block diagram of an AGC block used in the base unit of Fig. 1 and incorporating the AGC integrator of Fig. 3;

Fig. 5 is a block diagram of a carrier tracking loop (CTL) block used in the base unit of Fig. 1;

Fig. 6 is a block diagram showing the frequency and numerically controlled oscillator (NCO) integrators of the CTL block of Fig. 5 in further detail;

Fig. 7 is a block diagram showing an alternative embodiment of the frequency and NCO integrators of the CTL block of Fig. 5 in further detail; and

Fig. 8 is a flow diagram of an exemplary signal processing flow for the receiver portion of the base unit of Fig. 1, in accordance with an embodiment of the present invention.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring now to Fig. 1, there is shown a block diagram of spread spectrum TDMA multi-line digital wireless telephone system 100, in accordance with an embodiment of the present invention. TDMA system 100 comprises a base unit 110, which has receiver and transmitter units 112 and 111, respectively, and is coupled to external telephone network 116 via telephone line(s) 115. System 100 also comprises N wireless handsets $120_1, 120_2, \dots, 120_N$. Each has a transmitter and receiver unit (transceiver), such as transmitter 121 and receiver 122 of handset 120_1 . In one embodiment, receiver

unit 112 comprises N separate receivers, and transmitter unit 111 comprises N separate transmitters, so that receiver and transmitter units 112 and 111 provide N total transceiver units, one for each of N wireless handsets. At any given time, M handsets ($0 \leq M \leq N$) are
5 operating or active (i.e., in the process of conducting a telephone call). In one embodiment, system 100 employs a digital TDMA scheme, in which each operating handset only transmits or receives data during its own "time slice" or slot. System 100 thus provides a wireless network between the base station 110 and each handset 120_i
10 ($1 \leq i \leq N$).

System 100 preferably employs block error coding to reduce error. In one embodiment, during a time slice, digitally compressed audio packets (such as ADPCM (adaptive differential pulse code modulation) samples) are transmitted, such as recommendation ITU-T
15 G.721 or G.727 with a block code. This allows, for example, 16 ADPCM samples to be transmitted per audio packet. Block codes and ADPCM are preferred because of their low latency, which allows the wireless phone behavior to mimic that of a standard corded phone. Channel codes such as convolutional codes or turbo codes, or stronger source
20 coding such as LPC (linear predictive coding), transform coding, or formant coding incur more delay, which makes the system less like the equivalent corded telephone.

In order to address the aforementioned problems, the present invention employs a demodulator architecture in the base unit
25 receiver, which independently tracks and updates demodulation parameters for each of the plurality of active links supported by the TDMA wireless network, as described in further detail hereinbelow with reference to Figs. 3-8. The various receiver parameters that are

adjusted in order to enable adequate or quicker acquisition and synchronization of a given link are referred to herein as demodulation parameters.

Referring now to Fig. 2, there is shown a schematic representation 200 of the field, data packet, and audio packet structures used in the TDMA scheme of TDMA system 100 of Fig. 1. In one embodiment, a 2 ms field 210 of digital data comprises nine total packets, viz. a data packet 220 and eight audio packets such as audio packet 230. Each data packet is a set of data transmitted either to a given handset from the base unit or vice-versa, during a discrete time slice during which time no other handsets receive or transmit data over the system's data channel. Each audio packet is a set of audio data transmitted either to a given handset from the base unit or vice-versa, during a given time-slice in an overall "epoch" scheme, again during which time no other handsets receive or transmit data over the system's data channel.

As illustrated, each type of packet contains various sub-fields or sections. For example, data packet 220 comprises a 32-bit sync field 222, a data field 235, a FEC (forward error correction) field 222, and guard time 223. The data in data packet 220 is used to communicate between the base unit and a particular handset, and contains various types of information, such as caller ID type information, range and power information, and the like.

Audio packet 230 comprises an audio packet header 231, FEC data section 232, and guard time 233. Audio packet header 231, for example, contains information identifying the audio packet (such as the handset), the current place in the epoch, and the like.

In one mode of operation, each handset receives 16 4-bit ADPCM (adaptive differential pulse code modulation) samples during each time slice of the epoch allocated for the handset to receive audio data; and transmits to the base unit 16 ADPCM samples during each time slice of the epoch allocated for the handset to transmit audio data. In another mode of operation, the number of samples may be doubled to 32 per time slice, by lowering each sample's quality to 2-bit samples. ADPCM and related technical issues are described in detail in International Telecommunication Union (ITU), Recommendation G.727, (12/1990), "5-, 4-, 3- and 2-Bits Sample Embedded Adaptive Differential Pulse Code Modulation (ADPCM)," <http://www.itu.ch>.

Audio packet 230 therefore also comprises a main 64-bit "audio data" portion, which comprises either 16 4-bit ADPCM samples (high quality), or 32 2-bit ADPCM samples (low quality). As will be appreciated, for a 2 ms field, high quality (16 4-bit ADPCM samples per audio packet or time slice) provides 32Kbps ADPCM (the default audio data), and low quality (32 2-bit samples shared between two handsets, per audio packet) provides 16 Kbps.

The present invention utilizes independent automatic gain control (AGC), carrier tracking loops (CTL), and equalizer loops for each link, to independently track demodulation parameters and states associated with these three loops or blocks. The states and parameters associated with these three loops and which are adjusted to improve or allow synchronization are referred to, herein, in general, as demodulation parameters. Since each handset is independently moving and is in a potentially unique position, different parameters are needed by the base unit 110 to synchronize with each handset at

the beginning of the time slice for that handset. If these parameters and states (described in further detail below) were to be stored and modified during communication with each handset, then once synchronization is first established and a workable first set of parameters and states is found that allows synchronization, then these parameters may be used as a starting point for the next time the handset link is established. However, the last set of parameters established for one handset link will usually not be an efficient starting point for trying to synchronize with a different handset.

Accordingly, in the present invention, the AGC, CTL, and equalization blocks within the demodulation/receiver portion of base unit 110 are modified so allow each block to store and track a set of parameters for each handset, and to use the last-modified set of parameters for a given handset at the next time slice requiring re-synchronization with that handset. For example, once the appropriate AGC, CTL, and equalization parameters are found to allow synchronization with handset #1, they are stored in the respective blocks when handset #1's time slice is completed. When handset #2's time slice is next, base unit 110 again synchronizes and stores these parameters in a different location for handset #2. When another handset #1 time slice occurs, base unit 110's receiver re-loads with the last-stored parameters defining the state of the demodulation parameters during the last communication with handset #1, and updates these parameters as necessary. However, comparatively quick synchronization should be achieved since the demodulation parameters used in the previous time slice for handset #1 will likely be close to the ones needed for synchronization, since handset #1 will have only moved slightly in the brief time (e.g., 2ms) between its

time slices. Thus, the present invention minimizes acquisition and synchronization time for each time slice. The present invention also allows a single receiver datapath to be used to support TDMA signals from multiple independent sources.

5 The three receiver or demodulator blocks AGC, CTL, and equalization, of base unit 110's receiver, are modified as described below to allow each to provide state and parameter storage for each handset. In a preferred embodiment, the present invention is implemented in a digital system in which the state of the three loops
10 or blocks exist in the digital domain. In an alternative embodiment, some analog domains are utilized, although it may be more difficult to store a loop state in the analog domain (for example, it may be difficult to hold a voltage controlled oscillator (VCO) for carrier tracking over the time between TDMA slices). Therefore, in a
15 preferred embodiment, the present invention is implemented digitally.

Referring now to Fig. 4, there is shown an AGC block 400 used in receiver 112 of base unit 110 of Fig. 1. AGC block 400 comprises a plurality of standard components, except that AGC accumulator 300
20 comprises a plurality of registers, one for each handset (or possible link) of system 100. Signal processing block 420 is any receiver processing which occurs between the adjustable gain amplifier 421 and the input to amplitude detector 422, such as a pulse shaping filter, carrier derotator, analog-to-digital converters (ADC), IF
25 amplifiers, and the like. AGC integrator 300 stores a plurality of AGC parameters, to store the AGC loop state independently for each link.

Referring now to Fig. 3, there is shown in further detail the AGC integrator or accumulator 300 of AGC block 400, having a plurality of

10

N registers 310_i. AGC is implemented by storing an AGC value for each time slice or link, and by allowing each AGC value to adapt or update only during its designated time slice. In the TDMA wireless phone system 100 of the present invention, there is sufficient guard
5 time (*see* guard time 223, Fig. 2) to allow the amplifiers to slew 100dB in the dead time between TDMA time slices. One AGC state parameter is used per time slice, and is provided from AGC integrator 300.

For each time slice, one of the registers 310_i is enabled and its
10 output is selected, by applying information concerning the current time slice to enable select 330 and multiplexer 320. This causes the appropriate output value Q to be applied to summing node 411. Since only the appropriate register 310_i is enabled, only this register is updated with input value D; the other registers are held at their
15 previous value. This allows each channel of the receiver to start where it left off when its time slice occurs, since the disabled registers cause the loop to behave as if it were in perfect lock (amplitude error is zero). As will be appreciated, this is likely to be a better starting point for the next burst of data from the same transmitter-receiver
20 pair (handset-base unit pair) than default initial conditions or where the previous transmitter-receiver pair left off would be.

Referring now to Fig. 5, there is shown a CTL block 500 used in receiver 112 of base unit 110 of Fig. 1. CTL block 500 comprises a plurality of standard components, except that frequency accumulator
25 510 and numerically controlled oscillator (NCO) 530 are able to store a plurality of CTL-related states, one for each handset (or possible link) of system 100, as described in more detail with reference to Figs. 6 and 7.

11

To implement carrier tracking, NCO 530 is employed, and is kept operating for each time slice which is driven by value of frequency integrator or accumulator 510. Alternatively, the value applied to NCO integrator 530 can be computed by multiplying the value of frequency integrator 510 times the number of clock cycles until the next time slice. In both cases, the present invention only updates CTL states during the appropriate time slice.

CTL 500 provides a second order CTL, which utilizes two state parameters per time slice, the frequency and NCO parameters, stored by frequency integrator 510 and NCO integrator 530, respectively. The NCO parameter can be computed from its initial value and the value in the frequency integrator as follows:

$$NCO_{i+d} = NCO_i + d \cdot F \quad (1)$$

where NCO_i is the i th value of the NCO integrator, d is the number of delays until this time slice is active, and F is the frequency integrator value. This value is constant since the integrator only updates during the time slice. This allows a common NCO and CTL loop filter to support all TDMA slices. Only two data are required for CTL state preservation, the frequency integrator and the NCO integrator parameters or values.

Referring now to Fig. 6, there is shown an embodiment 600 of the frequency and NCO integrators 510, 530 of CTL block 500 in further detail. Frequency accumulator 510 and NCO section 530 of CTL block 500 are implemented, in one embodiment, as illustrated. Frequency accumulator 510 is implemented with enable select 511 and multiplexer 512, similar to the AGC accumulator 300 of Fig. 3. In the embodiment 600 illustrated in Fig. 6, NCO integrator 530 is either updated or computed as a function of the delay between time slices.

The updates to NCO 530 require input from the frequency integrator 513 values. Separate accumulators are used for each time slice (i.e., for each transmitter-receiver pair). In one embodiment, the frequency integrator value stored in registers 513 is accumulated in NCO 530 when the path is not active (when a different transmitter-receiver pair is in use), and the frequency integrator and NCO for a given time slice are controlled in a closed loop during that time slice. As in the AGC case described above, this preserves the state of the loop for each link, minimizing the reacquisition time between TDMA packets.

Referring now to Fig. 7, there is shown an embodiment 700 of an alternative embodiment of the frequency and NCO integrators 510, 630 of CTL block 500 in further detail. In embodiment 700, the NCO integrator is computed instantaneously instead of continuously. In this case, the multiplication is computed once per time slice, not every sample as in the accumulators used in embodiment 600 of Fig. 6. Multiplexers 711, 712 allow the NCO registers 531 to be programmed with the current NCO value plus the product of delay until the next packet for this link, times the current frequency value (i.e., executing Eq.). This is equivalent to accumulating the current frequency value until the next active time for this link (the next time slice). In systems with digital enabled timing, d in equation is based on enabled samples computed by the timing system. The enabled timing system may be a digital timing recovery system deriving timing from signal characteristics, or an enabled timing system relying on a master NCO synchronized by timing data sent over the channel.

The state of an equalization block is typically represented by a plurality of parameters known as a set of coefficients. In one

13

embodiment, such an equalization block is employed, such as a least mean squares (LMS) equalizer. Because each handset communicates over the shared RF channel via its time-divided link or time slice, and the RF path for each handset is different, the equalization block of the present invention stores a unique set of equalization coefficients for each handset or link. In one embodiment, these values are stored in a plurality of coefficient accumulators, and are swapped out for each time slice. In an alternative embodiment, a transposed filter structure is employed in which each coefficient is swapped out as the summation shifts out of the adder pipeline. One skilled in the art will recognize how to implement an equalization block so that its parameters may be changed as describe above, in accordance with the present invention.

Referring now to Fig. 8, there is shown a flow diagram of an exemplary signal processing flow 800 for the receiver portion of base unit 110, in accordance with an embodiment of the present invention. A near baseband signal is sampled using a fixed clock, applied to ADC 801. This signal is applied to an interpolation/timing recovery mechanism 802 which derives its error from the data past parallel correlator 804. A derotator 803 follows the timing estimator. Derotator 803 presents a phase corrected signal to parallel correlator 804, as will be appreciated. The symbol stream at the output of parallel correlator 804 is applied to a FEC system (not shown). The detection of the correlation peak will be dependent on the incoming SNR (signal-to-noise ratio), signal level, carrier and timing offset. Carrier or CTL loop or block 500, timing loop or block 820, and AGC loop or block 400 are implemented in the signal flow as illustrated. Timing loop 820 is used to establish sampling synchronization at a

receiver, so that sampling occurs at the proper time. In an alternative embodiment, timing loop 820 is characterized by timing loop parameters, which are included in the set of demodulation parameters stored and adjusted for each handset.

5 The illustrated signal flow is based on the assumption that base station 110 is the master and controls timing, carrier, and power levels. The handsets 120, based on this assumption, lock to the base's reference clock and carrier frequency and additionally provide information back to the base regarding their status. This assists base
10 110 in keeping track of all active and idle-mode links in the system. This strategy is aimed at maintaining robust links and also minimizing the time taken for a system to synchronize after either a cold start or from the idle mode. The processing at the base and processing at the handset may thus be regarded separately, to distinguish between the
15 two functional operations. It is clear that the handset functions are a subset of the processing at the base.

As will be appreciated, in alternative embodiments, the present invention may be implemented in other types of multiple-access systems, such as TDMA, CDMA, and FDMA, where there is a need to
20 frequently access multiple channels. In such alternative embodiments, the present invention provides for preserving the state of the relevant demodulation parameters, for each separate link, so as to minimize acquisition requirements. In CDMA and FDMA systems, symbol timing for the channels may be independent, allowing symbol
25 or chip timing loops to operate in a manner similar to the CTL described in this document.

One skilled in the art will recognize that the wireless system described above according to the principles of the invention may be a

15

cellular system where base unit 110 represents a base station serving one of the cells in a cellular telephone network.

5 It will be understood that various changes in the details, materials, and arrangements of the parts which have been described and illustrated above in order to explain the nature of this invention may be made by those skilled in the art without departing from the principle and scope of the invention as recited in the following claims.

CLAIMS

1. A wireless telephone system, comprising:

(a) a base transceiver having a base receiver; and

(b) a plurality of wireless handsets, each handset comprising a handset transceiver for establishing a wireless link over a shared channel with the base unit via the base transceiver, the base receiver comprising synchronization means, for maintaining a plurality of demodulation parameters for synchronizing with a particular handset, and means for storing a set of demodulation parameters for each handset and for providing to the set of demodulation parameters for a particular handset to the synchronizing means when the base unit is to synchronize with the particular handset.

2. The system of claim 1, wherein the wireless link is a time-division multiple access (TDMA) link, in which each handset communicates during an exclusive time slot of a TDMA scheme that allocates time slots to handsets.

3. The system of claim 1, wherein the set of demodulation parameters stored for each handset is updated for each time slot for the handset.

4. The system of claim 1, wherein the base unit is coupleable to one or more external telephone lines.

5. The system of claim 1, wherein a plurality of adaptive differential pulse code modulation (ADPCM) data samples are transmitted during each time slot.

5. 6. The system of claim 1, wherein:
the synchronization means comprises an automatic gain control (AGC) loop, a carrier tracking loop (CTL), and an equalization loop; and

the demodulation parameters comprise:

10 an AGC state parameter for determining the state of the AGC loop;

a CTL frequency parameter and a CTL NCO parameter for determining the state of the CTL loop; and

15 a set of equalization coefficients for determining the state of the equalization loop.

7. The system of claim 6, wherein:

20 the AGC loop comprises an AGC integrator having a plurality of registers for storing an AGC state parameter for each handset; and

the CTL loop comprises a CTL frequency integrator having a plurality of registers for storing a CTL frequency parameter for each handset and a CTL NCO integrator for
25 storing a CTL NCO parameter for each handset.

8. The system of claim 7, further comprising enable select units and multiplexers coupled to the pluralities of registers for the AGC state parameters, the CTL frequency parameters, and the CTL NCO parameters for selecting the corresponding demodulation parameters for a handset during a time slot for the handset.

9. In a wireless telephone system having a base unit and a plurality of wireless handsets, the base unit comprising a base transceiver having a base receiver, a method for establishing, for each handset, a wireless link over a shared RF channel with the base unit transceiver, the method comprising the steps of:

- (a) synchronizing, at the beginning of time slots for each handset, between the base unit and the handset in accordance with a plurality of demodulation parameters for the handset;
- (b) storing a set of demodulation parameters for each handset in accordance with the demodulation parameters utilized for the most recent time slot for the handset; and
- (c) switching, during synchronization, to the set of demodulation parameters for each handset when the base unit is to synchronize with the handset.

10. The method of claim 9, wherein the wireless link is a TDMA link, in which each handset communicates during an exclusive time slot of a TDMA scheme that allocates time slots to handsets.

11. A base unit for communicating with a plurality of wireless handsets, comprising:

5 (a) a base transceiver having a base receiver and a base transmitter for establishing a wireless link over a shared channel with the handsets;

(b) synchronization means for synchronizing with each handset in accordance with a plurality of demodulation parameters; and

10 (c) means for storing a set of demodulation parameters for each handset and for switching the synchronization means to the set of demodulation parameters for a particular handset when the base unit is to synchronize with the particular handset.

15

12. The base unit of claim 11, wherein the wireless link is a TDMA link, in which each handset communicates during an exclusive time slot of a TDMA scheme that allocates time slots to handsets.

1/6

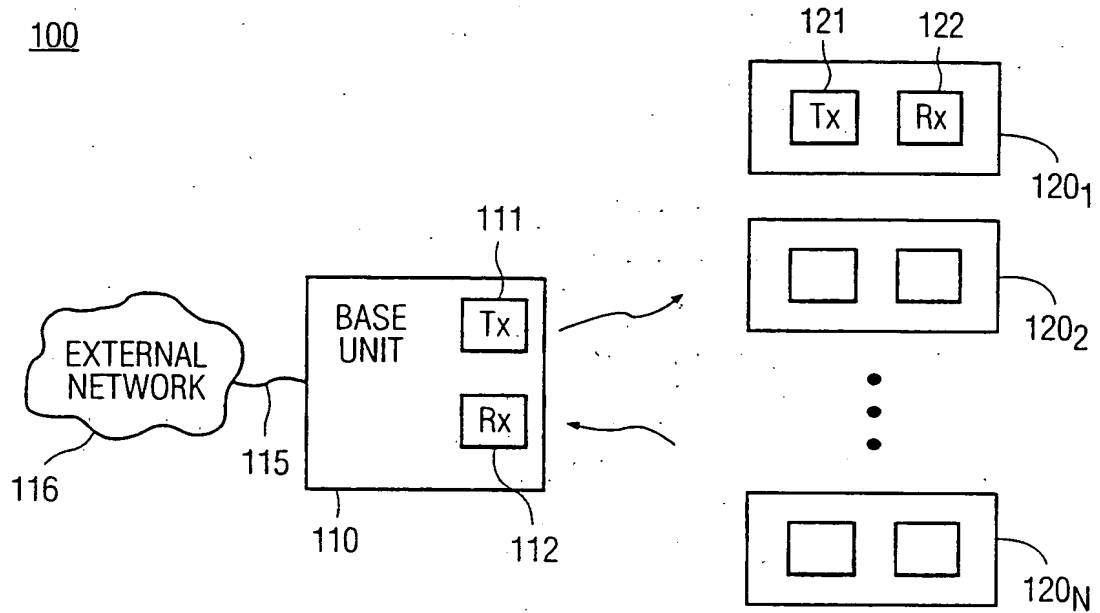


FIG. 1

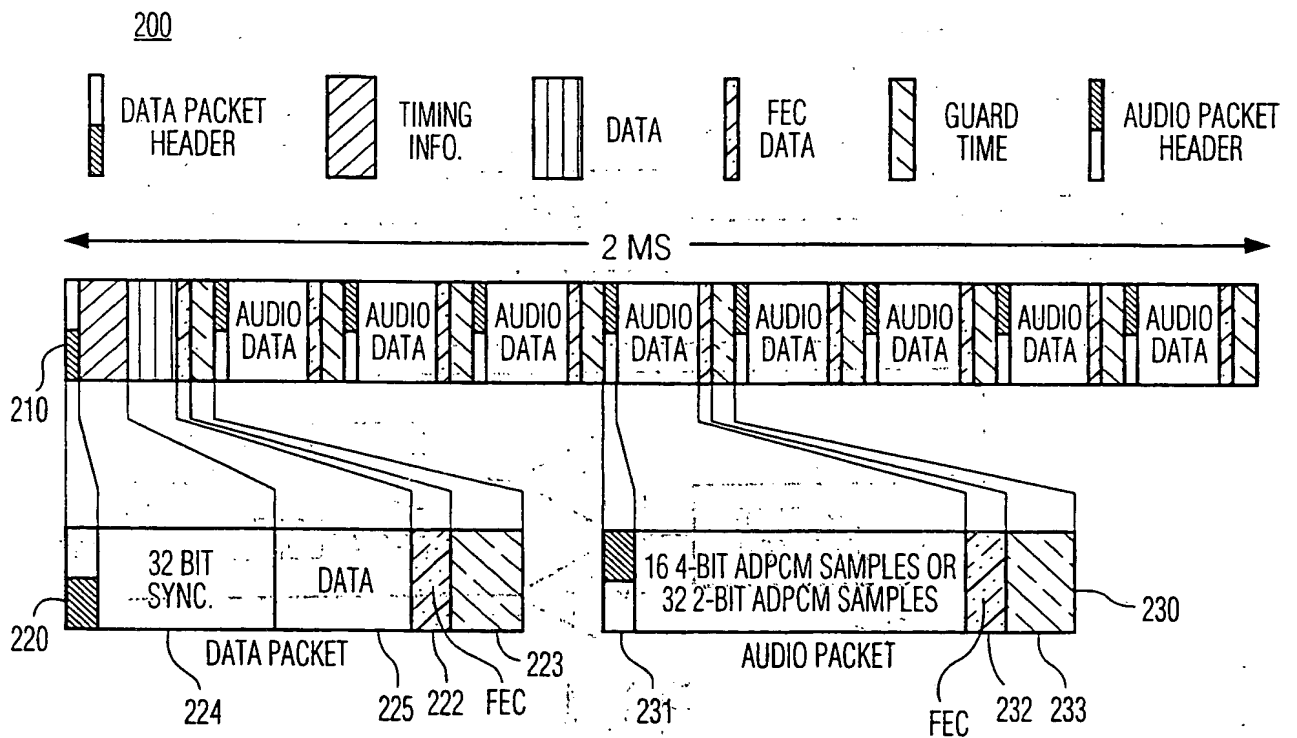


FIG. 2

SUBSTITUTE SHEET (RULE 26)

2/6

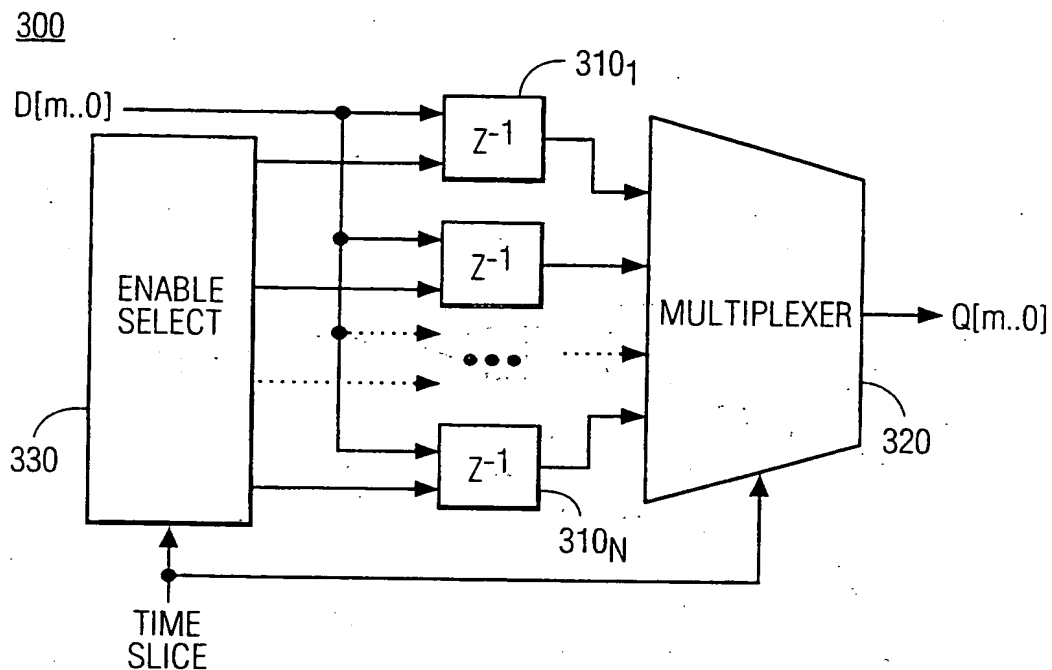


FIG. 3

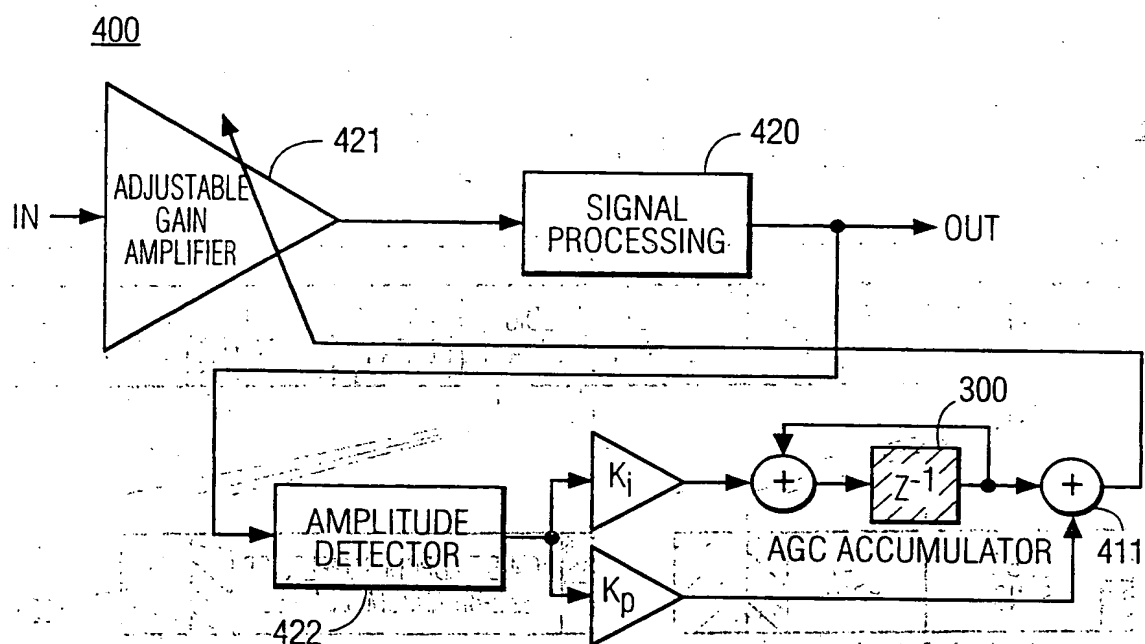


FIG. 4

SUBSTITUTE SHEET (RULE 26)

3/6

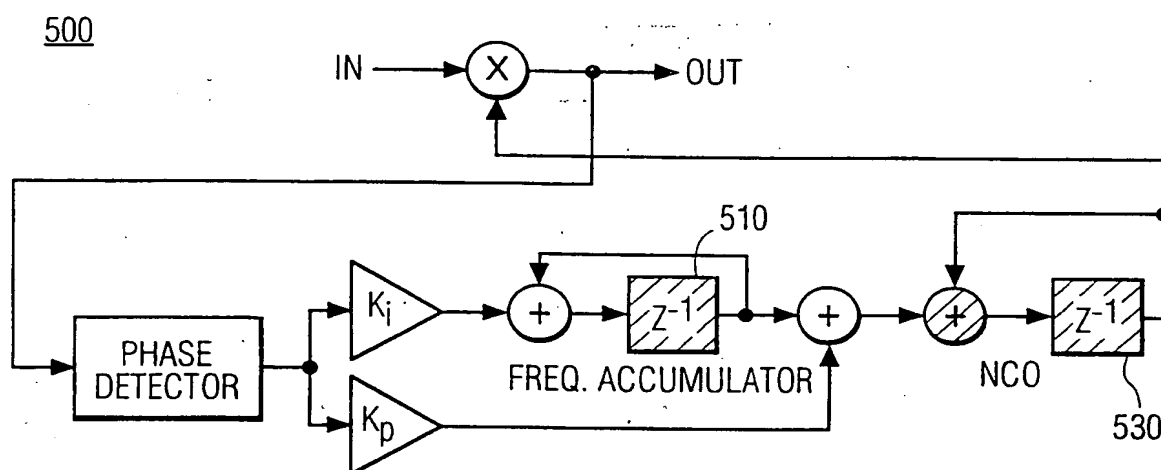


FIG. 5

SUBSTITUTE SHEET (RULE 26)

4/6

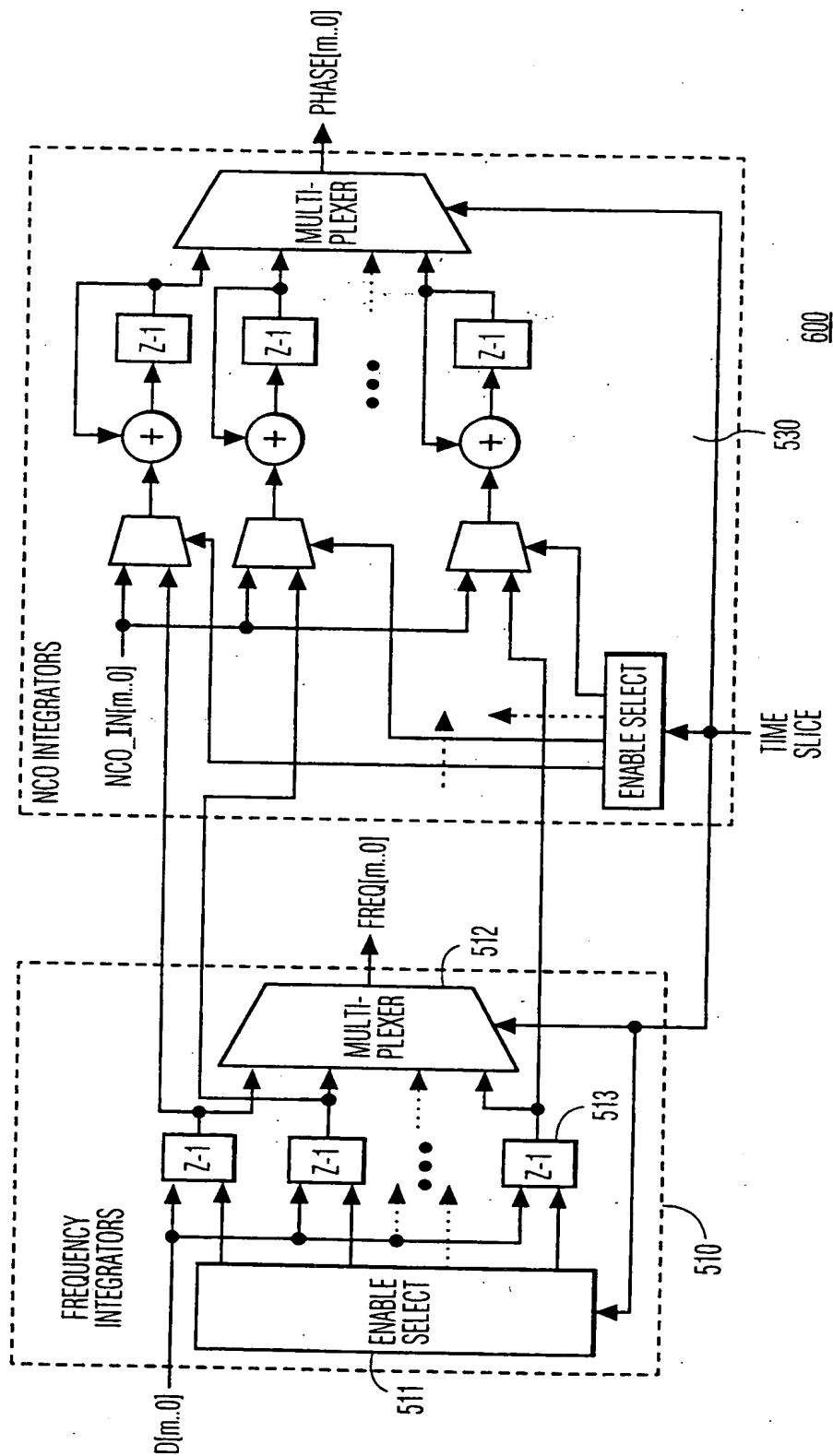
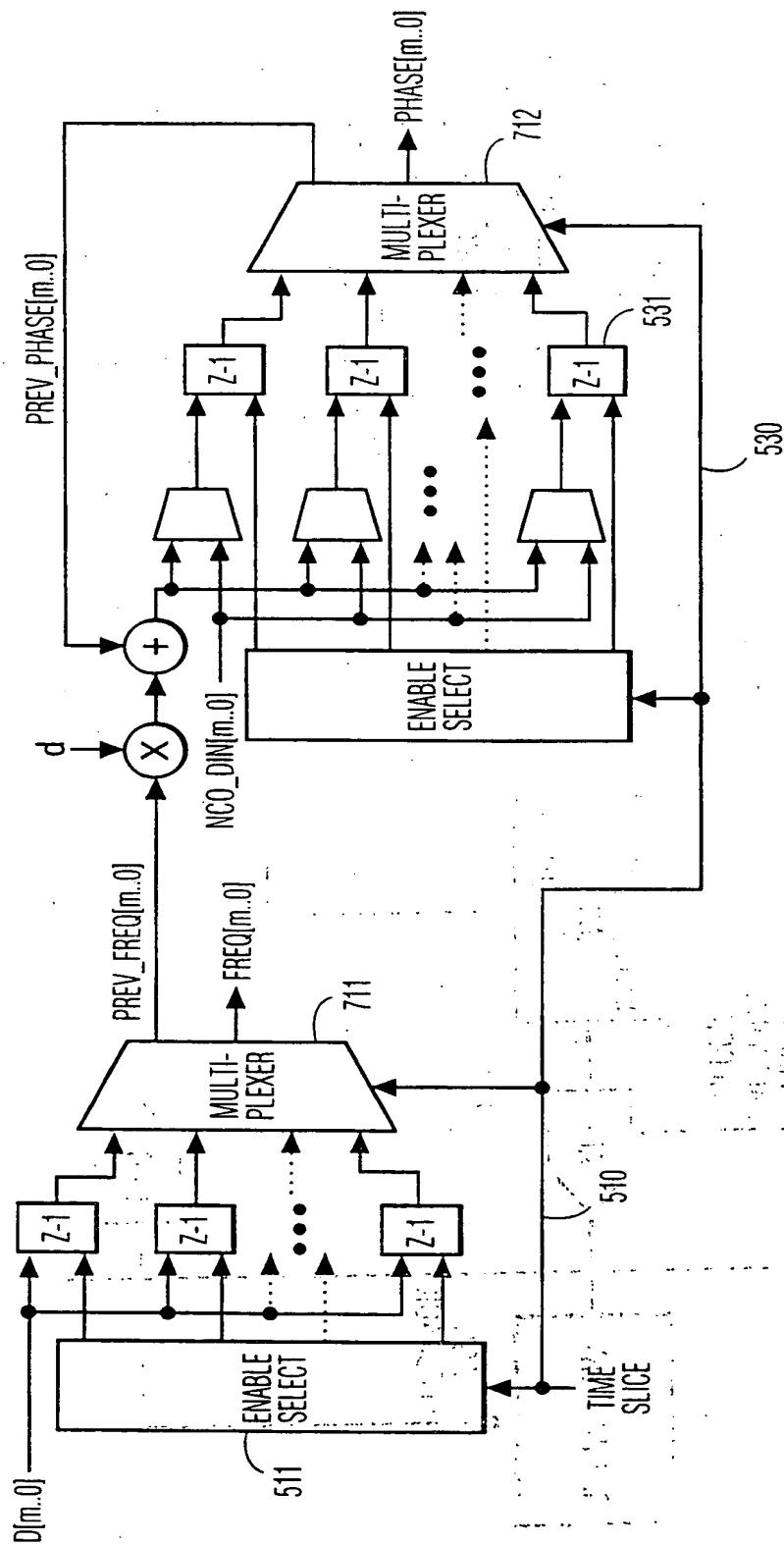


FIG. 6

SUBSTITUTE SHEET (RULE 26)

5/6



700

FIG. 7

SUBSTITUTE SHEET (RULE 26)

6/6

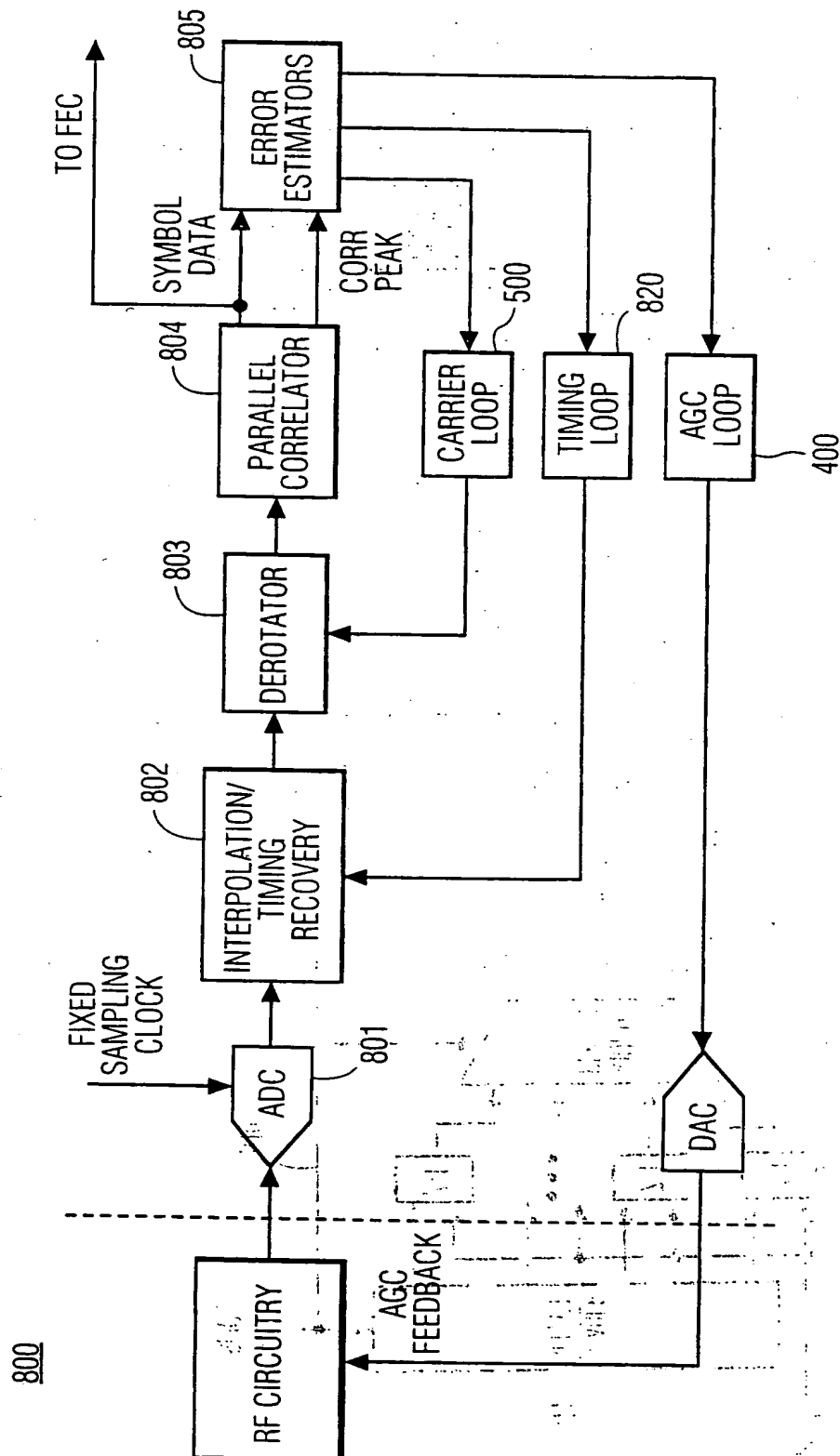


FIG. 8

SUBSTITUTE SHEET (RULE 25)

INTERNATIONAL SEARCH REPORT

International Application No
PCT/US 98/18089

A. CLASSIFICATION OF SUBJECT MATTER
IPC 6 H04L1/12

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 6 H04L H04B

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	WO 96 34481 A (RUDKIN PAUL WILLIAM ;IONICA INT LTD (GB)) 31 October 1996 see page 3, line 3 - line 9 see page 11, line 5 - line 13 see page 15, line 6 - line 9 see page 15, line 14 - line 19 see page 18, line 9 - page 19, line 12 see claims 1,2,9,11; figures 1,4	1-6,9-12
X	WO 88 05981 A (MOTOROLA INC) 11 August 1988 see page 5, line 25 - line 34 see page 9, line 3 - line 19 see page 17, line 28 - line 4 see page 17, line 26 - line 37 see claims 4A,,4B.1	1-3,9-12

-/--

☒ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in annex.

" Special categories of cited documents :

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier document but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

"&" document member of the same patent family

Date of the actual completion of the international search

20 November 1998

Date of mailing of the international search report

27/11/1998

Name and mailing address of the ISA

European Patent Office, P.B. 5818 Patentlaan 2
NL - 2280 HV Rijswijk
Tel. (+31-70) 340-2040, Tx. 31 651 epo nl,
Fax: (+31-70) 340-3016

Authorized officer

Cochet, B

INTERNATIONAL SEARCH REPORT

I. National Application No

PCT/US 98/18089

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	WO 97 13388 A (ERICSSON TELEFON AB L M) 10 April 1997 see page 13, line 20 - line 26; table 2 ---	1,2,5
A	WO 96 08905 A (ERICSSON GE MOBILE INC) 21 March 1996 see page 2, line 22 - line 30 see page 16, line 14 - line 20; figures 1,2 -----	6

1

Form PCT/ISA210 (continuation of second sheet) (July 1992)

page 2 of 2

BNSDOCID: <WO_9931837A1_1>

Ex.1002.00102

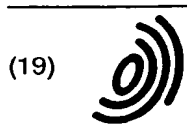
INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No

PCT/US 98/18089

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
WO 9634481 A	31-10-1996	AU 5342196 A	18-11-1996
		CN 1183192 A	27-05-1998
		EP 0823169 A	11-02-1998
WO 8805981 A	11-08-1988	DE 3885270 D	02-12-1993
		DE 3885270 T	17-02-1994
		EP 0343189 A	29-11-1989
		HK 18797 A	20-02-1997
		JP 10028084 A	27-01-1998
		JP 7105751 B	13-11-1995
		JP 1503268 T	02-11-1989
		KR 9608608 B	28-06-1996
		US 4852090 A	25-07-1989
WO 9713388 A	10-04-1997	US 5701294 A	23-12-1997
		AU 7150696 A	28-04-1997
		EP 0853863 A	22-07-1998
WO 9608905 A	21-03-1996	US 5568518 A	22-10-1996
		AU 690350 B	23-04-1998
		AU 3729595 A	29-03-1996
		EP 0782803 A	09-07-1997
		FI 971052 A	12-05-1997
		JP 10505980 T	09-06-1998
		US 5646963 A	08-07-1997
		US 5615231 A	25-03-1997



(19)

Europäisches Patentamt

European Patent Office

Office européen des brevets



(11)

EP 0 800 285 A2

(12)

EUROPÄISCHE PATENTANMELDUNG

(43) Veröffentlichungstag:
08.10.1997 Patentblatt 1997/41(51) Int. Cl.⁶: H04B 7/005

(21) Anmeldenummer: 97105376.4

(22) Anmeldetag: 01.04.1997

(84) Benannte Vertragsstaaten:
DE ES FR GB IT(71) Anmelder: SIEMENS AKTIENGESELLSCHAFT
80333 München (DE)

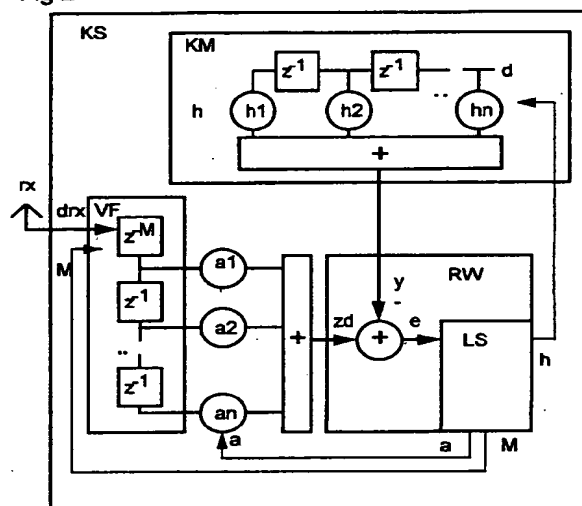
(30) Priorität: 04.04.1996 DE 19613624

(72) Erfinder: Schreib, Franz, Dipl.-Ing.
81475 München (DE)

(54) Verfahren zur Parametrierung einer Empfangseinrichtung, sowie entsprechende Empfangseinrichtung und Funkstation

(57) Es wird ein Verfahren zur Parametrierung zumindest einer Empfangseinrichtung und eine Empfangseinrichtung für eine Funkstation angegeben, wobei die Empfangseinrichtung einen adaptiven Vorfilter enthält. Die Filterkoeffizienten des Vorfilters zur Unterdrückung von empfangenen Störgrößen und die Kanalkoeffizienten für den Detektor zum Ausgleich der Laufzeitunterschiede verschiedener Signalkomponenten eines Empfangssignals werden gleichzeitig bestimmt. Während einer Trainingssequenz werden in der Empfangseinrichtung vorliegende Testdaten in einem Kanalmodell mit Kanalkoeffizienten bewertet und empfangene Testdaten mit Filterkoeffizienten des Vorfilters bewertet und zu Antennendaten bzw. Modellgrößen überlagert. Die Minimierung der Abweichung von Antennendaten und Modellgrößen wird unter Ausschluß der Trivialsolution vorgenommen. Der Erfindungsgegenstand eignet sich insbesondere für Basisstationen und Mobilteile in Mobilfunksystemen.

Fig 2



EP 0 800 285 A2

Beschreibung

Die Erfindung betrifft ein Verfahren zur Parametrierung einer Empfangseinrichtung eines Funksystems mit zugeordneter Antenneneinrichtung und mit einem Vorfilter und eine derartige Empfangseinrichtung bzw. eine Funkstation mit zumindest einer Empfangseinrichtung.

In einem Funksystem werden von einer sendenden Funkstation zu einer empfangenden Funkstation Informationen übertragen. Diese Informationen erreichen die empfangende Funkstation in Form von Empfangssignalen. Durch diverse externe Einflüsse erreichen die Empfangssignale die empfangende Funkstation über mehrere Laufwege. Die den verschiedenen Laufwegen entsprechenden Signalkomponenten treffen bei der empfangenden Funkstation zu aufeinanderfolgenden Zeitpunkten ein. In der empfangenden Funkstation besteht nun das Problem, diese Signalkomponenten, die zudem durch weitere Störkomponenten beeinflusst sein können, zu entzerren, die Fehler zu korrigieren und die übertragene Information zu dekodieren.

Aus Proakis, „Digital Communications“, 1989, S.593-595 sind Vorfilter bekannt, die in einer Empfangseinrichtung vor der Detektierung Störkomponenten in den Empfangssignalen unterdrücken, dabei insbesondere Nachbarkanalstörungen. Ein Vorfilter besteht aus Verzögerungsgliedern, in denen die Empfangssignale stufenweise verzögert werden. Die Empfangssignale unterschiedlicher Verzögerung werden jeweils mit einem Filterkoeffizienten bewertet und anschließend aufsummiert. Die Filterkoeffizienten sind jedoch fest vorgegeben und der Vorfilter ist Teil eines Entzerrers, wobei der Detektor als einfacher Schwellwertentscheider ausgebildet ist.

Zur Auswertung der Empfangssignale werden innerhalb der Empfangseinrichtung weitere Parameter bestimmt. Diese Parameter sind z.B. aus W.Koch, „Optimum and sub-optimum detection of coded data disturbed by time-varying intersymbol interference“, IEEE Proceedings 1990, S.1679-84 bekannte Kanalkoeffizienten. Diese in einem Kanalmodell verwendeten Kanalkoeffizienten dienen dazu, verschiedene nacheinander eintreffende Signalkomponenten eines Empfangssignals geeignet zu überlagern.

Es ist weiterhin bekannt, die aus den Empfangssignalen durch Übertragung ins Basisband und Analog/Digitalwandlung gewonnenen Antennendaten, sowie die Kanalkoeffizienten einem Detektor zuzuführen, der die Antennendaten entzerrt und die Fehlerkorrektur vornimmt. Die im Ausgang des Detektors rekonstruierten Symbole der Signale werden daraufhin in einem Dekodier, z.B. einem Viterbi-Dekodier, dekodiert.

Aus Mobilfunksystemen, siehe M.Mouly, M.-B.Pau-tet, „The GSM System for Mobile Communications“, 49. rue Louise Bruneau, F-91120 Palaiseau, Frankreich, 1992, S.231-237, ist es bekannt, sogenannte Trainingssequenzen zu nutzen, um empfangende Funkstationen abzugleichen. Zu vorbestimmten Zeitpunkten sendet

die sendende Funkstation eine Sequenz digitaler Daten, die der empfangenden Funkstation bekannt ist, d.h. deren Daten in der empfangenden Funkstation unverzerrt vorliegen.

Aufgabe der Erfindung ist es, ein Verfahren zur Parametrierung einer Empfangseinrichtung, sowie eine derartige Empfangseinrichtung bzw. Funkstation in einem Funksystem anzugeben, die eine einstellbare und verbesserte Störfestigkeit ermöglichen. Die Aufgabe wird durch das Verfahren nach Patentanspruch 1, und die Empfangseinrichtung nach Patentanspruch 6 bzw. die Funkstation nach Patentanspruch 13 gelöst. Weitere Ausbildungen des erfindungsgemäßen Gedankens sind den Unteransprüchen zu entnehmen.

In einem Funksystem wird eine Empfangseinrichtung mit Vorfilter dadurch parametriert, daß die Filterkoeffizienten des Vorfilters einstellbar sind und während des Betriebes der Empfangseinrichtung eine Anpassung des Vorfilters an gegebene Anforderung zur Störfestigkeit adaptiv, zusammen mit der Bestimmung von Kanalkoeffizienten erfolgt. Damit wird es möglich, veränderten Empfangsbedingungen gerecht zu werden. Gerade in Funksystemen erweist sich eine solche Parametrierung der Empfangseinrichtung als vorteilhaft, da sich die Bedingungen im Funkkanal schnell ändern. Zur Einstellung der Filterkoeffizienten eignen sich beispielsweise in Funksystemen bekannte Trainingssequenzen.

Entsprechend einer vorteilhaften Ausgestaltung dieses erfindungsgemäßen Verfahrens werden empfangene Empfangssignale in der Empfangseinrichtung in digitale Signale umgewandelt und in dem der Empfangseinrichtung zugehörigen adaptiven Vorfilter stufenweise verzögert, die unterschiedlich verzögerten Empfangssignale jeweils mit Filterkoeffizienten bewertet und überlagert. Weiterhin enthält die Empfangseinrichtung ein Kanalmodell, mit dem der Funkkanal zwischen sendender und empfangender Funkstation nachgebildet werden kann. Das Kanalmodell wird dabei durch Kanalkoeffizienten charakterisiert, durch die das Kanalmodell an den realen Funkkanal angepaßt wird. Das Kanalmodell stellt beispielsweise einen Filter mit endlicher Impulsantwort dar. Einem in der Empfangseinrichtung enthaltenen Detektor zur Entzerrung und Fehlerkorrektur der Antennendaten werden die Antennendaten und die bestimmten Kanalkoeffizienten zugeführt.

Während einer Trainingssequenz repräsentieren die Signale empfangene Testdaten, die zusätzlich ungestört in der Empfangseinrichtung vorliegen. Den empfangenen Testdaten zuordenbare Antennendaten und aus dem mit den Testdaten gespeisten Kanalmodell abgeleitete Modellgrößen werden einem Rechenwerk zugeführt. Im Rechenwerk, das ebenfalls der Empfangseinrichtung zugehörig ist, werden nun gleichzeitig die Filterkoeffizienten zur Unterdrückung von empfangenen Störgrößen und die Kanalkoeffizienten zum Ausgleich der Laufzeitunterschiede verschiedener Signalkomponenten eines Empfangssignals bestimmt.

Dazu wird ein Algorithmus zu Hilfe genommen, der die Minimierung der Abweichung von Antennendaten der Trainingssequenz und Modellgrößen der Trainingssequenz vornimmt. Die bestimmten Filterkoeffizienten und Kanalkoeffizienten können danach auch zur Bewertung der Signale außerhalb der Trainingssequenz benutzt werden. Bei der Verarbeitung von digitalen Empfangssignalen ist es möglich, Vorfilter, Kanalmodell und Rechenwerk in einem digitalen Signalprozessor zu realisieren, wodurch zusätzlicher schaltungstechnischer Aufwand verringert wird.

Die Kombination von adaptiven Vorfilter und Kanalmodell, sowie die gleichzeitige Berechnung der Parameter für die Filterkoeffizienten und die Kanalkoeffizienten in einem Rechenwerk schafft eine wesentliche Verbesserung der Funktionsweise der Empfangseinrichtung in Bezug auf die Rekonstruktion von übertragenen Informationen. Mit einem einfachen Algorithmus können die zur Einstellung der Empfangseinrichtung benötigten Parameter gemeinsam bestimmt werden. Es ist dabei die Nebenbedingung zu beachten, daß die Trivallösung mit auf den Wert null gesetzten Filterkoeffizienten und Kanalkoeffizienten ausgeschlossen wird. Im Algorithmus ist eine entsprechende Nebenbedingung vorzusehen.

Je nach Anzahl der Verzögerungsglieder des adaptiven Vorfilters erfolgt eine verbesserte Störsignalunterdrückung, sowohl für Störer in Nachbarkanälen als auch im eigenen Kanal, insbesondere sinusförmige Störer. Die Zahl der Sinusstörer, die vollständig eliminiert werden können, entspricht der Zahl der Filterkoeffizienten minus eins. Das adaptive Vorfilter ergibt eine deutliche Verbesserung der Empfangsqualität, wodurch sich bei einem Einsatz der Funkstation in einem Funksystem auch ein Zugewinn an Systemleistung z.B. bei Mobilfunksystemen durch eine dadurch ermöglichte höhere Dichte an Mobilstationen ergibt.

Nach weiteren Ausgestaltungen des Erfindungsgegenstandes ist der Algorithmus zur Bestimmung der Filterkoeffizienten und der Kanalkoeffizienten unter Ausschluß der Trivallösung derart ausgebildet, daß in der Empfangseinrichtung mehrere Sätze von Filterkoeffizienten vorliegen mit denen die empfangenen Testdaten jeweils bewertet werden und daraufhin die Kanalkoeffizienten mit einer minimalen Abweichung von Antennendaten und Modellgrößen bestimmt werden. Die Lösung mit der kleinsten Abweichung, d.h. die zugehörigen Filterkoeffizienten und dazu bestimmten Kanalkoeffizienten wird ausgewählt und dient zur Parametrierung der Empfangseinrichtung. Diese Lösung reduziert den Rechenaufwand auf die Bestimmung der Kanalkoeffizienten, währenddessen die Filterkoeffizienten aus einer Menge bekannter Filterkoeffizienten ausgewählt werden.

Eine alternative Variante besteht darin, die Berechnung der kleinsten Fehlerquadrate oder eine Korrelationsrechnung zur Bestimmung der Filterkoeffizienten und der Kanalkoeffizienten ohne Vorauswahl heranzuziehen und damit bei in Kauf genommenen größeren

Rechenaufwand die Filterkoeffizienten und Kanalkoeffizienten aus einer unendlich großen Menge von möglichen Werten auszuwählen, jedoch wiederum unter Ausschluß der Trivallösung. Die Trivallösung, bei der Filterkoeffizienten und Kanalkoeffizienten auf null gesetzt sind, entspricht einer möglichen, jedoch unsinnigen Lösung. Folglich ist es nötig, einen der Filterkoeffizienten oder der Kanalkoeffizienten auf einen Wert ungleich null festzusetzen.

Nach einer weiteren vorteilhaften Ausgestaltung des Erfindungsgegenstandes wird vor der endgültigen Bestimmung der Filterkoeffizienten und der Kanalkoeffizienten eine Synchronisation der empfangenen Testdaten mit dem im Kanalmodell verarbeiteten Testdaten vorgenommen. Durch eine nicht vorhersehbare Laufzeit der Empfangssignale der Trainingssequenz zwischen Sender und Empfänger kann der Zeitpunkt des Eintreffens der empfangenen Testdaten in der Empfangseinrichtung nicht mit völliger Sicherheit vorhergesagt werden. Um den Beginn der Trainingssequenz und eine wirkungsvolle Berechnung der Filterkoeffizienten und Kanalkoeffizienten ohne störenden Einfluß einer ungenügenden Synchronisation zu gewährleisten, wird deshalb eine Verzögerung berechnet, mit der die Empfangssignale in der Empfangseinrichtung beaufschlagt werden. Die Verzögerung kann z.B. dadurch bestimmt werden, daß an mehreren Positionen des Datenstromes der Antennendaten eine Minimierung der Abweichung vorgenommen wird und die optimale Lösung, dies entspricht der Synchronisation, ausgewählt wird. Daraufhin wird diese Verzögerung auch außerhalb der Trainingssequenz verwendet.

In den übrigen Patentansprüchen ist eine Funkstation angegeben, deren Empfangseinrichtung zur Durchführung der Parametrierung entsprechend ausgebildet ist. Vorteilhafterweise wird diese Funkstation in Funksystemen, die im Zeitlagenmultiplex betrieben werden, eingesetzt und die Parametrierung für jede einzelne Zeitlage neu bestimmt. Ein Beispiel für ein im Zeitlagenmultiplex betriebenes Funksystem sind Mobilfunksysteme (GSM, GSM-ähnliche) oder Schnurlos-Kommunikationssysteme (DECT), wobei die Funkstation als Basisstation oder Mobilstation betrieben wird. Die erfindungsgemäße Empfangseinrichtung bzw. Funkstation und das erfindungsgemäße Verfahren werden insbesondere den speziellen Bedingungen eines Mobilfunksystems gerecht, da sich durch die Mobilität von Kommunikationsendgeräten sich verändernde Ausbreitungsbedingungen ergeben, worauf die Parametrierung der Empfangseinrichtung entsprechend angepaßt werden kann.

Im folgenden soll der Erfindungsgegenstand anhand von zeichnerischen Darstellungen näher erläutert werden.

Dabei zeigen

FIG 1 ein Blockschaltbild einer Funkstation,

FIG 2 ein Blockschaltbild eines Kanalschätzers

während der Parametrierung,

FIG 3 ein Blockschaltbild der Empfangseinrichtung während des Empfangs mit zuvor bestimmten Parametern außerhalb der Trainingssequenz.

In FIG 1 ist die Empfangseinrichtung EE und die zugeordnete Antenneneinrichtung AE einer Funkstation dargestellt. Diese Funkstation ist Teil eines Funksystems und empfängt von einer sendenden Funkstation dieses Funksystems Empfangssignale rx. Das Funksystem ist beispielsweise ein GSM-Mobilfunksystem, bei dem die in FIG 1 dargestellte Funkstation eine Basisstation darstellt. Basisstationen sind jeweils über eine Luftschnittstelle mit Mobilteilen verbunden, die beispielsweise die sendende Funkstation darstellen. Im weiteren wird für die Basisstation der Empfangsfall dargestellt, nichtsdestotrotz besteht üblicherweise eine zweiseitige Verkehrsbeziehung, d.h. die Basisstation weist auch eine Sendeeinrichtung auf. Auch kann die Empfangseinrichtung des Mobilteils entsprechend der Erfindung ausgestaltet sein.

Aus den in der Antenneneinrichtung AE empfangenen Empfangssignalen rx werden z.B. durch eine Übertragung ins Basisband und darauffolgende Analog/Digitalwandlung digitale Signale drx erzeugt und einem Entzerrer, der innerhalb der Empfangseinrichtung EE angeordnet ist, zugeführt. Es ist zu bemerken, daß die Antennendaten z und die im folgenden zu berechnenden Koeffizienten c, h komplexe Werte darstellen, wenn die Basisbandumsetzung in In-Phase und Quadraturkomponenten unterscheidet.

Der Entzerrer enthält dabei einen Kanalschätzer KS und einen Detektor DT. Die digitalen Signale drx dienen als Eingangssignale für den Kanalschätzer KS, der mit dem Detektor DT verbunden ist und ihm aus den digitalen Signalen drx abgeleitete Antennendaten z und des weiteren im Kanalschätzer KS bestimmte Kanalkoeffizienten h zuführt.

Der Detektor DT nimmt eine Entzerrung und Fehlerkorrektur der Antennendaten z unter Zuhilfenahme der Kanalkoeffizienten h vor und erzeugt Symbole s, die weiteren Einrichtungen der Empfangseinrichtung EE, nicht dargestellt, zugeführt werden, in denen daraufhin eine Dekodierung und ggf. weitere Verarbeitungsschritte vorgenommen werden. Die Symbole s repräsentieren dabei die rekonstruierten, durch Entzerrung und Fehlerkorrektur verarbeiteten Signale rx.

In FIG 2 wird die Funktionsweise des Kanalschätzers KS während der Parametrierung erläutert. Die im Kanalschätzer KS enthaltenen Einrichtungen KM, RW sind vorteilhafterweise in einem digitalen Signalprozessor implementiert. Durch entsprechende Algorithmen, können im digitalen Signalprozessor neben der Lösung des Problems der kleinsten Fehlerquadrate auch entsprechende Verzögerungen von Datenelementen und eine Simulation gemäß dem Kanalmodell KM erfolgen.

Die Parametrierung findet während des Empfangs einer Trainingssequenz statt. Während dieser Trainings-

sequenz werden die Testdaten d von einer sendenden Funkstation an die in FIG 1 dargestellte, empfangende Funkstation übertragen. Durch Mehrwegeausbreitung, Störung und Verzögerung beeinträchtigt treffen die Empfangssignale rx bei der empfangenden Funkstation ein und stehen dem Kanalschätzer KS als digitale Signale drx zur Verfügung.

Diese digitalen Signale drx werden in einem Speicherelement gespeichert und um eine Verzögerung M verzögert ausgegeben. Das Speicherelement ist dabei beispielsweise Teil eines adaptiven Vorfilters VF. Das Vorfilter VF enthält mehrere (z.B. 5 oder 6) Verzögerungsglieder z^{-1} , in denen die digitalen Empfangssignale stufenweise verzögert werden. Die digitalen Signale drx werden daraufhin jeweils durch Filterkoeffizienten a bewertet und anschließend aufsummiert, wobei die Aufsummierung ein Antennendatum zd der Trainingssequenz ergibt. Aufeinanderfolgende Empfangssignale rx ergeben so die Antennendaten zd der Trainingssequenz.

Die in der Empfangseinrichtung EE bekannten Testdaten d werden einem Kanalmodell KM zugeführt. Dieses Kanalmodell KM besteht aus Verzögerungsgliedern z^{-1} , die kettenförmig angeordnet sind. Die Testdaten d durchlaufen diese Verzögerungsglieder z^{-1} . Die unverzögerten Testdaten d und die am Ausgang eines jeden Verzögerungsgliedes z^{-1} anliegenden verzögerten Testdaten d werden jeweils mit einem Kanalkoeffizienten h bewertet und anschließend zu einer Modellgröße y aufsummiert. In diesem Kanalmodell KM wird die Mehrwegeausbreitung simuliert, wobei nacheinander eintreffende Signalkomponenten zu einem gemeinsamen Signal überlagert werden. In Mobilfunksystemen reichen 3 bis 4 Verzögerungsglieder z^{-1} aus, um die Mehrwegeausbreitung auszugleichen. Die Modellgrößen y sind die Ausgangsgrößen des Kanalmodells KM.

Weiterhin enthält der Kanalschätzer KS ein Rechenwerk RW, das die Antennendaten zd der Trainingssequenz und die Modellgrößen k vergleicht und die Abweichung e beider Werte bestimmt. Die Abweichung e wird innerhalb des Rechenwerkes RW einer Einheit LS zugeführt, die die für eine minimale Abweichung e erforderlichen Filterkoeffizienten a, Kanalkoeffizienten h und die Verzögerung M bestimmt.

Zur Parametrierung wird zuerst die Verzögerung M bestimmt. Die Einheit LS löst das Problem der kleinsten Fehlerquadrate an mehreren Positionen des Empfangsdatenstromes, der durch die Antennendaten zd der Trainingssequenz gebildet wird. Die Position mit dem kleinsten quadratischen Fehler stellt die Synchronisationsposition dar. Damit ist auch die Verzögerung M bestimmt, die im weiteren bei der Bearbeitung der Empfangssignale rx auch außerhalb der Trainingssequenz für die gleiche Zeitlage verwendet wird. Bei der Lösung des Problems des kleinsten Fehlerquadrates wird die Nebenbedingung beachtet, daß nicht alle Filterkoeffizienten a und Kanalkoeffizienten h gleich null sein dürfen. Deshalb wird z.B. einer dieser Werte auf einen Wert

ungleich null voreingestellt.

Durch diese Verfahrensweise wird die Synchronisation und die Bestimmung der Filterkoeffizienten a und Kanalkoeffizienten h gleichzeitig bewirkt. Bei der Lösung des Problems der kleinsten Fehlerquadrate kann die Abweichung e vorteilhafterweise durch die Summe der quadrierten Kanalkoeffizienten h normalisiert werden, wodurch sich die Synchronisation weiter verbessern läßt. Anstelle der Lösung des Problems der kleinsten Fehlerquadrate können jedoch auch andere geeignete Algorithmen verwendet werden, die eine Minimierung der Abweichung e herbeiführen. Die durch das Rechenwerk RW bestimmten Kanalkoeffizienten h , Filterkoeffizienten a und die Verzögerung M werden daraufhin auch außerhalb der Trainingssequenz zur Verbesserung des Empfangs der Empfangseinrichtung EE benutzt.

In FIG 3 ist der Empfang und die Weiterverarbeitung der Empfangssignale rx außerhalb der Trainingssequenz dargestellt. Der Kanalschätzer KS nimmt die digitalen Signale drx auf und verzögert sie entsprechend der zuvor bestimmten Verzögerung M bevor sie im adaptiven Vorfilter VF verzögert und durch die bestimmten Filterkoeffizienten a bewertet zu Antennendaten z überlagert werden. Diese Antennendaten z werden dem Detektor DT durch den Kanalschätzer KS zugeführt. Weiterhin werden auch die bestimmten Kanalkoeffizienten h vom Kanalschätzer KS an den Detektor DT übermittelt.

Dieser Detektor DT kann daraufhin die Entzerrung und Fehlerkorrektur der Antennendaten z vornehmen und erzeugt die Symbole s . Die erfindungsgemäße Empfangseinrichtung EE zeigt dabei eine verbesserte Unterdrückung von Störsignalen, die durch die Kombination von Vorfilterung und Berücksichtigung von Laufzeitunterschieden von Signalkomponenten in einem einzigen Algorithmus erreicht wird. Die Komplexität des adaptiven Vorfilters, also z.B. die Anzahl der Verzögerungselemente z^{-1} , spielt eine Rolle bei der Wirksamkeit der erfindungsgemäßen Funkstation bzw. des erfindungsgemäßen Verfahrens.

Patentansprüche

1. Verfahren zur Parametrierung einer Empfangseinrichtung (EE) in einem Funksystem, bei dem durch eine zugeordnete Antenneneinrichtung (AE) Empfangssignale (rx) empfangen, digitalisiert, einem Vorfilter (VF) zugeführt, und anschließend entzerrt und fehlerkorrigiert werden, dadurch gekennzeichnet, daß das Vorfilter (VF) als adaptives Vorfilter (VF) ausgestaltet ist, und während des Empfangs eine gleichzeitige Einstellung von Filterkoeffizienten (a) des Vorfilters (VF) und Kanalkoeffizienten (h) eines Kanalmodells (KM) erfolgt.

2. Verfahren nach Anspruch 1, bei dem

durch die Empfangseinrichtung (EE)

- im adaptiven Vorfilter (VF) aus den Empfangssignalen (rx) abgeleitete digitale Signale (drx) verzögert werden, die unterschiedlich verzögerten digitalen Signale (drx) jeweils mit den Filterkoeffizienten (a) bewertet und zu Antennendaten (z , zd) überlagert werden,
- die Antennendaten (z), sowie die im Kanalmodell (KM) bestimmten, zur Berücksichtigung der Mehrwegeausbreitung der Empfangssignale (rx) vorgesehenen Kanalkoeffizienten (h) einem Detektor (DT) zur Entzerrung und Fehlerkorrektur der Antennendaten (z) zugeführt werden,

wobei während einer Trainingssequenz mit Testdaten (d):

- Modellgrößen (y) und den empfangenen Testdaten (d) zuordenbare Antennendaten (zd) einem Rechenwerk (RW) zugeführt werden, dabei sind die Modellgrößen (y) aus dem mit den in der Empfangseinrichtung (EE) vorliegenden, unverzerrten Testdaten (d) gespeicherten Kanalmodell (KM) abgeleitet,
- im Rechenwerk (RW)
 - die Filterkoeffizienten (a) zur Unterdrückung von empfangenen Störgrößen und
 - die Kanalkoeffizienten (h) zum Ausgleich der Laufzeitunterschiede verschiedener Signalkomponenten eines Empfangssignals (rx)

gleichzeitig mit einem Algorithmus bestimmt werden,

der zur Minimierung der Abweichung (e) von Antennendaten (zd) der Trainingssequenz und Modellgrößen (y) der Trainingssequenz vorgesehen ist, und diese bestimmten Filterkoeffizienten (a) und Kanalkoeffizienten (h) zur Bewertung der Empfangssignale (rx) außerhalb der Trainingssequenz vorgesehen sind.

3. Verfahren nach Anspruch 2, bei dem der Algorithmus zur Bestimmung der Filterkoeffizienten (a) und der Kanalkoeffizienten (h) unter Ausschluß der Trivialsolution ($a=0$; $h=0$) derart ausgebildet ist,

daß die empfangenen Testdaten (d) mit

mehreren vorbestimmten Sätzen von Filterkoeffizienten (a) bewertet und die Kanalkoeffizienten (h) mit einer minimalen Abweichung (e) von Antennendaten (zd) und Modellgrößen (y) bestimmt werden, 5

- derjenige Satz von Filterkoeffizienten (a), bei dem die Abweichung (e) von Antennendaten (zd) und Modellgrößen (y) am geringsten ist, und die zugehörigen bestimmten Kanalkoeffizienten (h) ausgewählt wird. 10

4. Verfahren nach Anspruch 2, 15

bei dem der Algorithmus zur Bestimmung der Filterkoeffizienten (a) und der Kanalkoeffizienten (h) unter Ausschluß der Trivallösung ($a=0$; $h=0$) derart ausgebildet ist, daß die Minimierung der Abweichung (e) von Antennendaten (zd) und Modellgrößen (y) mit der Berechnung der kleinsten Fehlerquadrate vorgenommen wird. 20

5. Verfahren nach einem der Ansprüche 2 bis 4, 25

bei dem vor Bestimmung der Filterkoeffizienten (a) und der Kanalkoeffizienten (h) durch Ermittlung einer Verzögerung (M) eine Synchronisation der empfangenen Testdaten (d) mit den im Kanalmodell verarbeiteten Testdaten (d) vorgenommen wird und die Verzögerung (M) zur der Bewertung der Empfangssignale (rx) auch außerhalb der Trainingssequenz vorgesehen ist. 30 35

6. Empfangseinrichtung (EE) in einem Funksystem, 40

- mit einer zugeordnete Antenneneinrichtung (AE) zum Empfang von Empfangssignalen (rx),
- mit einem Vorfilter (VF)
- zur Verzögerung von aus den Empfangssignalen (rx) abgeleiteten digitalen Signalen (drx), 45
- zur Bewertung der unterschiedlich verzögerten digitalen Signale (drx) jeweils mit Filterkoeffizienten (a), und

zu deren Überlagerung zu Antennendaten (z, zd), 50

- mit einem Detektor (DT) zur Entzerrung und zur Fehlerkorrektur der Antennendaten (z) durch eine Auswertung der Antennendaten (z) und in einem Kanalmodell (KM) bestimmter, zur Berücksichtigung der Mehrwegeausbreitung der Empfangssignale (rx) vorgesehener Kanalkoeffizienten (h), 55

dadurch gekennzeichnet,

daß Mittel (RW) zur gleichzeitigen Einstellung der Filterkoeffizienten (a) des Vorfilters (VF) und der Kanalkoeffizienten (h) des Kanalmodells (KM) vorgesehen sind und das Vorfilter (VF) damit adaptiv ist.

7. Empfangseinrichtung (EE) nach Anspruch 6, 60

- mit einem Rechenwerk (RW) zur Bestimmung
 - der Filterkoeffizienten (a) zur Unterdrückung von empfangenen Störgrößen und
 - der Kanalkoeffizienten (h) zum Ausgleich der Laufzeitunterschiede verschiedener Signalkomponenten eines Empfangssignals (rx)

unter Verwendung eines Algorithmus zum Minimieren der Abweichung (e) von Antennendaten (zd) der Trainingssequenz und Modellgrößen (y) der in der Empfangseinrichtung (EE) vorliegenden Testdaten (d) während einer Trainingssequenz, enthält.

8. Empfangseinrichtung (EE) nach Anspruch 7, 65

die die Bewertung der Empfangssignale (rx) mit den bestimmten Filterkoeffizienten (a) und Kanalkoeffizienten (h) auch außerhalb der Trainingssequenz vorsieht.

9. Empfangseinrichtung (EE) nach einem der Ansprüche 7 oder 8, 70

bei der das adaptive Vorfilter (VF) während der Testsequenz die Bewertung der Signale (rx, drx) mit mehreren vorbestimmten Sätzen von Filterkoeffizienten (a) vorsieht und das Rechenwerk (RW) die Bestimmung der Kanalkoeffizienten (h) derart vorsieht, daß derjenige Satz von Filterkoeffizienten (a), bei dem die Abweichung (e) von Antennendaten (zd) und Modellgrößen (y) am geringsten ist, und die zugehörigen bestimmten Kanalkoeffizienten (h) unter Ausschluß der Trivallösung ($a=0$; $h=0$) ausgewählt werden.

10. Empfangseinrichtung (EE) nach einem der Ansprüche 7 bis 9, 75

bei der das Rechenwerk (RW) während der Testsequenz das Bestimmen der Filterkoeffizienten (a) und der Kanalkoeffizienten (h) mit einer minimalen Abweichung (e) von Antennendaten (zd) und Modellgrößen (y) nach der Methode der kleinsten Fehlerquadrate unter Ausschluß der Trivallösung ($a=0$; $h=0$) vor-

sieht.

11. Empfangseinrichtung (EE) nach einem der Ansprüche 6 bis 10,

bei der das Rechenwerk (RW) das Bestimmen einer Verzögerung (M) zur Synchronisation der empfangenen Testdaten (d) mit den im Kanalmodell verarbeiteten Testdaten (d) unabhängig oder abhängig von der Bestimmung der Kanal-
koeffizienten (h) und Filterkoeffizienten (a) vor-
sieht und
das adaptive Vorfilter (VF) die Verzögerung (M) bei der Bewertung der Signale (drx, rx) zur Synchronisation auch außerhalb der Trainings-
sequenz vorsieht.

12. Empfangseinrichtung (EE) nach Anspruch 10,

bei der die Synchronisation dadurch bewirkt wird, daß an mehreren Positionen der Antennendaten (zd) eine Bestimmung der Kanal-
koeffizienten (h) und Filterkoeffizienten (a) vorgenommen wird und die Lösung mit der geringsten Abweichung (e) ausgewählt wird.

13. Funkstation mit einer Empfangseinrichtung (EE) nach einem der Ansprüche 6 bis 12.

14. Funkstation nach Anspruch 13,

die im Zeitlagenmultiplex betrieben wird und die die Bestimmung der Parameter (a, h, M) für jeweils eine Zeitlage vorsieht.

15. Funkstation nach einem der Ansprüche 14,

die als Basisstation eines Mobilfunksystems betrieben wird.

16. Funkstation nach einem der Ansprüche 14,

die als Mobilstation eines Mobilfunksystems betrieben wird:

das Rechenwerk (RW) das Bestimmen einer Verzögerung (M) zur Synchronisation der empfangenen Testdaten (d) mit den im Kanalmodell verarbeiteten Testdaten (d) unabhängig oder abhängig von der Bestimmung der Kanal-
koeffizienten (h) und Filterkoeffizienten (a) vor-
sieht und
das adaptive Vorfilter (VF) die Verzögerung (M) bei der Bewertung der Signale (drx, rx) zur Synchronisation auch außerhalb der Trainings-
sequenz vorsieht.

das Rechenwerk (RW) das Bestimmen einer Verzögerung (M) zur Synchronisation der empfangenen Testdaten (d) mit den im Kanalmodell verarbeiteten Testdaten (d) unabhängig oder abhängig von der Bestimmung der Kanal-
koeffizienten (h) und Filterkoeffizienten (a) vor-
sieht und
das adaptive Vorfilter (VF) die Verzögerung (M) bei der Bewertung der Signale (drx, rx) zur Synchronisation auch außerhalb der Trainings-
sequenz vorsieht.

das Rechenwerk (RW) das Bestimmen einer Verzögerung (M) zur Synchronisation der empfangenen Testdaten (d) mit den im Kanalmodell verarbeiteten Testdaten (d) unabhängig oder abhängig von der Bestimmung der Kanal-
koeffizienten (h) und Filterkoeffizienten (a) vor-
sieht und
das adaptive Vorfilter (VF) die Verzögerung (M) bei der Bewertung der Signale (drx, rx) zur Synchronisation auch außerhalb der Trainings-
sequenz vorsieht.

5

10

15

20

25

30

35

40

45

50

55

7

Fig 1

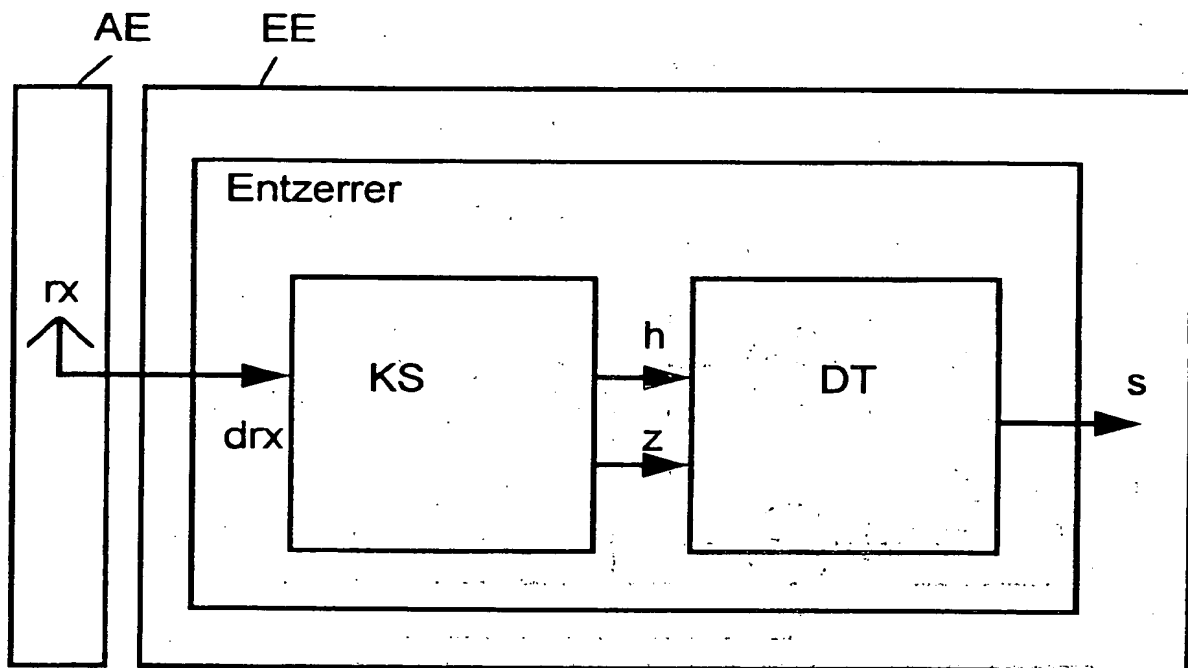


Fig 2

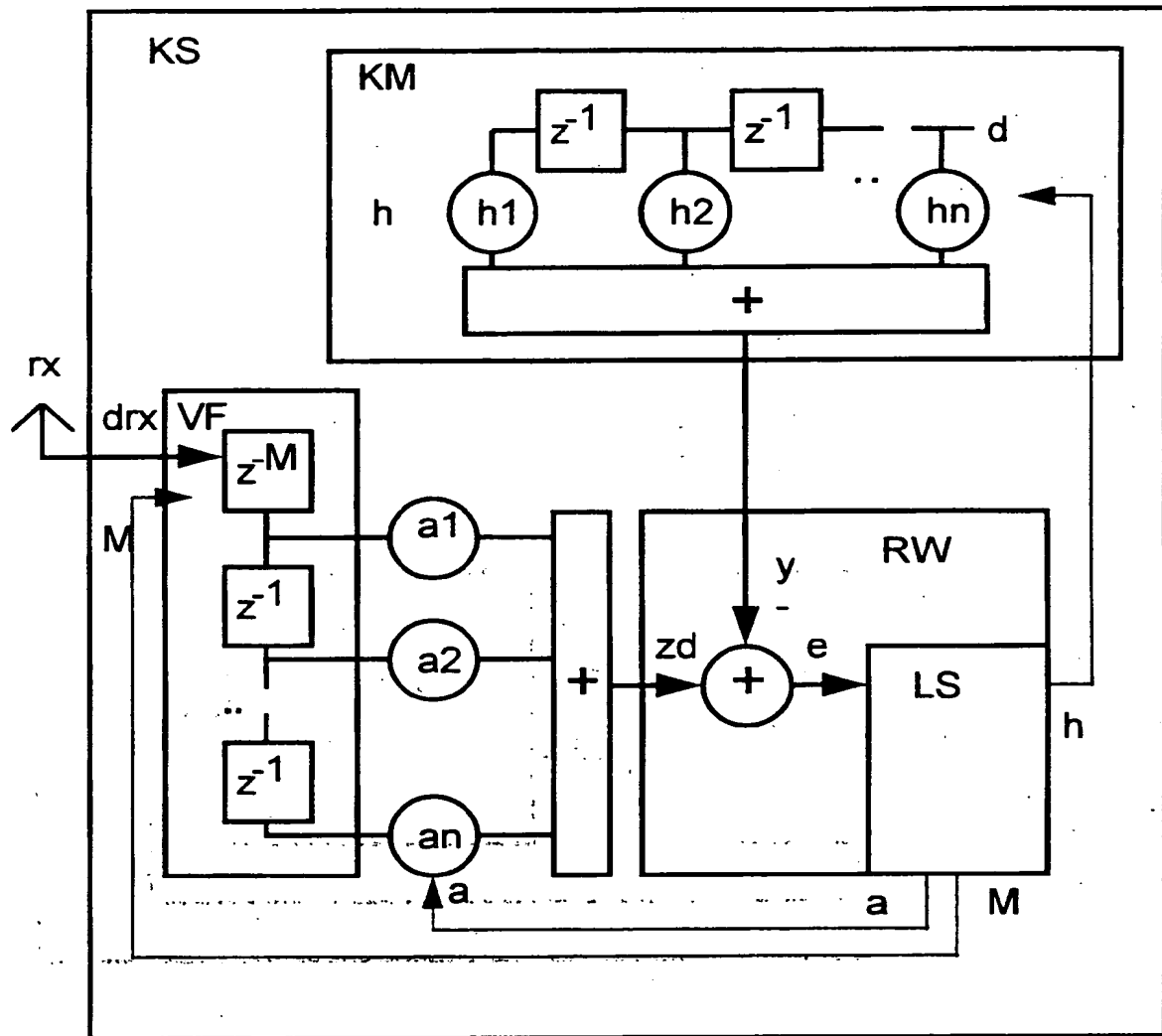
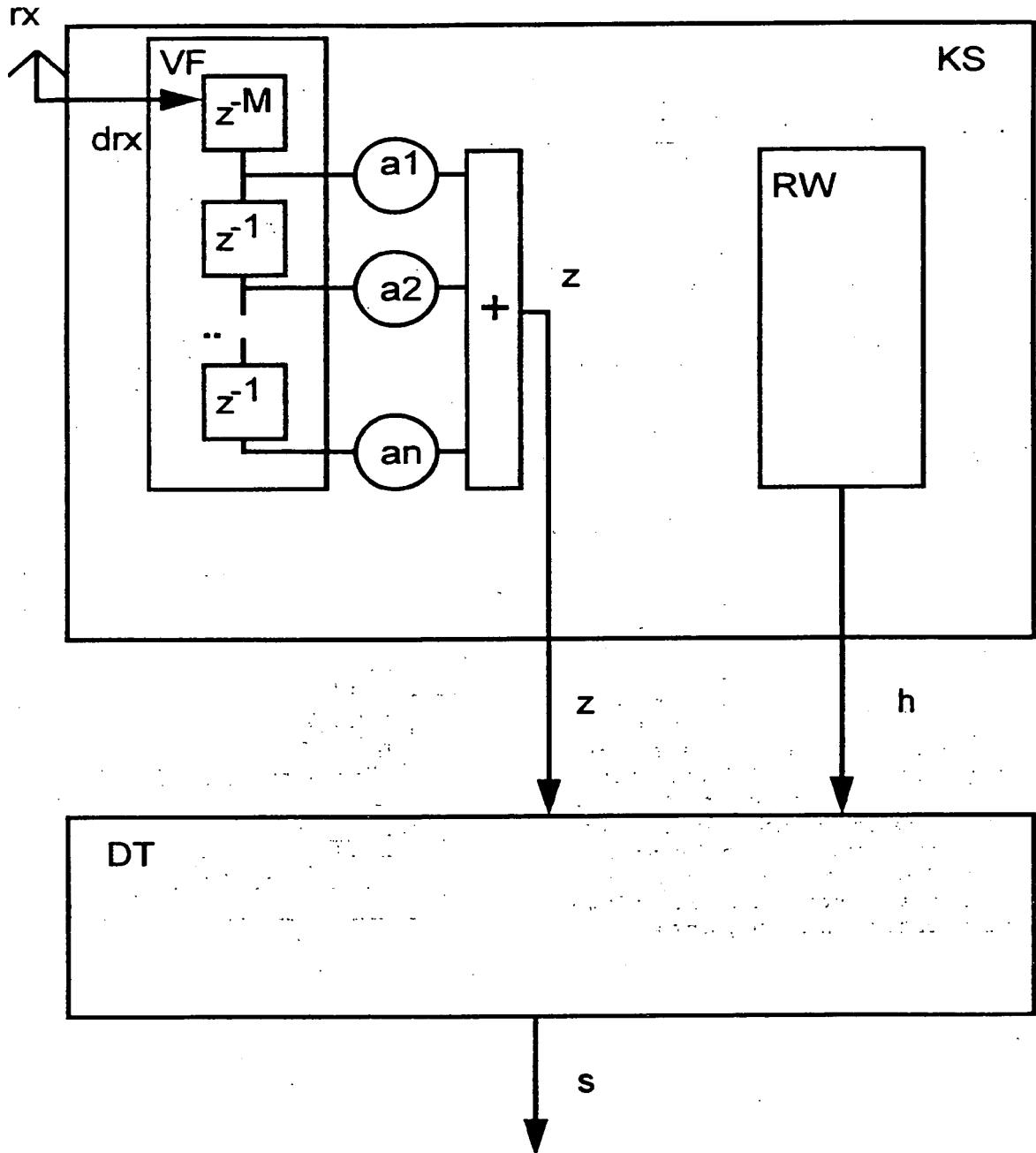
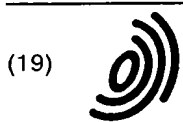


Fig 3





(19)

Europäisches Patentamt

European Patent Office

Office européen des brevets



(11)

EP 0 800 285 A3

(12)

EUROPÄISCHE PATENTANMELDUNG

(88) Veröffentlichungstag A3:
20.12.2000 Patentblatt 2000/51

(51) Int. Cl.⁷: H04B 7/005, H04L 25/03

(43) Veröffentlichungstag A2:
08.10.1997 Patentblatt 1997/41

(21) Anmeldenummer: 97105376.4

(22) Anmeldetag: 01.04.1997

(84) Benannte Vertragsstaaten:
DE ES FR GB IT

(30) Priorität: 04.04.1996 DE 19613624

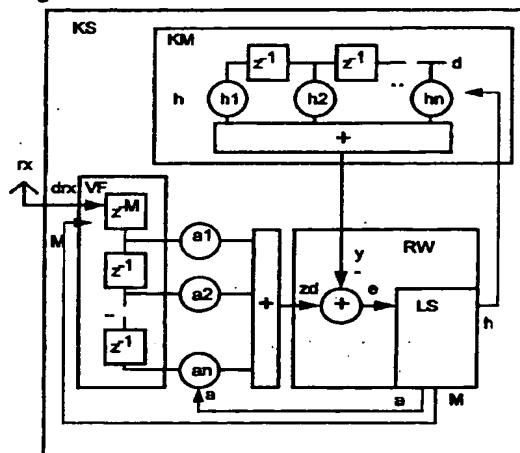
(71) Anmelder:
SIEMENS AKTIENGESELLSCHAFT
80333 München (DE)

(72) Erfinder:
Schreib, Franz, Dipl.-Ing.
81475 München (DE)

(54) Verfahren zur Parametrierung einer Empfangseinrichtung, sowie entsprechende Empfangseinrichtung und Funkstation

(57) Es wird ein Verfahren zur Parametrierung zumindest einer Empfangseinrichtung und eine Empfangseinrichtung für eine Funkstation angegeben, wobei die Empfangseinrichtung einen adaptiven Vorfilter (VF) enthält. Die Filterkoeffizienten des Vorfilters zur Unterdrückung von empfangenen Störgrößen und die Kanalkoeffizienten für den Detektor zum Ausgleich der Laufzeitunterschiede verschiedener Signalkomponenten eines Empfangssignals werden gleichzeitig bestimmt. Während einer Trainingssequenz werden in der Empfangseinrichtung vorliegende Testdaten in einem Kanalmodell (KM) mit Kanalkoeffizienten bewertet und empfangene Testdaten mit Filterkoeffizienten des Vorfilters bewertet und zu Antennendaten bzw. Modellgrößen überlagert. Die Minimierung der Abweichung von Antennendaten und Modellgrößen wird unter Ausschluß der Trivialsolution vorgenommen. Der Erfindungsgegenstand eignet sich insbesondere für Basisstationen und Mobilteile in Mobilfunksystemen.

Fig 2



EP 0 800 285 A3



Europäisches
Patentamt

EUROPÄISCHER RECHERCHENBERICHT

Nummer der Anmeldung
EP 97 10 5376

EINSCHLÄGIGE DOKUMENTE			
Kategorie	Kennzeichnung des Dokuments mit Angabe, soweit erforderlich, der maßgeblichen Teile	Betrifft Anspruch	KLASSIFIKATION DER ANMELDUNG (Int.Cl.6)
X,P	US 5 533 067 A (GUDMUNDSON BJOERN ET AL) 2. Juli 1996 (1996-07-02) * Zusammenfassung; Ansprüche 1,2,4,6; Abbildungen 4,10 * * Spalte 1, Zeile 9 - Zeile 49 * * Spalte 1, Zeile 67 - Spalte 2, Zeile 6 * * Spalte 3, Zeile 22 - Zeile 40 * * Spalte 4, Zeile 47 - Zeile 59 * * Spalte 6, Zeile 43 - Zeile 64 * * Spalte 7, Zeile 61 - Zeile 67 * * Spalte 8, Zeile 54 - Spalte 9, Zeile 15 * * Spalte 12, Zeile 3 - Zeile 32 * * Spalte 14, Zeile 11 - Zeile 29 *	1-16	H04B7/005 H04L25/03
X	& CA 2 126 604 A (GUDMUNDSON BJOERN ET AL) 25. Dezember 1994 (1994-12-25)	1-16	
X	TETSUYA SHIMAMURA ET AL: "AN AR PREFILTERING APPROACH TO ADAPTIVE EQUALIZATION" PROCEEDINGS OF THE INTERNATIONAL SYMPOSIUM ON CIRCUITS AND SYSTEMS. (ISCS),US,NEW YORK, IEEE, Bd. -, 3. Mai 1993 (1993-05-03), Seiten 730-733, XP000410102 ISBN: 0-7803-1281-3 * Zusammenfassung * * Seite 730, Spalte 1, Zeile 51 - Spalte 2, Zeile 23; Abbildung 1 * * Seite 730, Spalte 2, Zeile 52 - Seite 731, Spalte 1, Zeile 9 * * Seite 731, Spalte 1, Zeile 50 - Spalte 2, Zeile 27 * * Seite 731, Spalte 2, Zeile 43 - Zeile 67 * * Absatz [CONCLUSION] *	1-16	RECHERCHIERTE SACHGEBIETE (Int.Cl.6) H04B H04L
Der vorliegende Recherchenbericht wurde für alle Pat()ansprüche erstellt			
Recherchenort BERLIN		Abschlußdatum der Recherche 20. Oktober 2000	Prüfer Binger, B
KATEGORIE DER GENANNTEN DOKUMENTE X : von besonderer Bedeutung allein betrachtet Y : von besonderer Bedeutung in Verbindung mit einer anderen Veröffentlichung derselben Kategorie A : technologischer Hintergrund O : nichtschriftliche Offenbarung P : Zwischenliteratur		T : der Erfindung zugrunde liegende Theorien oder Grundsätze E : älteres Patentdokument, das jedoch erst am oder nach dem Anmeldedatum veröffentlicht worden ist D : in der Anmeldung angeführtes Dokument L : aus anderen Gründen angeführtes Dokument & : Mitglied der gleichen Patentfamilie, übereinstimmendes Dokument	

EPO FORM 1503 03.82 (P04C03)

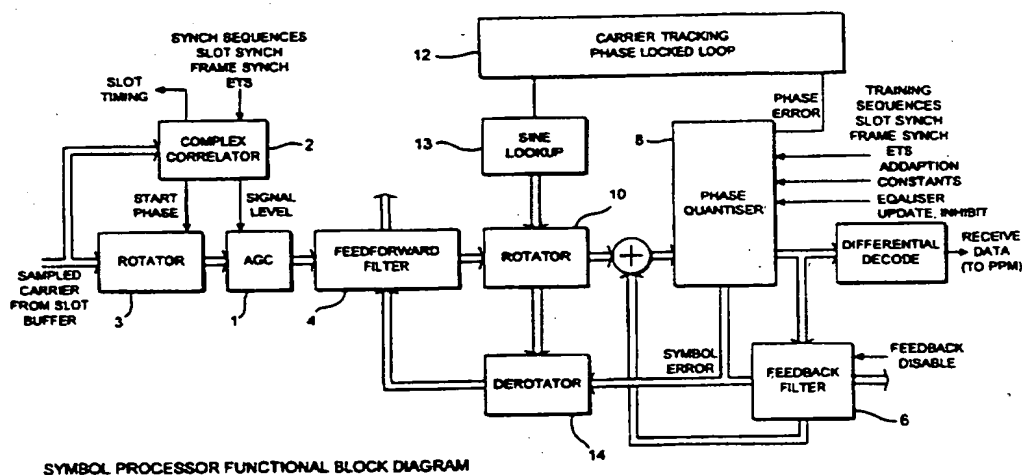
This Page Blank (uspto)



INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(51) International Patent Classification ⁶ : H04L 25/03	A2	(11) International Publication Number: WO 96/34481 (43) International Publication Date: 31 October 1996 (31.10.96)
(21) International Application Number: PCT/GB96/00947 (22) International Filing Date: 19 April 1996 (19.04.96) (30) Priority Data: 9508661.7 28 April 1995 (28.04.95) GB (71) Applicant (for all designated States except US): IONICA INTERNATIONAL LIMITED [GB/GB]; Cowley Road, Cambridge CB4 4AS (GB). (72) Inventor; and (75) Inventor/Applicant (for US only): RUDKIN, Paul, William [GB/GB]; 12 Tamarin Gardens, Cherry Hinton, Cambridge CB1 4BH (GB). (74) Agent: SARUP, David, Alexander; Withers & Rogers, 4 Dyer's Buildings, Holborn, London EC1N 2JT (GB).		(81) Designated States: AL, AM, AT, AU, AZ, BB, BG, BR, BY, CA, CH, CN, CZ, DE, DK, EE, ES, FI, GB, GE, HU, IS, JP, KE, KG, KP, KR, KZ, LK, LR, LS, LT, LU, LV, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, TJ, TM, TR, TT, UA, UG, US, UZ, VN, ARIPO patent (KE, LS, MW, SD, SZ, UG), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, ML, MR, NE, SN, TD, TG). Published Without international search report and to be republished upon receipt of that report.

(54) Title: ADAPTIVE FILTER FOR USE IN A TDM/TDMA RECEIVER



SYMBOL PROCESSOR FUNCTIONAL BLOCK DIAGRAM

(57) Abstract

A demodulator for a receiver of digital data messages sent in predetermined time slots within fixed length time frames includes an adaptive filter operative on each received data packet to determine digital bit values and to adapt filter coefficients. Filter coefficient values upon filtering a data packet in a time slot are used as initial values in adaptive filtering the next received data packet in the corresponding time slot of the next frame.

FOR THE PURPOSES OF INFORMATION ONLY

Codes used to identify States party to the PCT on the front pages of pamphlets publishing international applications under the PCT.

AM	Armenia	GB	United Kingdom	MW	Malawi
AT	Austria	GE	Georgia	MX	Mexico
AU	Australia	GN	Guinea	NE	Niger
BB	Barbados	GR	Greece	NL	Netherlands
BE	Belgium	HU	Hungary	NO	Norway
BF	Burkina Faso	IE	Ireland	NZ	New Zealand
BG	Bulgaria	IT	Italy	PL	Poland
BJ	Benin	JP	Japan	PT	Portugal
BR	Brazil	KE	Kenya	RO	Romania
BY	Belarus	KG	Kyrgyzstan	RU	Russian Federation
CA	Canada	KP	Democratic People's Republic of Korea	SD	Sudan
CF	Central African Republic	KR	Republic of Korea	SE	Sweden
CG	Congo	KZ	Kazakhstan	SG	Singapore
CH	Switzerland	LI	Liechtenstein	SI	Slovenia
CI	Côte d'Ivoire	LK	Sri Lanka	SK	Slovakia
CM	Cameroon	LR	Liberia	SN	Senegal
CN	China	LT	Lithuania	SZ	Swaziland
CS	Czechoslovakia	LU	Luxembourg	TD	Chad
CZ	Czech Republic	LV	Latvia	TG	Togo
DE	Germany	MC	Monaco	TJ	Tajikistan
DK	Denmark	MD	Republic of Moldova	TT	Trinidad and Tobago
EE	Estonia	MG	Madagascar	UA	Ukraine
ES	Spain	ML	Mali	UG	Uganda
FI	Finland	MN	Mongolia	US	United States of America
FR	France	MR	Mauritania	UZ	Uzbekistan
GA	Gabon			VN	Viet Nam

ADAPTIVE FILTER FOR USE IN A TDM/TDMA RECEIVER

The present invention relates to a demodulator for a receiver of digital data messages sent in predetermined time slots within fixed length time frames.

Numerous equaliser adaption (i.e. adaptive digital filtering) methods have been developed and widely applied. The most widely reported are known as Least Mean Squares (LMS) and Recursive Least Squares (RLS) algorithms. The fundamental difference between the two types is the error minimisation criterion used to adjust the filter coefficients. As its name suggests, LMS minimises the statistical expectation value (mean) of the error and theoretically only converges to an optimal solution after an infinite number of iterations. By contrast, RLS minimises the instantaneous error for a given set of operating parameters and has convergence properties dictated only by the data it is given to process. The emergence of these two method types can be attributed to their relative advantages and disadvantages:

LMS is comparatively slow to converge, making it poor at tracking moderate to fast channel variations, but is efficient to implement.

RLS converges rapidly, has good tracking properties but has a high computational cost and susceptibility to instability.

Over the years, both "Fast" and compromise variants of the basic RLS algorithms have been developed in an attempt to reduce its computational requirements but these are still 5 to 10

times more computationally intensive than LMS. A detailed coverage of LMS, RLS and adaptive techniques generally is given in the book "Adaptive Filter Theory" by Simon Haykin, Prentice Hall 1991 2nd Edition.

Adaptive filters (equalisers) are used in TDM/TDMA networks to compensate for multipath interference. Signals reflect from buildings, hills and high sided vehicles, and so can take various paths between a transmitter and receiver. As discussed in Cellular Radio Systems, DM Balston and RCV Macario Editors, Artech House Inc 1993, page 167 et seq., equalisation is undertaken by estimating the signal transfer properties of the transmission medium (eg. by determining impulse response) and then processing the received signal accordingly to compensate. There are several known methods for estimating the transfer function of the transmission path and most of these methods rely on receiving an expected data sequence. This is a training sequence sent as part of a data packet. The receiver detects the sequence and knowing what bit symbol pattern (1,0 etc), i.e. symbol, it is intended to represent, is able to estimate the transfer function most likely to have produced the received signal, and the filter (equaliser) coefficients required to compensate for the multipath distortion.

In known mobile TDM/TDMA networks, i.e. those having mobile subscribers, propagation delays can vary from frame-to-frame to such an extent that complete retraining of the equaliser is necessary before demodulation of each newly received data packet. Unfortunately, this means either that an RLS algorithm must be used at a high computational cost, or that a large number of training symbols must be incorporated in each data packet so as to enable retraining, with less other data being sent.

The invention is defined in the claims to which reference should now be made. Preferred features are laid out in the sub claims.

The present invention in its first aspect preferably provides a demodulator for a TDM/TDMA receiver unit including adaptive filter means operative on each received data packet in each time slot of a frame to determine digital bit values and to adapt filter coefficients, in which filter coefficients values upon filtering a data packet in a time slot are used as initial values in adaptive filtering the next received data packet in the corresponding time slot of the next frame. In the periods between corresponding time slots, filter coefficients are preferably stored in a memory for reuse.

Preferably, the demodulator includes correlation means operative to perform a complex correlation between received and expected synchronisation data to determine carrier phase at a predetermined symbol in the received packet. By "complex correlation" is meant correlation of data which includes values having both real and imaginary parts.

Such demodulators are particularly applicable in TDM/TDMA networks having base stations and subscriber units which substantially have fixed locations. Although fading effects due to multipath propagation might well occur, these effects change only slowly compared to the transmission frame rate. The preferred demodulator takes account of the expected slowly varying nature of multipath propagation by reusing filter coefficients adapted from previous frames. In consequence, the length of training sequences can be greatly reduced providing a larger proportion of the available bandwidth for user data.

In the preferred TDM/TDMA network which includes demodulators according to the present invention, data packets still include data sequences suitable for training, although the sequence is short. The preferred demodulator receives this expected sequence so as to determine the carrier phase and packet timing, but not necessarily for training the adaptive filter coefficients.

The preferred demodulator according to the present invention advantageously minimises the amount of training data required, thereby maximising the bandwidth available for user data and avoids the use of an RLS adaption algorithm. In consequence the preferred demodulator can be of simple construction and has low power consumption. Also, by using filter coefficients from the corresponding data packet of the previous frame as a starting point, a slowly converging and simple to implement filter coefficient adaption method can be used.

The present invention also relates to a method of adaptive filtering of each received data packet in each time slot of a frame to determine digital bit values and to adapt filter coefficients, in which filter coefficients values upon filtering a data packet in a time slot are used as initial values in adaptive filtering the next received data packet in the corresponding time slot of the next frame.

The present invention in its second aspect provides a demodulator preferably including correlation means operative to perform a complex correlation between received and expected synchronisation data to determine carrier phase at a predetermined symbol in the received packet. This has advantages of computational efficiency and speed of phase acquisition. The present invention also relates to a corresponding method to determine carrier phase in a

demodulator.

By way of example, reference will now be made to the accompanying drawings in which:

Figure 1 is a schematic diagram illustrating the system including a base station (BTE-Base Terminating Equipment) and subscriber unit (NTE - Network Terminating Equipment);

Figure 2 is a diagram illustrating frame structure and timing for a duplex link;

Figure 3 is a schematic diagram showing different types of data packet transmitted from a base station to a subscriber unit (i.e. downlink);

Figure 4 is a block diagram representing the symbol processor of the demodulator at a subscriber unit.

Figure 5 is a block diagram illustrating the correlator shown in Figure 4.

Figure 6 is a block diagram illustrating the rotator and Automatic Gain Control (AGC) shown in Figure 4, and

Figure 7 illustrates equaliser output quantisation according to a $\pi/4$ - Differential Quadrature Phase-Shift Keying Modulation Scheme.

The Basic System

As shown in Figure 1, the preferred system is part of a telephone system in which the local wired loop from exchange to subscriber has been replaced by a full duplex radio link between a fixed base station (BTE) and fixed subscriber unit (NTE). The preferred system includes the duplex radio link (Air Interface), and transmitters and receivers for implementing the necessary protocol. There are similarities between the preferred system and digital cellular mobile telephone systems such as GSM which are known in the art. This system uses a protocol based on a layered model, in particular the following layers: PHY (Physical), MAC (Medium Access Control), DLC (DataLink Control), NWK (Network).

One difference compared with GSM is that, in the preferred system, subscriber units are at fixed locations and there is no need for hand-off arrangements or other features relating to mobility. This means, for example, in the preferred system that directional antennae and mains electricity can be used.

Each base station in the preferred system provides six duplex radio links at twelve frequencies chosen from the overall frequency allocation, so as to minimize interference between base stations nearby. The frame structure and timing for a duplex link is illustrated in Figure 2.

Each duplex radio link comprises an up-link from a subscriber unit to a base station and, at a frequency offset, a down-link from the base station to the subscriber unit. The down-links are TDM, and the up-links are TDMA. Modulation for all links is $\pi/4$ - DQPSK, and the basic frame structure for all links is ten slots per frame of 2560 bits, i.e. 256 bits per slot. The bit rate is 512kbps. Down-links are continuously transmitted and incorporate a broadcast

channel for essential system information. When there is no user information to be transmitted, the down-link transmissions continue to use the basic frame and slot structure and contain a suitable fill pattern.

For both up-link and down-link transmissions, there are two types of slot: normal slots which are used after call set-up, and pilot slots used during call set-up.

Each down-link normal slot comprises 24 bits of synchronisation information followed by 24 bits designated S-field which includes an 8 bit header followed by 160 bits designated D-field. This is followed by 24 bits of Forward Error Correction and an 8 bit tail, followed by 12 bits of the broadcast channel. The broadcast channel consists of segments in each of the slots of a frame which together form the down-link common signalling channel which is transmitted by the base station, and contains control messages containing link information such as slot lists, multi-frame and super-frame information, connectionless messages, and other information basic to the operation of the system.

During the call set-up, each down-link pilot slot contains frequency correction data and a training sequence for receiver initialisation, with only a short S- field and no D- field information.

Up-link slots basically contain two different types of data packet. The first type of packet, called a pilot packet, is used before a connection is set up, for example, for an ALOHA call request and to allow adaptive time alignment. The other type of data packet, called a normal packet, is used when a call has been established and is a larger data packet, due to the use

of adaptive time alignment.

Each up-link normal packet contains a data packet of 244 bits which is preceded and followed by a ramp of 4 bits duration. The ramps and the remaining bits left of the 256 bit slot provide a guard gap against interference from neighbouring slots due to timing errors. Each subscriber unit adjusts the timing of its slot transmissions to compensate for the time it takes signals to reach the base station. Each up-link normal data packet comprises 24 bits of synchronisation data followed by an S-field and D-field of the same number of bits as in each down-link normal slot.

Each up-link pilot slot contains a pilot data packet which is 192 bits long preceded and followed by 4 bit ramps defining an extended guard gap of 60 bits. This larger guard gap is necessary because there is no timing information available and without it the propagation delays would cause neighbouring slots to interfere. The pilot packet comprises 64 bits of sync followed by 104 bits of S-field which starts with an 8 bit header and finishes with a 16 bit Cyclic Redundancy Check, 2 reserved bits, 14 FEC bits, and 8 tail bits. There is no D-field.

The S-fields in the above mentioned data packets can be used for two types of signalling. The first type is MAC signalling (MS) and is used for signalling between the MAC layers of the base station and the MAC layer of a subscriber unit whereby timing is important. The second type is called associated signalling, which can be slow or fast and is used for signalling between the base station and subscriber units in the DLC or NWK layers.

The D-field is the largest data field, and in the case of normal telephony contains digitised speech samples, but can also contain non-speech data samples.

Provision is made in the preferred system for subscriber unit authentication using a challenge response protocol. General encryption is provided by combining the speech or data with a non-predictable sequence of cipher bits produced by a key stream generator which is synchronised to the transmitted super-frame number.

In addition, the transmitted signal is scrambled to remove dc components.

The subscriber unit demodulator is concerned with the physical reception of data transmitted in the direction base-to-subscriber (downlink).

There are currently three types of downlink packet, two of these are shown in Figure 3. From the demodulation perspective, the third packet type (Idle Packet) is the same as the Pilot Packet shown except that the DOWN-P-DATA data field is replaced with a fixed fill pattern.

The Subscriber Unit Demodulator

The following functions are undertaken by a sub-section of the subscriber unit demodulator apparatus known as the Symbol Processor:

Synch Correlation (synch detection, slot timing recovery, initial carrier phase recovery),

Digital AGC,
Equalisation,
Carrier phase Tracking, and
Slicing (symbol decisions).

The Symbol Processor operates as one of a basic (non-equalising) coherent receiver, a linear equaliser, or a decision feedback equaliser (DFE). Which is best for any particular subscriber unit will be governed by characteristics of the RF propagation path. The basic receiver is likely to perform best where multipath effects are not significant, the linear equaliser will offer a performance benefit where multipath interference is present but not severe and the DFE has the potential to operate through severely dispersive channels.

Symbol Processing

The functions performed by the Symbol Processor are shown in Figure 4 which is a signal flow diagram in which double-edged arrows denote paths for complex data.

The output signal from the radio frequency (RF) section (not shown) of the subscriber receiver is digitised and presented to the symbol processor at baseband as a sequence of complex samples. These samples are buffered to enable non-real-time processing. The demodulated (output) bit sequence which can be a normal or pilot packet or a Broadcast data fragment, depending upon operating mode, is passed to a separate circuit block responsible for deformatting and bit-level protocol processing.

With the exception of the correlator 2, which operates at the input sample rate, all processing is performed iteratively at symbol rate. Timing is organised such that the received Slot Synch sequence of the captured packet falls within a predetermined region of the input buffer used by the correlator 2.

Complex Correlation

Complex correlation in correlator 2 with a stored representation of the expected synch sequence (Slot Synch or Frame Synch) then produces estimates of instantaneous carrier phase and signal level (gain) which are subsequently used to scale, and phase-align (ie. rotate), the input data samples. Rotation is undertaken by rotator 3, to establish the carrier phase mid-way through the synch sequence and having a zero degree reference defined by the stored synch pattern. Scaling is undertaken by operation of Automatic Gain Control (AGC) circuitry 1.

The expected synch sequences (Slot Synch in slots 1 to 9, Frame Synch in slot 0) are each stored as two sequences of N samples, one sequence being the real components, $\text{Re}Y[n]$ as shown in Figure 5, and the other sequence being the imaginary components, $\text{Im}Y[n]$ shown in Figure 5. The sequence $Y[n]$ represents the expected constellation points produced by optimally sampling a baseband carrier signal which has been $\pi/4$ - DQPSK modulated with a binary Slot Synch or Frame Synch sequence, and filtered through a matched receiving filter.

The stored sequences $Y[n]$ are stored either as hardwired constants or preferably programmed into static registers 16.

The correlator 2 processes one sample per symbol from a shift register 18 which holds input data $X[n]$ from the slot buffer (not shown), real and imaginary components $ReX[n]$ and $ImX[n]$ being held separately. The static registers 16 hold the expected values $Y[n]$. The shift register 18 is updated once per input sample and effectively holds decimated sequences from the synch window (see later), for example sample 1, 3, 5, 7 in the case of two samples per symbol.

As shown in Figure 5, the correlator consists of two main functional blocks. One block 20 undertakes sum-of products calculations on the real component of the input data $ReX[n]$. The other block 22 undertakes sum of products calculations on the imaginary component of the input data $ImX[n]$. The respective real and imaginary output signals 24, 26 from the sum-of-products circuits 20, 22 are combined in respective adders 28, 30 to provide real and imaginary components ReR_{xy} , ImR_{xy} of a discrete cross-correlation function $R_{xy}[n]$.

The received Synch sequence is known to occupy a certain region of the slot buffer upon reception of a packet. Cross correlation is performed across a limited region of the slot buffer (synch window) which is known to contain the incoming Synch pattern. For each element of the correlation function, the output power is evaluated by squaring in squarers 32, 34 and adding in adder 36. A power peak is detected by peak detector 38 when the expected sequence $Y[n]$ and the incoming decimated synch sequence are time aligned. The detector then outputs a peak signal $R_{xy}(\text{peak})$ which is independent of incoming carrier phase. The reciprocal of the peak power value $R_{xy}(\text{peak})$ is determined and output as a scale factor applied to the AGC circuitry 1 as shown in Figure 6. Upon the peak being detected, adders 28, 30 provide real and imaginary peak power components $Re R_{xy}(\text{peak})$ and $Im R_{xy}(\text{peak})$.

which are applied as phase correction signals to the rotator 3 as shown in Figure 6.

As illustrated in Figure 6, in the rotator 3, real and imaginary components of input data samples, $\text{ReX}[n]$ and $\text{ImX}[n]$ are respectively multiplied by the real and imaginary peak power values $\text{Re Rxy}(\text{peak})$ and $\text{Im Rxy}(\text{peak})$. The resulting real and imaginary products are summed to give phase corrected output signals 42, 44. These output signals 42, 44 are applied to the AGC circuitry 1 for scaling by the scale factor before being output as phase and gain corrected samples $\text{ReX}[n]'$ and $\text{ImX}[n]'$.

Demodulation

The phase and gain-corrected samples, starting with the one closest to the middle of synch, are applied to the main demodulation loop which carries out:

- symbol slicing (absolute phase decoding);

- carrier tracking (phase locked loop);

- multipath equalisation.

The equaliser is implemented in four principal sections:

- a feedforward filter 2

- a feedback filter 4

- a quantiser 8 and a

- filter adaption mechanism

The two filter sections each consist of a complex tapped delay line (ie. a Finite Impulse Response filter) with variable tap weights (ie. coefficients).

The feedforward filter 4, which has at least one delay element/coefficient per symbol period, takes input data from the AGC block 1, convolves the samples held in its tapped delay line with the current coefficient set and presents its output to the rotator 10 of the phase locked loop (PLL) 12.

Likewise, the feedback filter 4, which has only one delay element/coefficient per symbol period, convolves constellation decisions from the quantiser 8 with a further coefficient set. The combined output from feedforward and feedback filters 4, 6 constitutes the equaliser output and this particular configuration of filter sections is generally referred to as a decision feedback equaliser (DFE).

In operation, the equaliser generates one (equalised) output sample per symbol period which is fed to the quantiser 8. The function of the quantiser 8 is then to compare the output with the set of 'ideal' constellation points characterising the modulation scheme and to select the constellation point which is closest in the Euclidean sense. This process is depicted for the $\pi/4$ - DQPSK modulation scheme in Figure 7 which shows an equaliser output sample X being selected as having a closest constellation point Y' of possible constellation points Y.

The selected constellation point Y' forms the quantiser 8 decision for the current receive symbol and, as such, the next input sample for the feedback filter 4. Successive quantiser 8 decisions are also fed to a symbol decoding circuit where they are processed to recover the

transmitted bit sequences.

The difference between the equaliser output X and the selected constellation point Y represents the decision error Z for the current symbol and this is used by the coefficient adaption mechanism to drive the long term error to zero. The equaliser is said to have converged when the coefficients in the feedforward and feedback filters 4, 6 have reached values which adequately mitigate the effects of intersymbol interference.

Equaliser coefficients are initialised with constants (zeroes except for the 'main tap' which is set to unity) prior to pilot packet processing (the extended training sequence ETS is used to train the equaliser initially). Thereafter, the final values in one slot are used as the starting values in the corresponding slot of the next frame.

The two filter outputs are combined on the quantiser side of a phase rotator 10 which is driven by a decision-directed phase locked loop 12. Slicing produces a phase error term and, by subtracting the rotator output vector from the closest candidate constellation point, a symbol error vector suitable for equaliser coefficient updating.

The phase error term is passed to the carrier tracking algorithm which modifies the current phase estimate in preparation for the next symbol. A sine lookup table 13 is used to convert the phase estimate to an equivalent cartesian representation. At the start of each packet, or

more specifically for the first sample to be processed, which is the middle sample in the synch sequence, the phase reference (a state variable within the carrier tracking algorithm) is set to zero. Thereafter, it is adapted by means of a dedicated carrier tracking algorithm.

Two representations of the symbol error vector are required: the unprocessed error for feedback updates and a 'derotated' error vector, which reintroduces the phase offset removed by the phase locked loop, for feedforward updates. Derotation by derotator 14 is necessary to re-establish the correlative relationship between the decision error and samples in the feedforward filter. Coefficients are adjusted using the so-called Stochastic Gradient LMS algorithm although any direct-form adaption algorithm could be employed.

The adaption properties of the carrier tracking loop and equaliser are chosen to ensure that carrier phase variations (including frequency offset) are removed by the actions of the phase-locked loop leaving the equaliser to compensate exclusively for multipath channel variations.

On completing slot demodulation, the equaliser coefficients are stored away for use in the corresponding slot of the following frame.

The operation of the present invention will now be related to the steps involved in normal and pilot packet processing. To process a pilot packet, the following steps are involved:

- 1) Digitise and capture the required pilot packet into the slot buffer (in the preferred demodulator synch processing and packet capture are overlapped to minimise group delay).
- 2) Restore the equaliser coefficients to their values at the end of the preceding slot, one frame earlier. (For the first pilot packet, the coefficients are initialised with constant data).

- 3) Correlate for Slot Synch data (ie. Frame Synch in slot 0) over the synch window. use the peak output of the correlator to scale and rotate all samples in the synch region of the slot buffer. This aligns the phase of the input carrier with the equaliser coefficients.
- 4) Pass the scaled and rotated input Synch samples through the demodulator/equaliser, adapting the equaliser coefficients and local phase reference based upon the known symbol (Synch) sequence.
- 5) Demodulate the Synch sequence to provide an indication of packet integrity. A synch sequence received in error may be used, for example, to inhibit equaliser adaption thereby preventing potential corruption.
- 6) Correlate for the extended training sequence ETS over a delayed synch window. Use the peak correlator output to scale and rotate the samples in the ETS and DOWN-P-DATA regions of the slot buffer. This aligns the phase of the input carrier with the equaliser coefficients.
- 7) Determine the peak offset from the nominal synch position and, if necessary, realign the demodulator time frame to compensate.
- 8) Reset the local phase reference (to 0 degrees) and then pass the scaled and rotated ETS samples through the demodulator/equaliser, adapting the equaliser coefficients and phase reference based upon the known (ETS) sequence. This is the normal

training procedure.

- 9) Pass the (scaled and rotated) DOWN-P-DATA samples through the demodulator/equaliser, adapting the equaliser coefficients and phase reference based upon constellation decisions. This is typically a decision-directed adaption. The demodulated DOWN-P-DATA contribution is passed on for bit-level protocol processing.
- 10) Store away the equaliser coefficients for the next pilot or normal packet on this carrier (ie. in the next frame).

A switch to normal packet reception occurs once the equaliser has successfully trained from pilot packets. The preferred procedure for normal packet reception is then as follows:

- 1) Digitise and capture the required normal packet into the slot buffer (in the preferred demodulator synch processing and packet capture are overlapped to minimise group delay).
- 2) Restore the equaliser coefficients to their values at the end of the preceding slot, one frame earlier. (For the first normal packet, the coefficients are established during pilot training).
- 3) Correlate for Slot Synch (Frame Synch in slot 0) over the synch window. Use the peak correlator output to scale and rotate all samples in the slot buffer. This aligns

the phase of the input carrier with the equaliser coefficients.

- 4) Pass the scaled and rotated input Synch samples through the demodulator/equaliser, adapting the equaliser coefficients and local phase reference based upon the known symbol (Synch) sequence. Demodulate the Synch sequence to provide an indication of packet integrity. A synch sequence received in error may be used, for example, to inhibit equaliser adaption thereby preventing potential corruption.
- 5) Pass the (scaled and rotated) DOWN-N-DATA samples through the demodulator/equaliser, adapting the equaliser coefficients and phase reference based upon constellation decisions. This is typically referred to a decision-directed adaption. The demodulated DOWN-N-DATA is passed on for bit-level protocol processing.
- 6) Store away the equaliser coefficients for the next pilot or normal packet on this carrier (ie. in the next frame).

CLAIMS

1. A demodulator for a receiver of digital data messages sent in predetermined time slots within fixed length time frames, the demodulator including adaptive filter means operative on each received data packet in each time slot of a frame to determine digital bit values and to adapt filter coefficients, in which values of filter coefficients upon filtering a data packet in a time slot are used as initial values in adaptive filtering the next received data packet in the corresponding time slot of the next frame.
2. A demodulator for a receiver of digital data messages sent in predetermined time slots within fixed length time frames according to claim 1, in which in the periods between corresponding time slots, filter coefficients are stored in a memory for reuse.
3. A demodulator for a receiver of digital data messages sent in predetermined time slots within fixed length time frames according to claim 2, in which the demodulator includes correlation means operative to perform a complex correlation between received and expected synchronisation data to determine carrier phase at a predetermined symbol in the received packet.
4. A demodulator for a receiver of digital data messages according to claim 3, in which the received synchronisation data is selected upon reception as that being at a predetermined position or positions within the received data packet.
5. A demodulator for a receiver of digital data messages according to claim 3 or claim 4, in which the determined carrier phase is used to correct phases determined for other

received data.

6. A receiver of digital data messages sent in predetermined time slots within fixed length time frames comprising a demodulator according to any preceding claim.
7. A receiver according to claim 6, which is a subscriber unit operative to receive time division multiplex (TDM) data signals.
8. A receiver according to claim 7, which is a subscriber unit having a fixed location.
9. A receiver according to claim 6, which is a base station operative to receive time division multiple access (TDMA) data signals.
10. A receiver according to any of claims 6 to 9, operative to receive digital data messages sent by radio.
11. Communications means comprising a plurality of subscriber units each operative to receive digital data messages comprising data packets in predetermined time slots within fixed length time frames from a base station, and the base station operative to receive digital data messages comprising data packets in predetermined time slots within fixed length time frames from the subscriber units, the base station and subscriber units each comprising a receiver including a demodulator, the demodulators each including adaptive filter means operative on each received data packet in each time slot of a frame to determine digital bit values and to adapt filter coefficients, in which values of filter coefficients upon filtering a data packet in

a time slot are used as initial values in adaptive filtering the next received data packet in the corresponding time slot of the next frame.

12. A method of demodulating a digital data message received as data packets in predetermined time slots within fixed length time frames including adaptive filtering of each received data packet to determine digital bit values and to adapt filter coefficients, in which filter coefficients values upon filtering a data packet in a time slot are used as initial values in adaptive filtering the next received data packet in the corresponding time slot of the next frame.

13. A demodulator of digital data messages received as data packets in time slots within fixed length time frames including correlation means operative to perform a complex correlation between received and expected synchronisation data to determine carrier phase at a predetermined symbol in a received data packet.

14. A demodulator of digital data messages according to claim 13, in which the received synchronisation data is selected upon reception as that being at a predetermined position or positions within the received data packet.

15. A demodulator of digital data messages according to claim 13 or claim 14, in which the received data packet is stored in a memory for processing.

16. A demodulator of digital data messages according to any of claims 13 to 15, in which the correlation means comprises first means and second means, the first means being

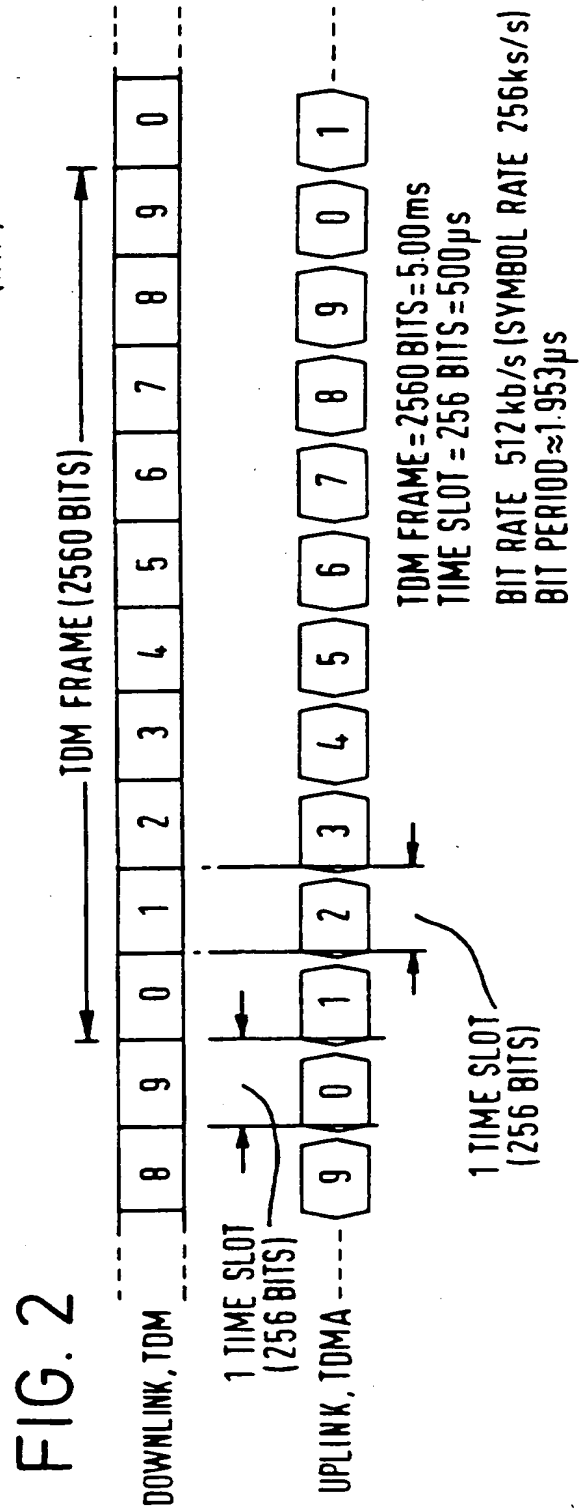
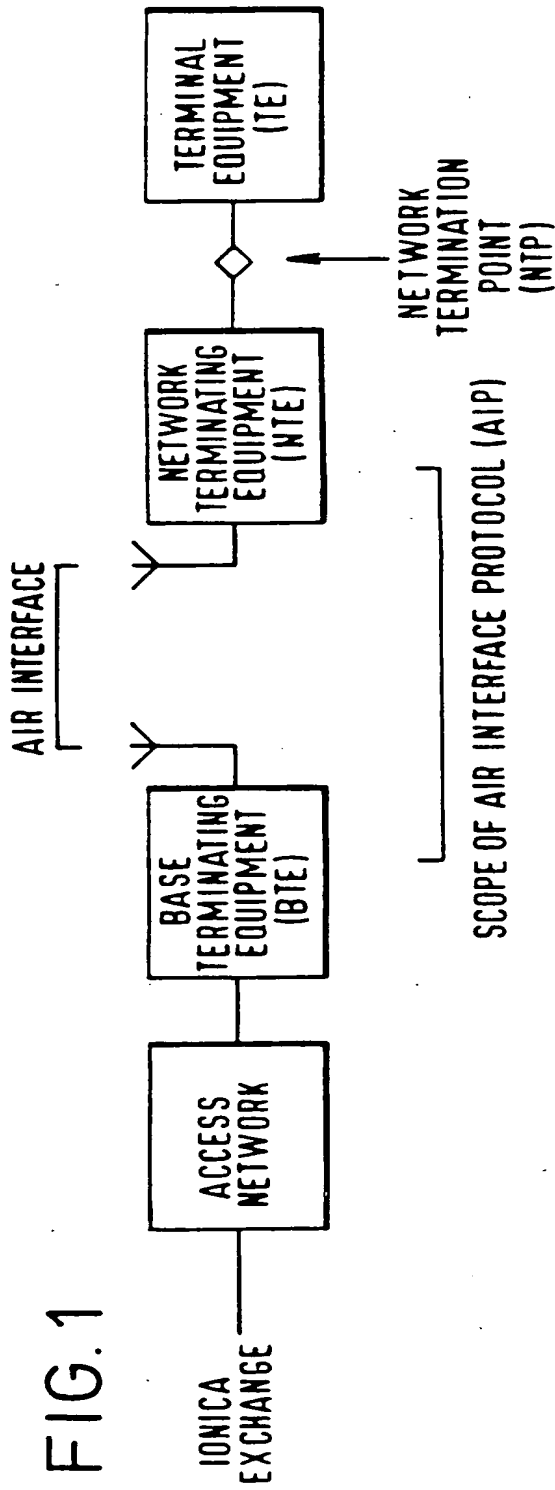
operative to determine sum of product values for real components of received synchronisation data multiplied by corresponding real and imaginary components of expected synchronisation data, the second means being operative to determine sum of product values for imaginary components of the received synchronisation data multiplied by real and imaginary components of the expected synchronisation data, the respective real and imaginary output signals from the first means and second means being combined by combination means to provide real and imaginary cross correlation function components, the correlation means comprising squaring means operative to provide values proportional to the respective real and imaginary cross correlation function components squared and detector means operative to detect a power peak, the combination means providing the real and imaginary cross correlation function components at which the power peak occurs as the real and imaginary components of the carrier phase.

17. A demodulator of digital data messages according to claim 16, in which the real and imaginary cross correlation function components at which the power peak occurs are used for gain control.

18. A demodulator of digital data messages according to any of claims 13 to 17, in which values determined as real and imaginary components of the carrier phase are applied as phase correction signals in subsequent demodulation of received data.

19. A method of determining carrier phase in a demodulator of digital data received as data packets in time slots within fixed length time frames by performing a complex correlation between received and expected synchronisation data to determine carrier phase at

a predetermined symbol in a received data packet.



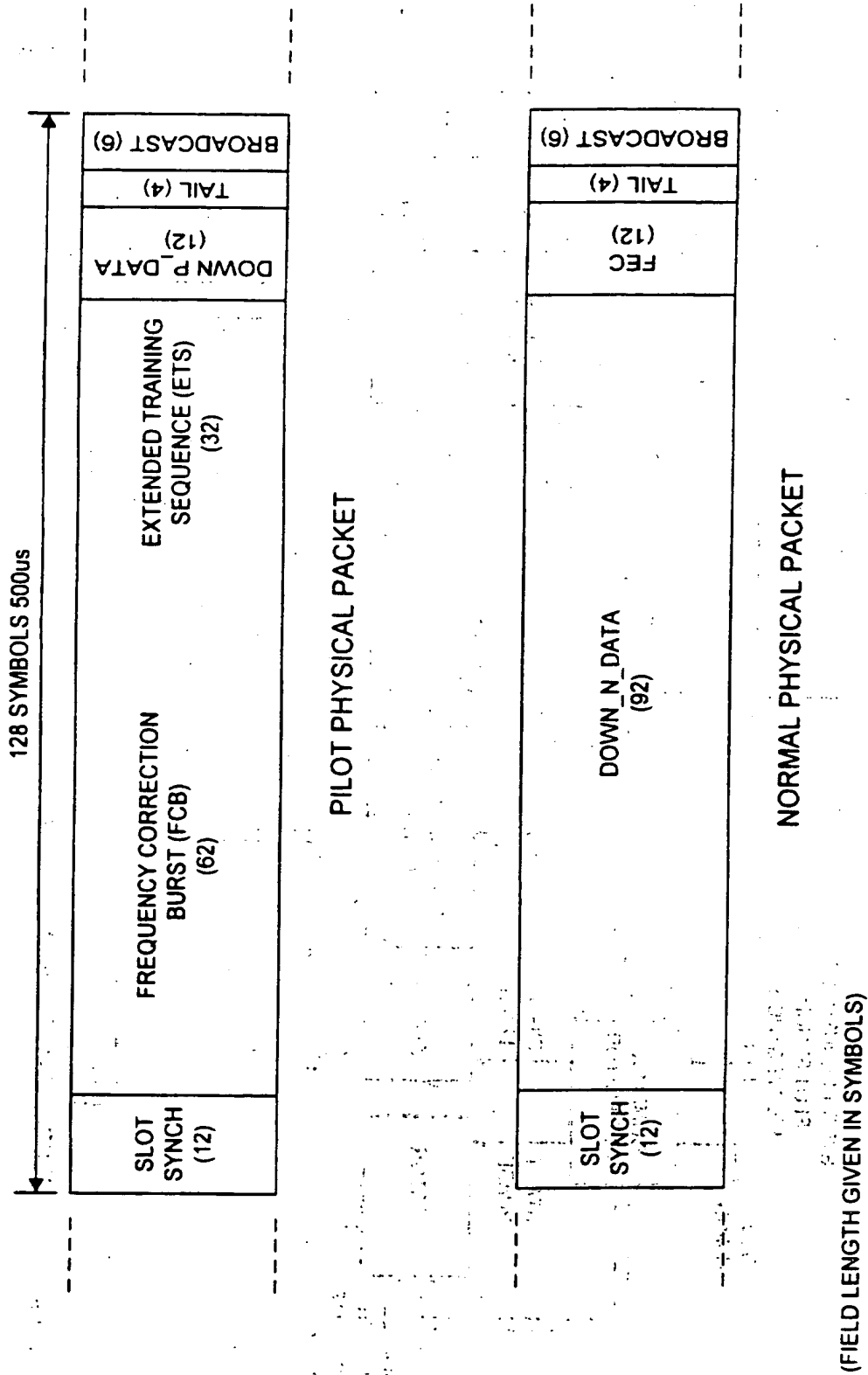


FIG. 3
DOWNLINK PHYSICAL PACKET STRUCTURES

3 / 6

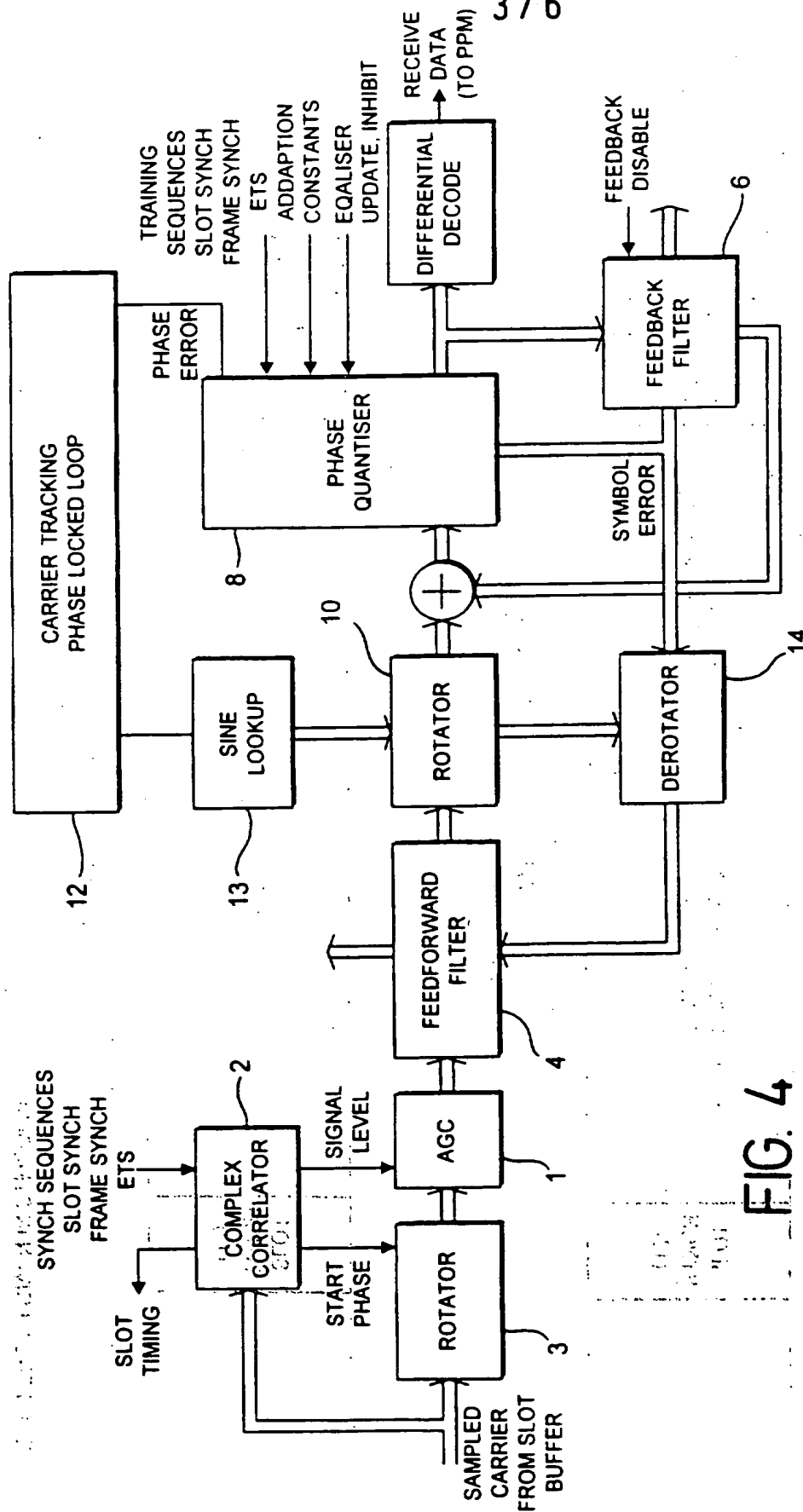


FIG. 4

SYMBOL PROCESSOR FUNCTIONAL BLOCK DIAGRAM

4 / 6

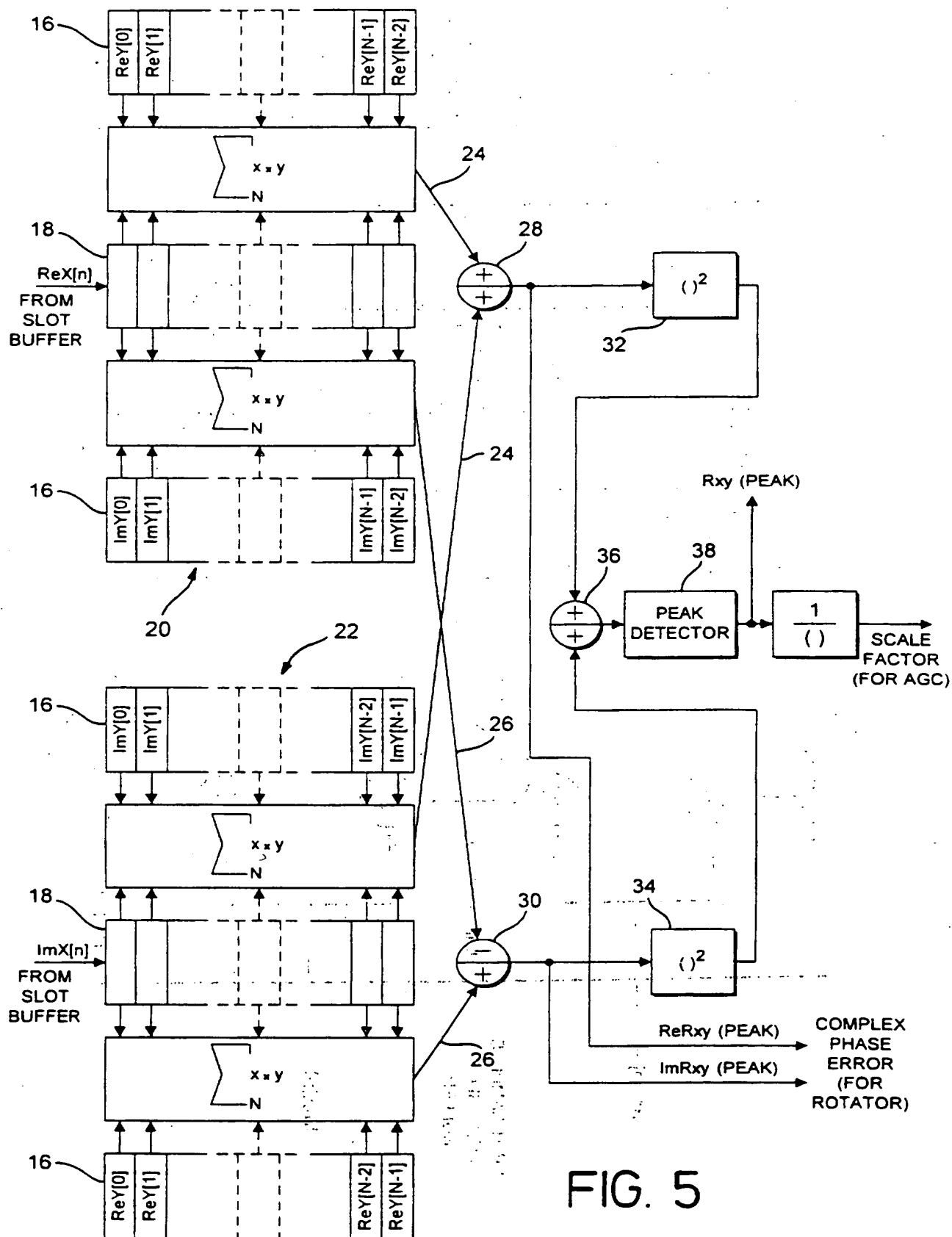
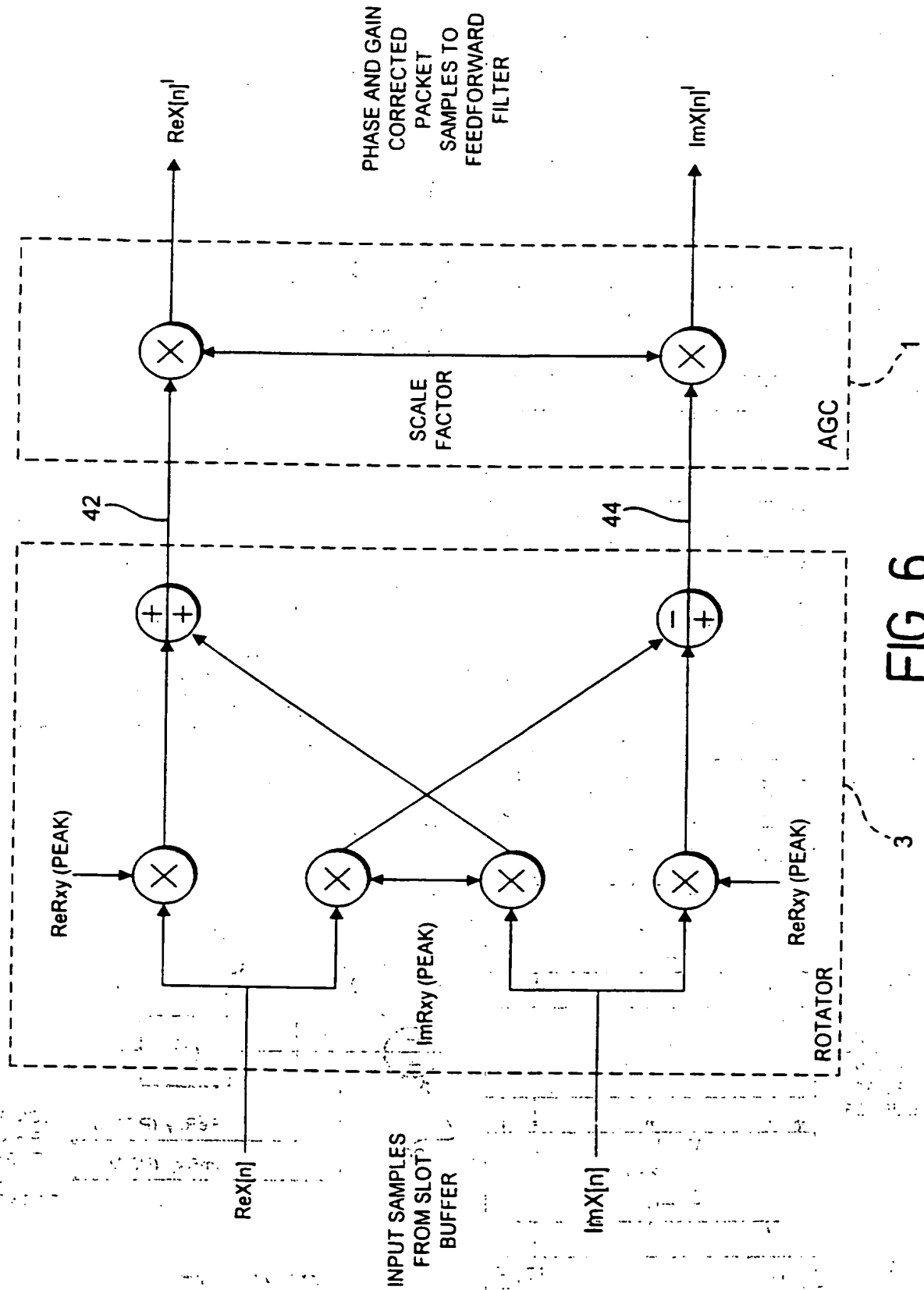


FIG. 5



6 / 6

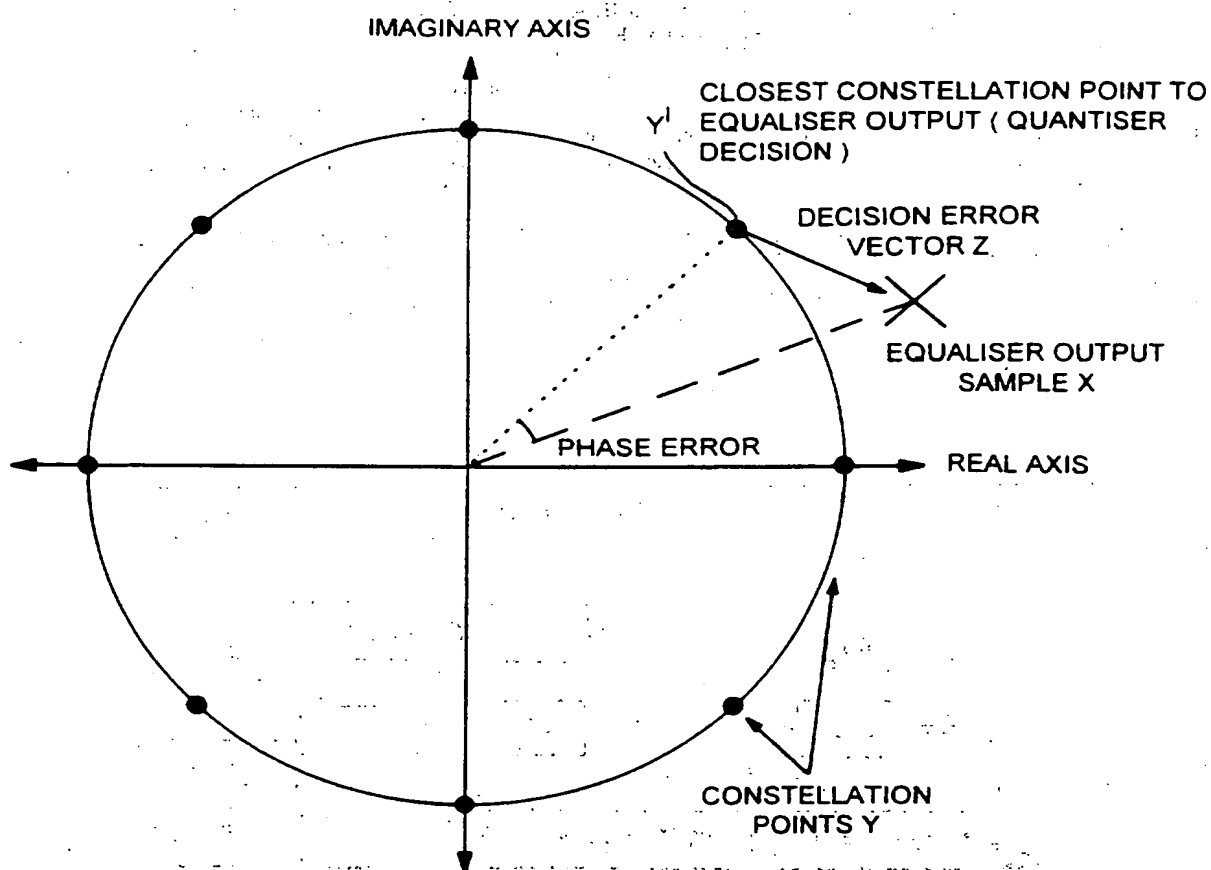


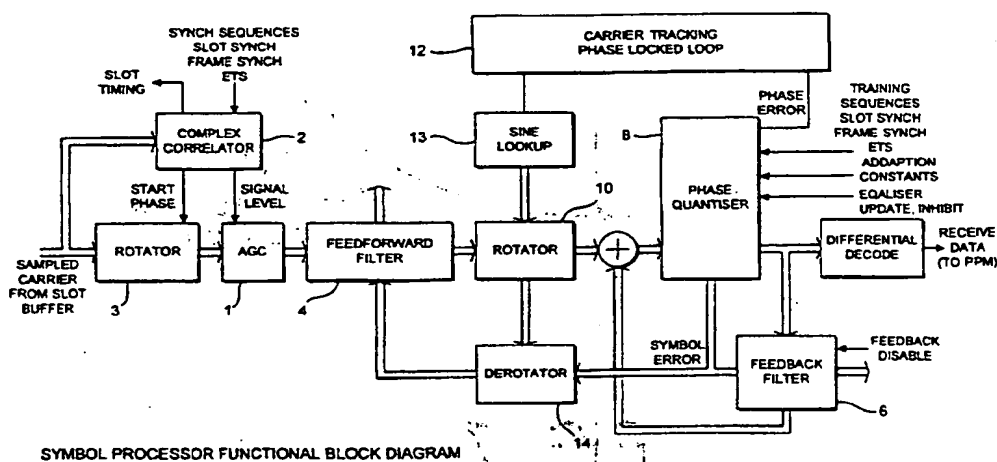
FIG. 7



INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(51) International Patent Classification ⁶ : H04L 25/03, 27/233	A3	(11) International Publication Number: WO 96/34481 (43) International Publication Date: 31 October 1996 (31.10.96)
(21) International Application Number: PCT/GB96/00947 (22) International Filing Date: 19 April 1996 (19.04.96) (30) Priority Data: 9508661.7 28 April 1995 (28.04.95) GB (71) Applicant (for all designated States except US): IONICA INTERNATIONAL LIMITED [GB/GB]; Cowley Road, Cambridge CB4 4AS (GB). (72) Inventor; and (75) Inventor/Applicant (for US only): RUDKIN, Paul, William [GB/GB]; 12 Tamarin Gardens, Cherry Hinton, Cambridge CB1 4BH (GB). (74) Agent: SARUP, David, Alexander; Withers & Rogers, 4 Dyer's Buildings, Holborn, London EC1N 2JT (GB).	(81) Designated States: AL, AM, AT, AU, AZ, BB, BG, BR, BY, CA, CH, CN, CZ, DE, DK, EE, ES, FI, GB, GE, HU, IS, JP, KE, KG, KP, KR, KZ, LK, LR, LS, LT, LU, LV, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, TJ, TM, TR, TT, UA, UG, US, UZ, VN, ARIPO patent (KE, LS, MW, SD, SZ, UG), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, ML, MR, NE, SN, TD, TG). Published <i>With international search report.</i> <i>Before the expiration of the time limit for amending the claims and to be republished in the event of the receipt of amendments.</i> (88) Date of publication of the international search report: 28 November 1996 (28.11.96)	

(54) Title: ADAPTIVE FILTER FOR USE IN A TDM/TDMA RECEIVER



SYMBOL PROCESSOR FUNCTIONAL BLOCK DIAGRAM

(57) Abstract

A demodulator for a receiver of digital data messages sent in predetermined time slots within fixed length time frames includes an adaptive filter operative on each received data packet to determine digital bit values and to adapt filter coefficients. Filter coefficient values upon filtering a data packet in a time slot are used as initial values in adaptive filtering the next received data packet in the corresponding time slot of the next frame.

FOR THE PURPOSES OF INFORMATION ONLY

Codes used to identify States party to the PCT on the front pages of pamphlets publishing international applications under the PCT.

AM	Armenia	GB	United Kingdom	MW	Malawi
AT	Austria	GE	Georgia	MX	Mexico
AU	Australia	GN	Guinea	NE	Niger
BB	Barbados	GR	Greece	NL	Netherlands
BE	Belgium	HU	Hungary	NO	Norway
BF	Burkina Faso	IE	Ireland	NZ	New Zealand
BG	Bulgaria	IT	Italy	PL	Poland
BJ	Benin	JP	Japan	PT	Portugal
BR	Brazil	KE	Kenya	RO	Romania
BY	Belarus	KG	Kyrgyzstan	RU	Russian Federation
CA	Canada	KP	Democratic People's Republic of Korea	SD	Sudan
CF	Central African Republic	KR	Republic of Korea	SE	Sweden
CG	Congo	KZ	Kazakhstan	SG	Singapore
CH	Switzerland	LI	Liechtenstein	SI	Slovenia
CI	Côte d'Ivoire	LK	Sri Lanka	SK	Slovakia
CM	Cameroon	LR	Liberia	SN	Senegal
CN	China	LT	Lithuania	SZ	Swaziland
CS	Czechoslovakia	LU	Luxembourg	TD	Chad
CZ	Czech Republic	LV	Latvia	TG	Togo
DE	Germany	MC	Monaco	TJ	Tajikistan
DK	Denmark	MD	Republic of Moldova	TT	Trinidad and Tobago
EE	Estonia	MG	Madagascar	UA	Ukraine
ES	Spain	ML	Mali	UG	Uganda
FI	Finland	MN	Mongolia	US	United States of America
FR	France	MR	Mauritania	UZ	Uzbekistan
GA	Gabon			VN	Viet Nam

INTERNATIONAL SEARCH REPORT

International Application No

PCT/GB 96/00947

A. CLASSIFICATION OF SUBJECT MATTER
IPC 6 H04L25/03 H04L27/233

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 6 H04L

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	PATENT ABSTRACTS OF JAPAN vol. 014, no. 455 (E-0985), 28 September 1990 & JP,A,02 183614 (MATSUSHITA), 18 July 1990, see abstract	1,2,6-12 3-5
Y	---	---
X	EP,A,0 106 136 (COMMUNICATIONS SATELLITE CORP.) 25 April 1984 see page 7, line 5 - page 8, line 2 see page 10, line 35 - page 11, line 7	1,2,6-12 3-5
Y	---	---
X	EP,A,0 639 914 (MARTIN MARIETTA CORP.) 22 February 1995 see page 4, line 31 - line 33 see page 5, line 29 - page 7, line 1 see figures 2,3	13-19 3-5
Y	---	---

☒ Further documents are listed in the continuation of box C.☒ Patent family members are listed in annex.

* Special categories of cited documents:

- * "A" document defining the general state of the art which is not considered to be of particular relevance
- * "E" earlier document but published on or after the international filing date
- * "L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
- * "O" document referring to an oral disclosure, use, exhibition or other means
- * "P" document published prior to the international filing date but later than the priority date claimed

* "T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

* "X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

* "Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

* "&" document member of the same patent family

Date of the actual completion of the international search

11 October 1996

Date of mailing of the international search report

18.10.96

Name and mailing address of the ISA:

European Patent Office, P.B. 5818 Patentlaan 2
NL - 2280 HV Rijswijk
Tel. (+ 31-70) 340-2040, Tx. 31 651 epo nl,
Fax (+ 31-70) 340-3016

Authorized officer

Ghigliotti, L

Form PCT/ISA/210 (second sheet) (July 1992)

page 1 of 2

INTERNATIONAL SEARCH REPORT

Inter. onal Application No

PCT/GB 96/00947

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT		
Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US,A,4 583 048 (GUMACOS CONSTANTINE ET AL.) 15 April 1986 see column 6, line 9 - column 8, line 57	13-19
Y	see figure 3 ---	3-5
X	US,A,4 238 739 (ANDREN CARL F. ET AL.) 9 December 1980 see column 4, line 47 - column 6, line 40	13,14, 17,18
Y	see figure ---	3-5
X	WO,A,85 04999 (HARRIS CORP.) 7 November 1985 see page 8, line 2 - page 10, line 4	13,14, 17,18
Y	see figure 2 -----	3-5

Form PCT/ISA/210 (continuation of second sheet) (July 1992)

page 2 of 2

INTERNATIONAL SEARCH REPORT

International application No.

PCT/GB96/00947

Box I Observations where certain claims were found unsearchable (Continuation of item 1 of first sheet)

This international search report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. ☐ Claims Nos.:
because they relate to subject matter not required to be searched by this Authority, namely:
2. ☐ Claims Nos.:
because they relate to parts of the international application that do not comply with the prescribed requirements to such an extent that no meaningful international search can be carried out, specifically:
3. ☐ Claims Nos.:
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

Box II Observations where unity of invention is lacking (Continuation of item 2 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

see continuation sheet

1. ☒ As all required additional search fees were timely paid by the applicant, this international search report covers all searchable claims.
2. ☐ As all searchable claims could be searched without effort justifying an additional fee, this Authority did not invite payment of any additional fee.
3. ☐ As only some of the required additional search fees were timely paid by the applicant, this international search report covers only those claims for which fees were paid, specifically claims Nos.:
4. ☐ No required additional search fees were timely paid by the applicant. Consequently, this international search report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

Remark on Protest

- ☐ The additional search fees were accompanied by the applicant's protest.
- ☒ No protest accompanied the payment of additional search fees.

FURTHER INFORMATION CONTINUED FROM PCT/ISA/210

Group I: Claims 1-12;
Group II: Claims 13-19.

Group I: Adaptive filter means (filtering step); whose coefficients in a time slot are used as initial values in adaptive filtering the data received in the corresponding time slot of the next frame.

Group II: Correlation means, for determining the carrier phase at a predetermined symbol in a received data packet.

INTERNATIONAL SEARCH REPORT

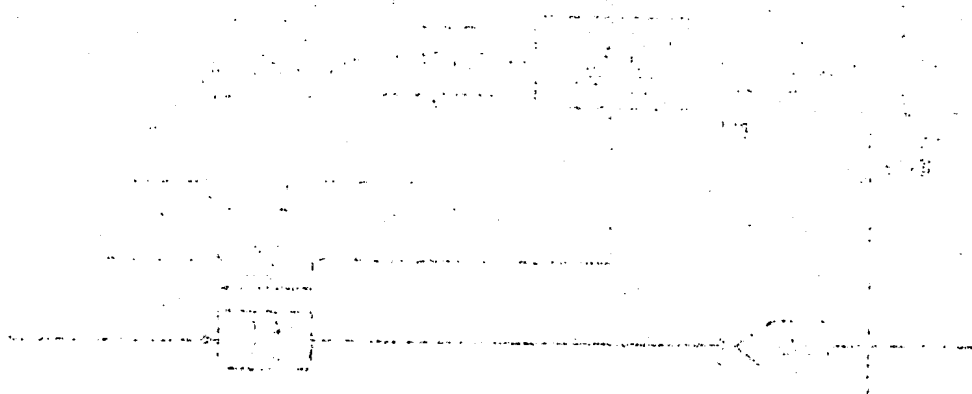
Information on patent family members

International Application No

PCT/GB 96/00947

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
EP-A-0106136	25-04-84	US-A- 4475211 CA-A- 1194139 JP-A- 59070027	02-10-84 24-09-85 20-04-84
EP-A-0639914	22-02-95	US-A- 5425058 CA-A- 2124491 JP-A- 7154436	13-06-95 29-01-95 16-06-95
US-A-4583048	15-04-86	NONE	
US-A-4238739	09-12-80	NONE	
WO-A-8504999	07-11-85	US-A- 4599732 CA-A- 1246152 DE-T- 3590158 EP-A- 0186691 GB-A,B 2170978	08-07-86 06-12-88 26-06-86 09-07-86 13-08-86

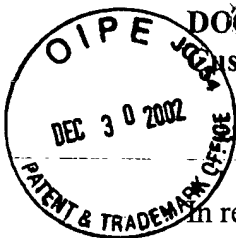
Form PCT/ISA/210 (patent family annex) (July 1992)



2581
#4
B1

PATENT

01-87-03



DOCKET NO. WEST14-00016

Customer No. 23990

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re application of : PAUL F. STRUHSACKER, ET AL.

U.S. Serial No. : 09/839,719

Filed : April 20, 2001

For : APPARATUS AND METHOD FOR CREATING SIGNAL AND
PROFILES AT A RECEIVING STATION

Group No. : 2681

Examiner : (Not Yet Assigned)

Commissioner for Patents
Washington, D.C. 20231

RECEIVED

JAN 02 2003

Technology Center 2600

Sir:

CERTIFICATE OF MAILING BY FIRST CLASS MAIL

The undersigned hereby certifies that the following documents:

1. Postcard receipt;
2. Supplemental Information Disclosure Statement;
3. Form PTO-1449;
4. Copy of International Search Report issued in Int'l Application No.
PCT/IB02/00136;
5. Four (4) references

relating to the above application, were deposited as "First Class Mail" with the United States Postal Service, addressed to Commissioner for Patents, Washington, D.C. 20231, on December 23 2002.

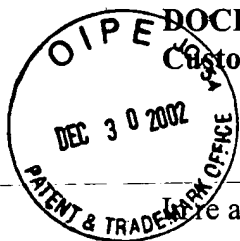
Date: 12/23/02

Laura Z...
Mailer

Date: Dec. 23, 2002

William A. Munck
William A. Munck
Reg. No. 39,308

P.O. Drawer 800889
Dallas, Texas 75380
Phone: (972) 628-3600
Fax: (972) 628-3616
E-mail: wmunck@davismunck.com



DOCKET NO. WEST14-00016

PATENT

Customer No. 23990

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

International application of : PAUL F. STRUHSAKER, ET AL.
U.S. Serial No. : 09/839,719
Filed : April 20, 2001
For : APPARATUS AND METHOD FOR CREATING SIGNAL AND
PROFILES AT A RECEIVING STATION
Group No. : 2681
Examiner : (Not Yet Assigned)

Commissioner for Patents
Washington, D.C. 20231

RECEIVED

JAN 02 2003

Technology Center 2600

Sir:

SUPPLEMENTAL INFORMATION DISCLOSURE STATEMENT

Pursuant to the duty of disclosure under 37 C.F.R. § 1.56, Applicant submits this statement.

This submittal is made in accordance with 37 C.F.R. §§ 1.97 and 1.98 and § 609 of the Manual of Patent Examining Procedure. The patents, publications and other information herein are listed below and on the attached Form PTO-1449. These references were located in a International Search Report issued in the related PCT Patent Application No. PCT/IB02/00136, a copy of which is attached hereto. Copies of the listed references are submitted herewith.

U.S. Patents

<u>Patent No.</u>	<u>Inventor</u>	<u>Date</u>
5,978,650	Fischer, et al.	Nov. 2, 1999

Foreign Patents

<u>Patent No.</u>	<u>Country</u>	<u>Date</u>
WO 96/34481	PCT	Oct. 31, 1996
WO 99/31837	PCT	Jun. 24, 1999
EP 0 800 285 A2	EPO	Oct. 8, 1997

Applicant hereby expressly reserves the right to swear behind the effective dates of any of the above Patents and to question the relevance and materiality of the Patents and Publications listed herein, in whole, in part, or in combination, subsequent to filing this Information Disclosure Statement.

Respectfully submitted,

DAVIS MUNCK, P.C.

Date: Dec. 23, 2002



William A. Munck
Registration No. 39,308

P.O. Drawer 800889
Dallas, Texas 75380
Phone: (972) 628-3600
Fax: (972) 628-3616
Email: wmunck@davismunck.com

FORM PTO-1449 (REV. 7.80)		U.S. DEPARTMENT OF COMMERCE PATENT AND TRADEMARK OFFICE		ATTY. DOCKET NO. WEST14-00016		SERIAL NO. 09/8390,719	
LIST OF REFERENCES CITED BY APPLICANT (Use several sheets if necessary)				APPLICANT Paul F. Struhsaker, et al.			
				FILING DATE April 20, 2001		GROUP 2681	

RECEIVED
 DEC 30 2002
 PATENT & TRADEMARK OFFICE

U. S. PATENT DOCUMENTS							
*EXAMINER INITIAL	DOCUMENT NUMBER	DATE	NAME	CLASS	SUBCLASS	FILING DATE (if appropriate)	
AA	5.978.650	11/02/1999	Fischer, et al.	455	3.1	01/21/1997	

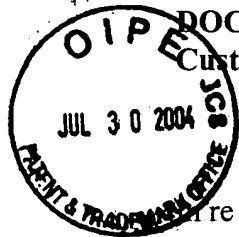
RECEIVED
 JAN 02 2003
 Technology Center 2600

FOREIGN PATENT DOCUMENTS							
DOCUMENT NUMBER	DATE	COUNTRY	CLASS	SUBCLASS	TRANSLATION		
AB	WO 96/34481	10/31/1996	PCT		YES	NO	
AC	WO 99/31837	06/24/1999	PCT				
AD	EP 0 800 285 A2	10/08/1997	EPO				

OTHER REFERENCES (Including Author, Title, Date, Pertinent Pages, Etc.)	

EXAMINER	DATE CONSIDERED
----------	-----------------

*EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609; Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.



DOCKET NO.: WEST14-00016

Customer No.: 23990

2681 RFW
PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Re application of : PAUL F. STRUHSACKER ET AL.

U.S. Serial No. : 09/839,719

Filed : April 20, 2001

For : APPARATUS AND METHOD FOR CREATING SIGNAL AND
PROFILES AT A RECEIVING STATION

Group No. : 2681

Examiner : Not Yet Assigned

MAIL STOP AMENDMENT

Commissioner for Patents

P.O. Box 1450

Alexandria, VA 22313-1450

Sir:

CERTIFICATE OF MAILING BY FIRST CLASS MAIL

The undersigned hereby certifies that the following documents:

1. Postcard receipt;
2. Information Disclosure Statement;
3. Form PTO/SB/08A; and
4. One (1) reference.

relating to the above application, were deposited as "First Class Mail" with the United States Postal Service, addressed to, MAIL STOP AMENDMENT, Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450, on July 27, 2004.

Date: July 27, 2004

Kathleen Newsome
Mailer

Date: July 27, 2004

William A. Munck
William A. Munck
Reg. No. 39,308

Docket Clerk
P.O. Drawer 800889
Dallas, Texas 75380
Phone: (972) 628-3600
Fax: (972) 628-3616
E-mail: wmunck@davismunck.com

DOCKET NO.: WEST14-00016

PATENT

Customer No.: 23990

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re application of : Paul F. Struhsaker et al.

Serial No. : 09/839,719

Filed : April 20, 2001

For : APPARATUS AND METHOD FOR CREATING SIGNAL AND
PROFILES AT A RECEIVING STATION

Group No. : 2681

Examiner : Not Yet Assigned

Mail Stop Amendment
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Dear Sir:

INFORMATION DISCLOSURE STATEMENT

Pursuant to the duty of disclosure under 37 C.F.R. § 1.56, Applicant submits this statement.

This submittal is made in accordance with 37 C.F.R. §§ 1.97 and 1.98 and § 609 of the Manual of Patent Examining Procedure. The patent herein is listed below and on the attached Form PTO/SB/08A. A copy of the listed patent is submitted herewith.

U.S. Patent No.

Inventor

Date

5,793,753

Hershey et al.

August 11, 1998

Applicant hereby expressly reserves the right to swear behind the effective dates of any of the above Patents and to question the relevance and materiality of the Patents and Publications listed herein, in whole, in part, or in combination, subsequent to filing this Information Disclosure Statement.

Respectfully submitted,

DAVIS MUNCK, P.C.

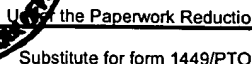
Date: _____

July 27, 2014



William A. Munck
Registration No. 39,308

P.O. Drawer 800889
Dallas, Texas 75380
Phone: (972) 628-3600
Fax: (972) 628-3616
email: wmunck@davismunck.com



U.S. Patent and Trademark Office, U.S. DEPARTMENT OF COMMERCE

Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

Substitute for form 1449/PTO

(Use as many sheets as necessary)

Sheet	1	of	1
-------	---	----	---

Complete if Known

Application Number	09/839,719
Filing Date	April 20, 2001
First Named Inventor	Paul F. Struhsaker
Art Unit	2681
Examiner Name	Not Yet Assigned
Attorney Docket Number	WEST14-00016

U. S. PATENT DOCUMENTS

FOREIGN PATENT DOCUMENTS

**Examiner
Signature**

Date
Considered

*EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant. ¹ Applicant's unique citation designation number (optional). ² See Kinds Codes of USPTO Patent Documents at www.uspto.gov or MPEP 901.04. ³ Enter Office that issued the document, by the two-letter code (WIPO Standard ST.3). ⁴ For Japanese patent documents, the indication of the year of the reign of the Emperor must precede the serial number of the patent document. ⁵ Kind of document by the appropriate symbols as indicated on the document under WIPO Standard ST.16 if possible. ⁶ Applicant is to place a check mark here if English language Translation is attached.

This collection of information is required by 37 CFR 1.97 and 1.98. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 2 hours to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, P.O. Box 1450, Alexandria, VA 22313-1450. **DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

If you need assistance in completing the form, call 1-800-PTO-9199 (1-800-786-9199) and select option 2.

L Number	Hits	Search Text	DB	Time stamp
-	2	20020097685.did.	USPAT; US-PGPUB; EPO; JPO; DERWENT; IBM_TDB	2004/09/17 19:02
-	0	("5978650" "5793753").pn. and profile	USPAT; US-PGPUB; EPO; JPO; DERWENT; IBM_TDB	2004/09/16 15:18
-	4	("5978650" "5793753").pn.	USPAT; US-PGPUB; EPO; JPO; DERWENT; IBM_TDB	2004/09/16 15:20
-	2	("5978650" "5793753").pn. and channel	USPAT; US-PGPUB; EPO; JPO; DERWENT; IBM_TDB	2004/09/16 15:25
-	1	("6590872").pn. and channel	USPAT; US-PGPUB; EPO; JPO; DERWENT; IBM_TDB	2004/09/16 15:25
-	221	@ad<20010420 and (fixed near2 wireless fwa) and profile	USPAT; US-PGPUB; EPO; JPO; DERWENT; IBM_TDB	2004/09/16 16:50
-	48	@ad<20010420 and (fixed near2 wireless fwa) and profile and burst	USPAT; US-PGPUB; EPO; JPO; DERWENT; IBM_TDB	2004/09/16 16:50
-	10	@ad<20010420 and (fixed near2 wireless fwa) and profile and burst and contention	USPAT; US-PGPUB; EPO; JPO; DERWENT; IBM_TDB	2004/09/17 18:12
-	0	@ad<20010420 and (fixed near2 wireless fwa) and profile with parameters and burst and contention	USPAT; US-PGPUB; EPO; JPO; DERWENT; IBM_TDB	2004/09/16 16:51
-	2	@ad<20010420 and (fixed near2 wireless fwa) and profile with parameters and burst	USPAT; US-PGPUB; EPO; JPO; DERWENT; IBM_TDB	2004/09/16 16:52
-	17	@ad<20010420 and (fixed near2 wireless fwa) and profile with parameters	USPAT; US-PGPUB; EPO; JPO; DERWENT; IBM_TDB	2004/09/16 16:58
-	3	@ad<20010420 and (fixed near2 wireless fwa) and profile near2 channel	USPAT; US-PGPUB; EPO; JPO; DERWENT; IBM_TDB	2004/09/16 16:59
-	54	@ad<20010420 and (fixed near2 wireless fwa) and profile near2 (subscriber remote)	USPAT; US-PGPUB; EPO; JPO; DERWENT; IBM_TDB	2004/09/16 16:59
-	7	@ad<20010420 and (fixed near2 wireless fwa) and profile near2 (subscriber remote) and fading	USPAT; US-PGPUB; EPO; JPO; DERWENT; IBM_TDB	2004/09/17 19:04

-	0	6590872.pn. and burst	USPAT; US-PGPUB; EPO; JPO; DERWENT; IBM_TDB	2004/09/16 18:58
-	1	6590872.pn. and channel	USPAT; US-PGPUB; EPO; JPO; DERWENT; IBM_TDB	2004/09/16 18:59
-	0	6590872.pn. and store	USPAT; US-PGPUB; EPO; JPO; DERWENT; IBM_TDB	2004/09/16 19:00
-	2	6590872.pn. and parameters	USPAT; US-PGPUB; EPO; JPO; DERWENT; IBM_TDB	2004/09/17 18:11
-	0	6590872.pn. and store	USPAT; US-PGPUB; EPO; JPO; DERWENT; IBM_TDB	2004/09/17 18:07
-	1	6590872.pn. and store\$5	USPAT; US-PGPUB; EPO; JPO; DERWENT; IBM_TDB	2004/09/16 19:04
-	1	6590872.pn. and stor\$5	USPAT; US-PGPUB; EPO; JPO; DERWENT; IBM_TDB	2004/09/17 10:43
-	1	6590872.pn. and stor\$5 and data	USPAT; US-PGPUB; EPO; JPO; DERWENT; IBM_TDB	2004/09/17 10:43
-	204	@ad<20010420 and channel near2 parameter same initializ\$7	USPAT; US-PGPUB; EPO; JPO; DERWENT; IBM_TDB	2004/09/17 17:54
-	105	@ad<20010420 and channel near2 parameter with initializ\$7	USPAT; US-PGPUB; EPO; JPO; DERWENT; IBM_TDB	2004/09/17 17:33
-	0	@ad<20010420 and channel near2 parameter with initializ\$7 and fwa	USPAT; US-PGPUB; EPO; JPO; DERWENT; IBM_TDB	2004/09/17 17:33
-	18	@ad<20010420 and channel near2 parameter with initializ\$7 and wireless	USPAT; US-PGPUB; EPO; JPO; DERWENT; IBM_TDB	2004/09/17 17:36
-	244	@ad<20010420 and parameter with handshak\$6	USPAT; US-PGPUB; EPO; JPO; DERWENT; IBM_TDB	2004/09/17 17:36
-	0	@ad<20010420 and parameter with handshak\$6 and fwa	USPAT; US-PGPUB; EPO; JPO; DERWENT; IBM_TDB	2004/09/17 17:36

-	65	@ad<20010420 and parameter with handshak\$6 and wireless	USPAT; US-PGPUB; EPO; JPO; DERWENT; IBM_TDB	2004/09/17 17:36
-	4	@ad<20010420 and parameter with handshak\$6 and fixed near2 wireless	USPAT; US-PGPUB; EPO; JPO; DERWENT; IBM_TDB	2004/09/17 17:37
-	13	@ad<20010420 and channel near2 parameter with handshak\$6	USPAT; US-PGPUB; EPO; JPO; DERWENT; IBM_TDB	2004/09/17 17:38
-	2	@ad<20010420 and channel near2 parameter same initializ\$7 near2 period	USPAT; US-PGPUB; EPO; JPO; DERWENT; IBM_TDB	2004/09/17 17:48
-	1352183	@ad<20010420 and channel near2 parameter same initial nears burst	USPAT; US-PGPUB; EPO; JPO; DERWENT; IBM_TDB	2004/09/17 17:50
-	2	@ad<20010420 and channel near2 parameter same initial near2 burst	USPAT; US-PGPUB; EPO; JPO; DERWENT; IBM_TDB	2004/09/17 17:50
-	2	@ad<20010420 and fixed adj2 wireless same initializ\$7	USPAT; US-PGPUB; EPO; JPO; DERWENT; IBM_TDB	2004/09/17 17:54
-	0	6590872.pn. and antenna	USPAT; US-PGPUB; EPO; JPO; DERWENT; IBM_TDB	2004/09/17 18:08
-	17	("4164628" "5408504" "5414711" "5414730" "5533010" "5590160" "5629929" "5805648" "5859874" "5881056" "5909462" "5914949" "5936999" "5966411" "6091718" "6282228" "6320903").PN.	USPAT	2004/09/17 18:08
-	17	@ad<20010420 and (fixed near2 wireless fwa) and antenna near2 parameters	USPAT; US-PGPUB; EPO; JPO; DERWENT; IBM_TDB	2004/09/17 18:15
-	9	@ad<20010420 and (MMDS LMDS) and antenna near2 parameters	USPAT; US-PGPUB; EPO; JPO; DERWENT; IBM_TDB	2004/09/17 18:15
-	0	20020097685.did. and tdma	USPAT; US-PGPUB; EPO; JPO; DERWENT; IBM_TDB	2004/09/17 19:02
-	0	@ad<20010420 and (fixed near2 wireless fwa) and fec near2 (parameter values)	USPAT; US-PGPUB; EPO; JPO; DERWENT; IBM_TDB	2004/09/17 19:07
-	0	@ad<20010420 and (fixed near2 wireless fwa) and fec near2 (characteris\$5)	USPAT; US-PGPUB; EPO; JPO; DERWENT; IBM_TDB	2004/09/17 19:08

-	57	@ad<20010420 and (fixed near2 wireless fwa) and fec	USPAT; US-PGPUB; EPO; JPO; DERWENT; IBM_TDB	2004/09/17 19:08
-	1	@ad<20010420 and (fixed near2 wireless fwa) and base near2 station near2 fec	USPAT; US-PGPUB; EPO; JPO; DERWENT; IBM_TDB	2004/09/17 19:09
-	0	@ad<20010420 and base near2 station near2 fec near parameters	USPAT; US-PGPUB; EPO; JPO; DERWENT; IBM_TDB	2004/09/17 19:09
-	0	@ad<20010420 and base near2 station near2 fec near3 parameter	USPAT; US-PGPUB; EPO; JPO; DERWENT; IBM_TDB	2004/09/17 19:09
-	1	@ad<20010420 and base near2 station near2 fec near3 value	USPAT; US-PGPUB; EPO; JPO; DERWENT; IBM_TDB	2004/09/17 19:09
-	56	@ad<20010420 and fec near3 parameters	USPAT; US-PGPUB; EPO; JPO; DERWENT; IBM_TDB	2004/09/17 19:09
-	45	@ad<20010420 and fec near2 parameters	USPAT; US-PGPUB; EPO; JPO; DERWENT; IBM_TDB	2004/09/17 19:10
-	20	@ad<20010420 and fec near2 parameters and wireless	USPAT; US-PGPUB; EPO; JPO; DERWENT; IBM_TDB	2004/09/17 19:10

Notice of References Cited	Application/Control No. 09/839,719	Applicant(s)/Patent Under Reexamination STRUHSAKER ET AL.	
	Examiner Harry Vartanian	Art Unit 2634	Page 1 of 1

U.S. PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Name	Classification
	A	US-6,590,872	07-2003	Shiue et al.	370/314
	B	US-6,636,490	10-2003	Johnson, Philip N	370/328
	C	US-6,230,326	05-2001	Unger et al.	725/111
	D	US-6,320,903	11-2001	Isaksson et al.	375/232
	E	US-6,654,384	11-2003	Reza et al.	370/469
	F	US-5,832,365	11-1998	Chen et al.	455/15
	G	US-6,345,071	02-2002	Hamdi, Rabah S.	375/222
	H	US-6,222,858	04-2001	Counterterman, Raymond C.	370/474
	I	US-2003/0002495	01-2003	Shahar et al.	370/389
	J	US-			
	K	US-			
	L	US-			
	M	US-			

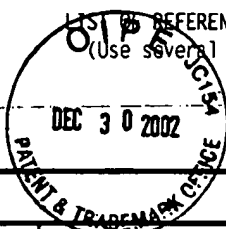
FOREIGN PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Country	Name	Classification
	N					
	O					
	P					
	Q					
	R					
	S					
	T					

NON-PATENT DOCUMENTS

*		Include as applicable: Author, Title Date, Publisher, Edition or Volume, Pertinent Pages)
	U	
	V	
	W	
	X	

*A copy of this reference is not being furnished with this Office action. (See MPEP § 707.05(a).)
Dates in MM-YYYY format are publication dates. Classifications may be US or foreign.

FORM PTO-1449
(REV. 7.80)U.S. DEPARTMENT OF COMMERCE
PATENT AND TRADEMARK OFFICEATTY. DOCKET NO.
WEST14-00016SERIAL NO.
09/8390.719LIST OF REFERENCES CITED BY APPLICANT
(Use several sheets if necessary)APPLICANT
Paul F. Struhsaker, et al.FILING DATE
April 20, 2001GROUP
2681

U. S. PATENT DOCUMENTS

*EXAMINER INITIAL		DOCUMENT NUMBER	DATE	NAME	CLASS	SUBCLASS	FILING DATE (if appropriate)
H.V.	AA	5.978.650	11/02/1999	Fischer, et al.	455	3.1	01/21/1997

RECEIVED

JAN 02 2003

Technology Center 2600

FOREIGN PATENT DOCUMENTS

		DOCUMENT NUMBER	DATE	COUNTRY	CLASS	SUBCLASS	TRANSLATION	
							YES	NO
H.V.	AB	WD 96/34481	10/31/1996	PCT				
H.V.	AC	WD 99/31837	06/24/1999	PCT				
H.V.	AD	EP 0 800 285 A2	10/08/1997	EPO				

OTHER REFERENCES (Including Author, Title, Date, Pertinent Pages, Etc.)

EXAMINER

DATE CONSIDERED

9/16/04

*EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609; Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.

Approved for use through 07/31/2006. OMB 0651-0031

U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE

Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

Substitute for form 1449/PTO

INFORMATION DISCLOSURE STATEMENT BY APPLICANT

(Use as many sheets as necessary)

Sheet	1	of	1
-------	---	----	---

Complete if Known

Application Number	09/839,719
Filing Date	April 20, 2001
First Named Inventor	Paul F. Struhsaker
Art Unit	2681
Examiner Name	Not Yet Assigned
Attorney Docket Number	WEST14-00016

U. S. PATENT DOCUMENTS

[illegible]

FOREIGN PATENT DOCUMENTS

[illegible]

**Examiner
Signature**

Date Considered

9/16/00

*EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant. ¹Applicant's unique citation designation number (optional). ²See Kinds Codes of USPTO Patent Documents at www.uspto.gov or MPEP 901.04. ³Enter Office that issued the document, by the two-letter code (WIPO Standard ST.3). ⁴For Japanese patent documents, the indication of the year of the reign of the Emperor must precede the serial number of the patent document. ⁵Kind of document by the appropriate symbols as indicated on the document under WIPO Standard ST.16 if possible. ⁶Applicant is to place a check mark here if English language Translation is attached.

This collection of information is required by 37 CFR 1.97 and 1.98. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 2 hours to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, P.O. Box 1450, Alexandria, VA 22313-1450. **DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

If you need assistance in completing the form, call 1-800-PTO-9199 (1-800-786-9199) and select option 2.



UNITED STATES PATENT AND TRADEMARK OFFICE

COMMISSIONER FOR PATENTS
UNITED STATES PATENT AND TRADEMARK OFFICE
WASHINGTON, D.C. 20231
www.uspto.gov



Bib Data Sheet

CONFIRMATION NO. 1196

SERIAL NUMBER 09/839,719	FILING DATE 04/20/2001 RULE	CLASS 455	GROUP ART UNIT 2681	ATTORNEY DOCKET NO. WEST14-00016
------------------------------------	---	---------------------	-------------------------------	--

APPLICANTS
Paul F. Struhsaker, Plano, TX;
Russell C. McKown, Richardson, TX;

**** CONTINUING DATA *******
THIS APPLN CLAIMS BENEFIT OF 60/262,827
WHICH CLAIMS BENEFIT OF 60/262,712 01/19/2001
WHICH CLAIMS BENEFIT OF 60/262,825 01/19/2001
WHICH CLAIMS BENEFIT OF 60/262,698 01/19/2001
WHICH CLAIMS BENEFIT OF 60/262,826 01/19/2001
WHICH CLAIMS BENEFIT OF 60/262,951 01/19/2001
WHICH CLAIMS BENEFIT OF 60/262,824 01/19/2001
WHICH CLAIMS BENEFIT OF 60/263,101 01/19/2001
WHICH CLAIMS BENEFIT OF 60/263,097 01/19/2001
WHICH CLAIMS BENEFIT OF 60/273,579 03/05/2001
WHICH CLAIMS BENEFIT OF 60/262,955 01/19/2001
WHICH CLAIMS BENEFIT OF 60/262,708 01/19/2001
WHICH CLAIMS BENEFIT OF 60/273,689 03/05/2001
WHICH CLAIMS BENEFIT OF 60/273,757 03/05/2001
WHICH CLAIMS BENEFIT OF 60/270,378 02/21/2001
WHICH CLAIMS BENEFIT OF 60/270,385 02/21/2001
WHICH CLAIMS BENEFIT OF 60/270,430 02/21/2001

**** FOREIGN APPLICATIONS *******

IF REQUIRED, FOREIGN FILING LICENSE GRANTED.. SMALL ENTITY **
** 08/10/2001

Foreign Priority claimed ☐ yes ☒ no	STATE OR COUNTRY TX	SHEETS DRAWING 5	TOTAL CLAIMS 20	INDEPENDENT CLAIMS 2
35 USC 119 (a-d) conditions met ☐ yes ☒ no ☐ Met after Allowance				
Verified and Acknowledged Examiner's Signature: <i>[Signature]</i> Initials: H.V.				

ADDRESS
William A. Munck, Esq.
NOVAKOV DAVIS & MUNCK, P.C.
900 Three Galleria Tower
13155 Noel Road
Dallas, TX 75240

TITLE
Apparatus and method for creating signal and profiles at a receiving station

☐ All Fees

Index of Claims



Application No.

09/839,719

Examiner

Harry Vartanian

Applicant(s)

STRUHSAKER ET AL.

Art Unit

2634

✓	Rejected
=	Allowed

—	(Through numeral) Cancelled
÷	Restricted

N	Non-Elected
I	Interference

A	Appeal
O	Objected

Claim		Date						
Final	Original	9/18/04						
	1	✓						
	2	✓						
	3	✓						
	4	✓						
	5	✓						
	6	✓						
	7	✓						
	8	✓						
	9	✓						
	10	✓						
	11	✓						
	12	✓						
	13	✓						
	14	✓						
	15	✓						
	16	✓						
	17	✓						
	18	✓						
	19	✓						
	20	✓						
	21							
	22							
	23							
	24							
	25							
	26							
	27							
	28							
	29							
	30							
	31							
	32							
	33							
	34							
	35							
	36							
	37							
	38							
	39							
	40							
	41							
	42							
	43							
	44							
	45							
	46							
	47							
	48							
	49							
	50							

Claim		Date						
Final	Original							
	51							
	52							
	53							
	54							
	55							
	56							
	57							
	58							
	59							
	60							
	61							
	62							
	63							
	64							
	65							
	66							
	67							
	68							
	69							
	70							
	71							
	72							
	73							
	74							
	75							
	76							
	77							
	78							
	79							
	80							
	81							
	82							
	83							
	84							
	85							
	86							
	87							
	88							
	89							
	90							
	91							
	92							
	93							
	94							
	95							
	96							
	97							
	98							
	99							
	100							

Claim		Date						
Final	Original							
	101							
	102							
	103							
	104							
	105							
	106							
	107							
	108							
	109							
	110							
	111							
	112							
	113							
	114							
	115							
	116							
	117							
	118							
	119							
	120							
	121							
	122							
	123							
	124							
	125							
	126							
	127							
	128							
	129							
	130							
	131							
	132							
	133							
	134							
	135							
	136							
	137							
	138							
	139							
	140							
	141							
	142							
	143							
	144							
	145							
	146							
	147							
	148							
	149							
	150							



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/839,719	04/20/2001	Paul F. Struhsaker	WEST14-00016	1196

7590 09/22/2004

William A. Munck, Esq.
NOVAKOV DAVIS & MUNCK, P.C.
900 Three Galleria Tower
13155 Noel Road
Dallas, TX 75240

EXAMINER

VARTANIAN, HARRY

ART UNIT PAPER NUMBER

2634

DATE MAILED: 09/22/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/839,719

Applicant(s)

STRUHSAKER ET AL.

Examiner

Harry Vartanian

Art Unit

2634

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 20 April 2001.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-20 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-20 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 20 April 2001 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date 12/02, 7/04.
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____

DETAILED ACTION***Drawings***

1. The drawings are objected to as failing to comply with 37 CFR 1.84(p)(5) because they do not include the following reference sign(s) mentioned in the description: 167-169, 308. Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The replacement sheet(s) should be labeled "Replacement Sheet" in the page header (as per 37 CFR 1.84(c)) so as not to obstruct any portion of the drawing figures. If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Claim Objections

2. Claims 1, 15, and 16 are objected to because of the following informalities:

Claim 1; lines 9-10 recites "the burst data signal". Please correct to "the **first** burst data signal".

Claim 15, lines 6 recites "the burst data signals". Please correct to "the **plurality of** burst data signal".

Claim 16, lines 8 recites "the burst data signal". Please correct to "the **first** burst data signal".

Appropriate correction is required.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

3. Claim 1, 3-5, 8-10, 12-13, 15-17, and 19-20 are rejected under 35 U.S.C. 102(b) as being anticipated by Shiue et al (WO 99/31837). Shiue et al's TDMA, which typically sends burst data, invention discloses a system wherein profiles of each subscriber link, i.e. channel, are maintained and stored by the basestation. Once the subscriber's time slot is open for communication, the basestation loads that particular subscriber's parameters. More specifically, Shiue et al meets the following limitations of claim 1:

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, said profile parameter determiner for determining a value of at least one parameter representative of communication of the burst data signal to the receiving station; and **Abstract; (Page 3, Lines 1-8);**

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 parameter determined by said profile parameter determiner, the values stored at said profile parameter storage device to be used to facilitate receive operations performed at the receiving station of subsequent bursts of the first burst data signal. **(Page 9, Lines 5-16); (Pg 8, Lines 10-28 describe the receive operations for subsequent bursts)**

Regarding Claim 3, Shiue et al meets the following limitations:

wherein the at least one parameter determined by said profile parameter determiner comprises a channel-related parameter, the channel-related parameter representative of a channel condition of the first channel. **[(Page 7, Lines 20-26) Note: AGC, CTL, and Equalizer loops are "channel-related" parameters]**

Regarding Claim 4, Shiue et al meets the following limitations:

wherein the channel-related parameter determined by said profile parameter determiner comprises a value representative of fading exhibited upon the first channel. **[(Pg 12, Line 27 to Pg 13, line 8) Note: AGC parameters and equalizer weights are types of fading parameters]**

Regarding Claim 5, Shiue et al meets the following limitations:

wherein the receiving station comprises an equalizer for performing equalization operations when the at least the first burst data signal **(Page 7, Lines 20-26)**

Art Unit: 2634

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. **(Pg 12, Line 27 to Pg13, line 8)**

Regarding Claim 8, Shiue et al meets the following limitations:

the at least one parameter determiner by said profile parameter determiner comprises a signal-related parameter, the signal-related parameter representative of a signal characteristic of the first burst data signal transmitted when the first channel. **[(Page 7, Lines 20-26)Note: AGC, CTL, and Equalizer loops are "signal-related" parameters]**

Regarding Claim 9, Shiue et al meets the following limitations:

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. **[(Page 7, Lines 20-26) Note: A carrier tracking loop is a "frequency characteristic"]**

Regarding Claim 10, Shiue et al meets the following limitations:

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. **[(Page 7, Lines 20-26) Note: equalizer is time shift related and synchronization helps to fix time shift problems]**

Regarding Claim 12, Shiue et al meets the following limitations:

the signal related parameter determined by said profile parameter determiner comprises a value related to power-levels of the first burst data signal. **[(Pg 9, line 17-26) Note: AGC deals with adjust the gain or the power of a received burst]**

Regarding Claim 13, Shiue et al meets the following limitations:

said profile parameter determiner is further coupled to receive an indication of at least one additional burst of the first burst data signal, **(Page 8, lines 10 to Pg 9, line 4)**

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. **(Page 8, lines 10 to Pg 9, line 4)**

Regarding Claim 15, Shiue et al meets the following limitations:

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 **[Abstract; (Page 3, Lines 1-8); Note: Use of a many links represents separate channels]**

wherein said profile parameter determiner determines a value of a plurality of parameters representative of communication of the burst data signals and each of the plurality of channels. **Abstract; (Page 3, Lines 1-8);**

Regarding Claim 16, Shiue et al meets the following limitations:

Art Unit: 2634

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 parameter representative of communication of the burst data signal to the receiving station; **Abstract; (Page 3, Lines 1-8);**

storing values representative of the at least one parameter determined during said operation of determining; **(Page 9, Lines 5-16) Claim 1**

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. **(Page 9, Lines 5-16); Claim 1; (Pg 8, Lines 10-28 describe the receive operations for subsequent bursts)**

Regarding Claim 17, Shiue et al meets the following limitations:

detecting, at the receiving station the at least one subsequent burst of the first burst data signal; **Abstract; (Page 8, lines 10 to Pg 9, line 4)**

updating the value of the at least one parameter determined during said operation of determining responsive to the at least one subsequent burst detected during said operation of detecting. **(Page 8, lines 10 to Pg 9, line 4)**

Regarding Claim 19, Shiue et al meets the following limitations:

wherein the at least one parameter determined during said operation of determining comprises a channel-related parameter. **[(Page 7, Lines 20-26) Note: AGC, CTL, and Equalizer loops are "channel-related" parameters]**

Regarding Claim 20, Shiue et al meets the following limitations:

wherein the at least one parameter determined during said operation of determining comprises a signal-related parameter. **[(Page 7, Lines 20-26) Note: AGC, CTL, and Equalizer loops are "signal-related" parameters]**

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.

Art Unit: 2634

3. Resolving the level of ordinary skill in the pertinent art.
 4. Considering objective evidence present in the application indicating obviousness or nonobviousness.
4. Claims 2, 14, 18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Shiue et al(WO 99/31837) in view of Unger et al(US PAT#6,230,326). Shiue et al meets all the limitations of claims 2, 14, and 18(see above rejections) except disclosing the use of a contention period and wherein the first parameter is determined during said contention period.

However, Unger et al's cable modem system describes the following:

"The cable modem listens for a UCD message which includes an initial maintenance burst type and when it detects one it obtains the upstream parameters for the management channel, block 703. The CM then carries out normal ranging and other initialization over the management channel, block 704. After completion of initialization..."(Column 6, Line 38-44)

Therefor it would have been prima facie obvious to determine communication parameters during an initialization or contention period. A motivation to combine is stated by Unger et al wherein he states that an initialization period prevents a communication link to start transmission that is not optimized, which can cause errors. (See Column 1, line 55 to Column 2, line 35)

5. Claims 6-7 are rejected under 35 U.S.C. 103(a) as being unpatentable over Shiue et al(WO 99/31837) in view of Reza et al (US PAT#6,654,384). Shiue et al meets all the limitations of claim 6-7(see above rejections) except disclosing the use of antenna related parameters.

However, Reza et al's invention describes the following:

"... The wireless physical layer and the wireless media-access-control (MAC) layer collectively include a set of parameters, which are adaptively modified by a base station controller for communication with a plurality of customer premises equipment. The base station controller adjusts communication with each customer premises equipment individually and adaptively in response to changes in characteristics of communication, including physical characteristics, amount of communication traffic, and nature of application for the communication traffic." **abstract**

"In a preferred embodiment, physical parameters and MAC parameters include the following **physical parameters: antenna selection**--The base station controller 120 includes more than one antenna, and each customer premises equipment 130 includes one or more antennas. In a preferred embodiment, the

Art Unit: 2634

antenna selection parameter includes a choice of which one antenna at the base station controller 120 and which one antenna at the each customer premises equipment 130.” (Column 5, line 66 to Column 6, line 14)

Therefor it would have been prima facie obvious to determine and use antenna related parameters. A motivation to combine is stated by Reza et al wherein he states that since channel conditions change constantly overtime between a basestation and subscriber there is a need to communicate updated parameters in order to adapt. (See Column 1, line 21 to Column 1, line 62)

6. Claim 11 is rejected under 35 U.S.C. 103(a) as being unpatentable over Shiue et al(WO 99/31837) in view of Hamdi (US PAT#6,345,071). Shiue et al meets all the limitations of claim 11(see above rejections) except disclosing the use of FEC related parameters.

However, Hamdi’s ADSL system describes the following:

“The ADSL modem 710 operates according to Forward Error Correction (FEC), which is based on the Reed Solomon coding method. After power up and optional self-test, the **ADSL modem 710 participates in an activation and acknowledgment phase and transmits activate or tone requests to the ATU-C 202.** The ATU-C 202 responds with an activation signal or activation tones. The **ADSL modem 710 and the ATU-C 202 then determine the relevant attributes of the transmission medium 102** using transceiver **training and analysis procedures.** The ADSL modem 710 measures the **communication characteristics of the transmission medium 102**, such as the characteristic impedance, the SNR for each sub-channel, the line quality, etc. and generates an initial profile of the channel or transmission medium 102. **The initial profile includes bits and gains (B&G) tables, FEC parameters R** (redundant check bytes) and S (number of symbols per R-S codeword) values, the interleaver depth (D), and the power spectral density (PSD) level.” (Column 12, lines 18-35)

Therefor it would have been prima facie obvious to communicate FEC related parameters between a basestation and receiver. A motivation to combine is stated by Hamdi wherein he states that since channel conditions change consistently overtime due to line impedance changes there is a need to communicate updated parameters in order to retrain the modems and ADSL Termination Unit(ATU-C), which is similar to a basestation. (See Column 1, line 21 to Column 1, line 62)

Art Unit: 2634

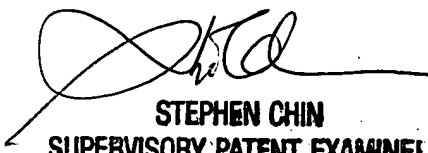
Any inquiry concerning this communication or earlier communications from the examiner should be directed to Harry Vartanian whose telephone number is 571.272.3048. The examiner can normally be reached on 10:00-6:30 Mondays to Fridays.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Stephen Chin can be reached on 571.272.3056. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Harry Vartanian
Examiner
Art Unit 2634

HV



STEPHEN CHIN
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 2800

Search Notes

Application No.

09/839,719

Examiner

Harry Vartanian

Applicant(s)

STRUHSAKER ET AL.

Art Unit

2634

SEARCHED

Class	Subclass	Date	Examiner
375	222	9/17/2004	HV
370	314	9/17/2004	HV
370	321	9/17/2004	HV
370	347	9/17/2004	HV

INTERFERENCE SEARCHED

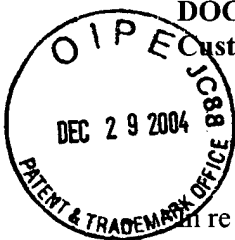
Class	Subclass	Date	Examiner
375	222	9/17/2004	HV

**SEARCH NOTES
(INCLUDING SEARCH STRATEGY)**

	DATE	EXMR
Inventorship	9/16/2004	HV
EAST: US-Pat, PGPUB, EPO, JPO, Derwent, IBM	9/17/2004	

2634
PATENT

DOCKET NO. WEST14-00016
Customer No. 23990



IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re application of: : Paul F. Struhsaker, et al.
Serial No. : 09/839,719
Filed : April 20, 2001
For : APPARATUS AND METHOD FOR CREATING SIGNAL AND
PROFILES AT A RECEIVING STATION
Group No. : 2634
Examiner : Harry Vartanian

MAIL STOP AMENDMENT

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

PROPOSED DRAWING CHANGES

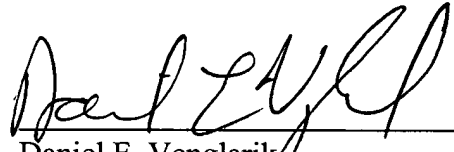
In response to the Office Action dated September 22, 2004, Applicants propose to amend the drawings as shown in the attached sketches in red ink, by insertion of reference characters 166-169 in FIGURE 1. No new matter is being added by these changes. Replacement formal drawings will be provided upon approval of the changes.

Approval of the changes is respectfully requested.

Respectfully submitted,

DAVIS MUNCK, P.C.

Date: 12-22-04



Daniel E. Venglarik
Registration No. 39,409

P.O. Drawer 800889
Dallas, Texas 75380
(972) 628-3621 (direct dial)
(972) 628-3600 (main number)
(972) 628-3616 (fax)
E-mail: dvenglarik@davismunck.com



POCKET NO. WEST14-00016
Customer No. 23990

PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re application of: : Paul F. Struhsaker, et al.
Serial No. : 09/839,719
Filed : April 20, 2001
For : APPARATUS AND METHOD FOR CREATING SIGNAL AND
PROFILES AT A RECEIVING STATION
Group No. : 2634
Examiner : Harry Vartanian

MAIL STOP AMENDMENT

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

CERTIFICATE OF MAILING BY FIRST CLASS MAIL

Sir:

The undersigned hereby certifies that the following documents:

1. Amendment and Response to Office Action;
2. Proposed Drawing Changes (w/1 sheet redlined drawings);
3. Change of Correspondence Address; and
4. A postcard receipt;

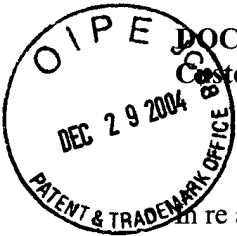
relating to the above application, were deposited as "First Class Mail" with the United States Postal Service, addressed to MAIL STOP AMENDMENT, Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450 on December 22, 2004.

Date: 12/22/04

Date: 12-22-04

Kathy Cedar
Mailer
Daniel E. Venglarik
Daniel E. Venglarik
Reg. No. 39,409

P.O. Drawer 800889
Dallas, Texas 75380
Phone: (972) 628-3600
Fax: (972) 628-3616
E-mail: dvenglarik@davismunck.com



DOCKET NO. WEST14-00016

Customer No. 23990

PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re application of: : Paul F. Struhsaker, et al.
Serial No. : 09/839,719
Filed : April 20, 2001
For : APPARATUS AND METHOD FOR CREATING SIGNAL AND
PROFILES AT A RECEIVING STATION
Group No. : 2634
Examiner : Harry Vartanian

MAIL STOP AMENDMENT

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

CHANGE OF CORRESPONDENCE ADDRESS

Please direct future correspondence and telephone calls relating to this patent application to the following:

Customer No. 23990

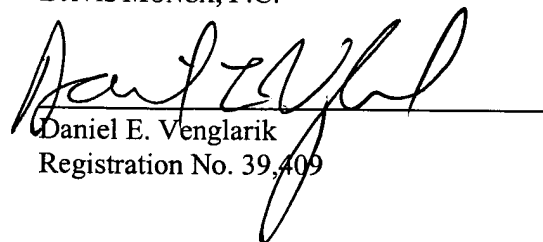
Docket Clerk
P.O. Drawer 800889
Dallas, Texas 75380

Phone: (972) 628-3600
Fax: (972) 628-3616

Respectfully submitted,

DAVIS MUNCK, P.C.

Date: 12-22-04


Daniel E. Venglarik
Registration No. 39,409

P.O. Drawer 800889
Dallas, Texas 75380
Phone: (972) 628-3600
Fax: (972) 628-3616
E-mail: dvenglarik@davismunck.com

REMARKS

Claims 1–20 are pending in the present application.

Claims 1, 3, 8 and 15–20 were amended herein.

Reconsideration of the claims is respectfully requested.

35 U.S.C. § 102 (Anticipation)

Claims 1, 3–5, 8–10, 12–13, 15–17 and 19–20 were rejected under 35 U.S.C. § 102(e) as being anticipated by WO 99/31837 to *Shiue et al.* This rejection is respectfully traversed.

A claim is anticipated only if each and every element is found, either expressly or inherently described, in a single prior art reference. The identical invention must be shown in as complete detail as is contained in the claim. MPEP § 2131 at p. 2100-73 (8th ed. rev. 2 May 2004).

Independent claims 1 and 16 each recite determining and storing at least one signal-related profile parameter and at least one channel-related profile parameter, where the signal-related and channel-related parameters collectively represent communication of a first burst data signal over a first channel to the receiving station. Such a feature is not found in the cited reference. The Office Action alternately characterizes AGC, CTL and equalization from *Shiue et al* as both signal-related and channel-related, depending upon the claim limitation within a given claim (e.g., claims 3 and 8). Those parameters cannot logically be both signal-related AND channel-related.

Therefore, the rejection of claims 1, 3–5, 8–10, 12–13, 15–17 and 19–20 under 35 U.S.C. § 103 has been overcome.

35 U.S.C. § 103 (Obviousness)

Claims 2, 14 and 18 were rejected under 35 U.S.C. § 103(a) as being unpatentable over *Shiue et al* in view U.S. Patent No. 6,230,326 to *Unger et al*. Claims 6–7 were rejected under 35 U.S.C. § 103(a) as being unpatentable over *Shiue et al* in view U.S. Patent No. 6,654,384 to *Reza et al*. Claim 11 was rejected under 35 U.S.C. § 103(a) as being unpatentable over *Shiue et al* in view U.S. Patent No. 6,345,071 to *Hamdi*. These rejections are respectfully traversed.

In *ex parte* examination of patent applications, the Patent Office bears the burden of establishing a *prima facie* case of obviousness. MPEP § 2142; *In re Fritch*, 972 F.2d 1260, 1262, 23 U.S.P.Q.2d 1780, 1783 (Fed. Cir. 1992). The initial burden of establishing a *prima facie* basis to deny patentability to a claimed invention is always upon the Patent Office. MPEP § 2142; *In re Oetiker*, 977 F.2d 1443, 1445, 24 U.S.P.Q.2d 1443, 1444 (Fed. Cir. 1992); *In re Piasecki*, 745 F.2d 1468, 1472, 223 U.S.P.Q. 785, 788 (Fed. Cir. 1984). Only when a *prima facie* case of obviousness is established does the burden shift to the applicant to produce evidence of nonobviousness. MPEP § 2142; *In re Oetiker*, 977 F.2d 1443, 1445, 24 U.S.P.Q.2d 1443, 1444 (Fed. Cir. 1992); *In re Rijckaert*, 9 F.3d 1531, 1532, 28 U.S.P.Q.2d 1955, 1956 (Fed. Cir. 1993). If the Patent Office does not produce a *prima facie* case of unpatentability, then without more the applicant is entitled to grant of a patent. *In re Oetiker*, 977 F.2d 1443, 1445, 24 U.S.P.Q.2d 1443, 1444 (Fed. Cir. 1992); *In re Grabiak*, 769 F.2d 729, 733, 226 U.S.P.Q. 870, 873 (Fed. Cir. 1985).

A *prima facie* case of obviousness is established when the teachings of the prior art itself suggest the claimed subject matter to a person of ordinary skill in the art. *In re Bell*, 991 F.2d 781, 783, 26 U.S.P.Q.2d 1529, 1531 (Fed. Cir. 1993). To establish a *prima facie* case of obviousness, three basic criteria must be met. First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings. Second, there must be a reasonable expectation of success. Finally, the prior art reference (or references when combined) must teach or suggest all the claim limitations. The teaching or suggestion to make the claimed invention and the reasonable expectation of success must both be found in the prior art, and not based on applicant's disclosure. MPEP § 2142.

As noted above, independent claims 1 and 16 each recite limitations not found in *Shiue et al.* Such features are also not found in the remaining cited references.

Therefore, the rejection of claims 2, 6–7, 11, 14 and 18 under 35 U.S.C. § 103 has been overcome.

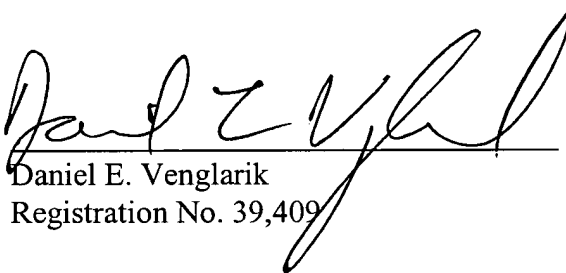
If any issues arise, or if the Examiner has any suggestions for expediting allowance of this Application, the Applicant respectfully invites the Examiner to contact the undersigned at the telephone number indicated below or at *dvenglarik@davismunck.com*.

The Commissioner is hereby authorized to charge any additional fees connected with this communication or credit any overpayment to Deposit Account No. 50-0208.

Respectfully submitted,

DAVIS MUNCK, P.C.

Date: 12-22-04


Daniel E. Venglarik
Registration No. 39,409

P.O. Drawer 800889
Dallas, Texas 75380
(972) 628-3621 (direct dial)
(972) 628-3600 (main number)
(972) 628-3616 (fax)
E-mail: *dvenglarik@davismunck.com*

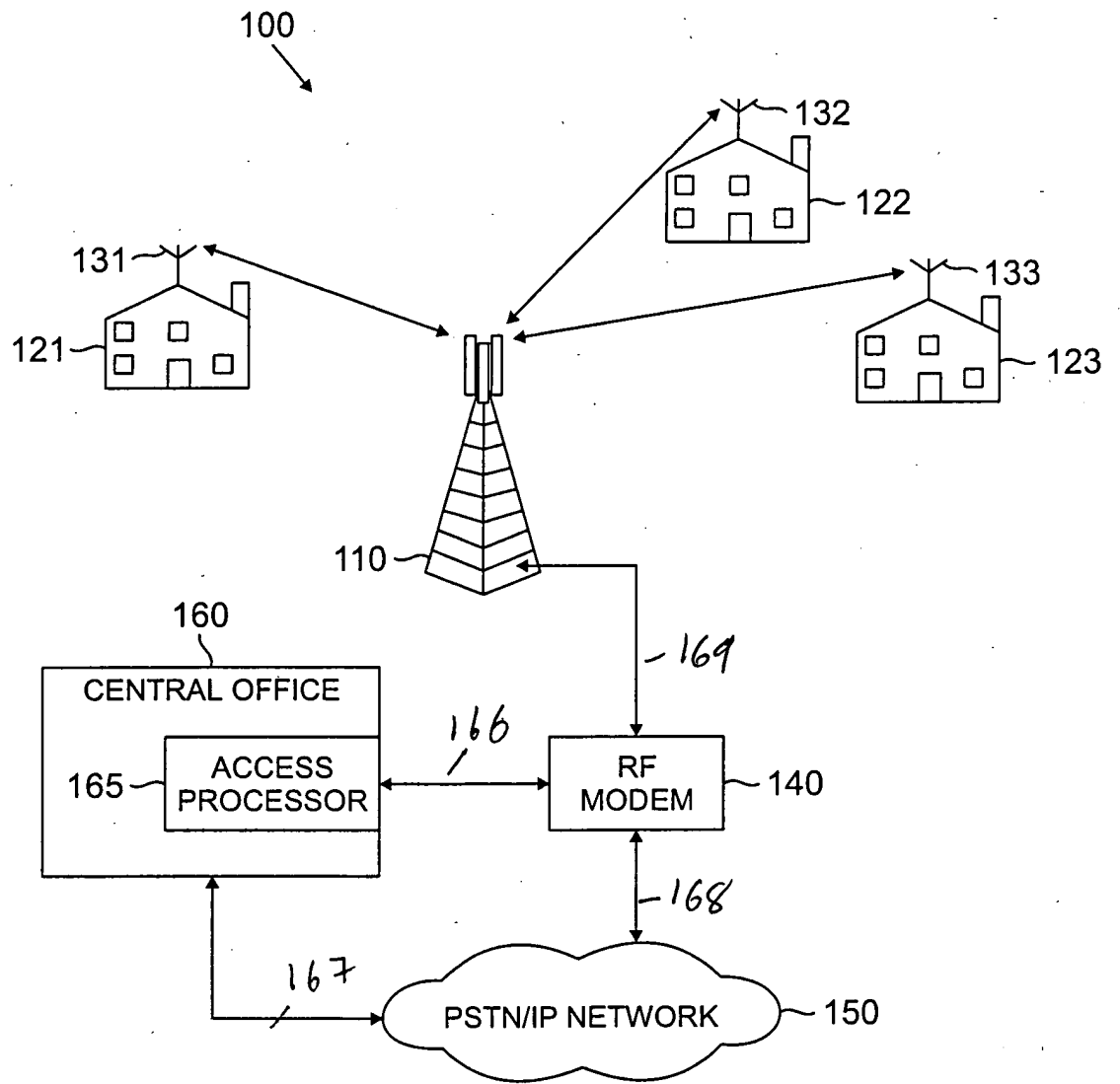


FIG. 1

AMENDMENTS TO THE CLAIMS:

Please amend the claims as follows, substituting any amended claim(s) for the corresponding pending claim(s):

1. (Currently Amended) 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:

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, 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

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, the values stored at said profile parameter storage device to be used to facilitate receive operations performed at the receiving station ~~of~~ on subsequent bursts of the first burst data signal.

2. (Original) 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.
3. (Currently Amended) The apparatus of Claim 1 wherein ~~the at least one parameter determined by said profile parameter determiner comprises a channel-related parameter~~, the channel-related parameter is representative of a channel condition of the first channel.
4. (Original) 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.

5. (Original) 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.

6. (Original) 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.

7. (Original) 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.

8. (Currently Amended) The apparatus of Claim 1 wherein ~~the at least one parameter determiner by said profile parameter determiner comprises a signal-related parameter,~~ the signal-related parameter is representative of a signal characteristic of the first burst data signal transmitted ~~when over~~ the first channel.

9. (Original) 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.
10. (Original) 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.
11. (Original) 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.
12. (Original) 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.
13. (Original) 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.

14. (Original) 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.

15. (Currently Amended) 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.

16. (Currently Amended) 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:

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;

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

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.

17. (Currently Amended) 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 determined during said operation of determining responsive to the at least one subsequent burst detected during said operation of detecting.

18. (Currently Amended) 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 is and the at least one channel-related parameter are determined during said operation of determining is transmitted to the receiving station during the contention period.

19. (Currently Amended) The method of Claim 16 wherein the at least ~~one parameter determined during said operation of determining~~ comprises a channel-related parameter comprises one or more of equalization weighting and antenna parameters.

20. (Currently Amended) The method of Claim 16 wherein the at least ~~one~~ parameter ~~determined during said operation of determining~~ comprises a signal-related parameter comprises one or more of forward error correction (FEC) amount, frequency change, burst time change, and burst power level change.

AMENDMENTS TO THE SPECIFICATION:

Please replace the paragraph on page 26 at lines 6–21 of the specification with the following:

FIGURE 3 illustrates a functional block diagram of a portion of the present invention comprising two modems and a controller in an embodiment of the present invention. Modem 302 and modem 304 are selectively coupled to receive uplink signals sent by different ones of subscriber stations to the base station (not shown). Here, IF/Rf (intermediate frequency/radio frequency) receive circuitry 306 of the base station is shown to pass the uplink signals to the modems. Circuitry 306 is operable to down-convert in frequency uplink signals received from receive circuitry 304. Thereafter, the down-converted signals, bursts sub3...sub1 and bursts subN...sub2 are operated upon by modems 304 and 302 respectively. The modems are shown to be functionally coupled to controller 308 316 via lines 310, for receiving contention results, and 312 for passing parameters, frame times and weight values for the modems to apply to the received signals. Controller 314 includes control CPU 316 and memory device 318.

DOCKET NO. WEST14-00016

PATENT

Customer No. 23990



IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re application of: : Paul F. Struhsaker, et al.

Serial No. : 09/839,719

Filed : April 20, 2001

For : APPARATUS AND METHOD FOR CREATING SIGNAL
AND PROFILES AT A RECEIVING STATION

Group No. : 2634

Examiner : Harry Vartanian

MAIL STOP AMENDMENT

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

AMENDMENT AND RESPONSE TO OFFICE ACTION

No fees are believed to be necessary; however, in the event that any fees are required for the prosecution of this application, please charge any necessary fees to Deposit Account No. 50-0208. No extension of time is believed to be necessary. If, however, an extension of time is needed, the extension is requested and please charge the fee for this extension to Deposit Account No. 50-0208.

In response to the Office Action dated September 22, 2004, please amend the above-identified application as follows:

PATENT APPLICATION FEE DETERMINATION RECORD

Effective October 1, 2000

Application or Docket Number

09839719
WFS14-00016

CLAIMS AS FILED - PART I

	(Column 1)	(Column 2)
TOTAL CLAIMS	20	
FOR	NUMBER FILED	NUMBER EXTRA
TOTAL CHARGEABLE CLAIMS	20 minus 20 =	0
INDEPENDENT CLAIMS	2 minus 3 =	8
MULTIPLE DEPENDENT CLAIM PRESENT ☐		

* If the difference in column 1 is less than zero, enter "0" in column 2

CLAIMS AS AMENDED - PART II

122904

	(Column 1)	(Column 2)	(Column 3)
AMENDMENT A	CLAIMS REMAINING AFTER AMENDMENT	HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA
Total	20	20	=
Independent	2	3	=
FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM ☐			

	(Column 1)	(Column 2)	(Column 3)
AMENDMENT B	CLAIMS REMAINING AFTER AMENDMENT	HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA
Total			=
Independent			=
FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM ☐			

	(Column 1)	(Column 2)	(Column 3)
AMENDMENT C	CLAIMS REMAINING AFTER AMENDMENT	HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA
Total			=
Independent			=
FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM ☐			

* If the entry in column 1 is less than the entry in column 2, write "0" in column 3.

** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, enter "20."

***If the "Highest Number Previously Paid For" IN THIS SPACE is less than 3, enter "3."

The "Highest Number Previously Paid For" (Total or Independent) is the highest number found in the appropriate box in column 1.

SMALL ENTITY TYPE ☐

OR OTHER THAN SMALL ENTITY

RATE	FEE
BASIC FEE	355.00
X\$ 9=	
X40=	
+135=	
TOTAL	355.00

RATE	FEE
BASIC FEE	710.00
X\$18=	
X80=	
+270=	
TOTAL	

SMALL ENTITY

OR OTHER THAN SMALL ENTITY

RATE	ADDITIONAL FEE
X\$ 9=	
X40=	
+135=	
TOTAL	

RATE	ADDITIONAL FEE
X\$18=	
X80=	
+270=	
TOTAL	

RATE	ADDITIONAL FEE
X\$ 9=	
X40=	
+135=	
TOTAL	

RATE	ADDITIONAL FEE
X\$18=	
X80=	
+270=	
TOTAL	

RATE	ADDITIONAL FEE
X\$ 9=	
X40=	
+135=	
TOTAL	

RATE	ADDITIONAL FEE
X\$18=	
X80=	
+270=	
TOTAL	

BEST AVAILABLE COPY

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
S12	3	@ad<"20010420" and (fixed near2 wireless fwa) and profile near2 channel	US-PGPUB; USPAT; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2005/04/20 13:11
L1	64	@ad<"20010420" and burst with channel same profile	US-PGPUB; USPAT; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2005/04/20 13:14
L2	20	@ad<"20010420" and burst with channel same profile same signal	US-PGPUB; USPAT; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2005/04/20 13:24
L3	0	@ad<"20010420" and burst with channel same equaliz\$7 near2 weight same signal near2 power	US-PGPUB; USPAT; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2005/04/20 13:25
L4	0	@ad<"20010420" and burst same equaliz\$7 near2 weight same signal near2 power	US-PGPUB; USPAT; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2005/04/20 13:25
L5	0	@ad<"20010420" and profile same equaliz\$7 near2 weight same signal near2 power	US-PGPUB; USPAT; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2005/04/20 13:26
L6	0	@ad<"20010420" and profile same equaliz\$7 near2 coeff\$9 same signal near2 power	US-PGPUB; USPAT; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2005/04/20 13:26

Search Notes

Application/Control No.

09/839,719

Examiner

Harry Vartanian

Applicant(s)/Patent under
Reexamination

STRUHSAKER ET AL.

Art Unit

2634

SEARCHED

Class	Subclass	Date	Examiner

INTERFERENCE SEARCHED

Class	Subclass	Date	Examiner

**SEARCH NOTES
(INCLUDING SEARCH STRATEGY)**

	DATE	EXMR
East: USPG-PUB, USPAT, EPO, JPO, Derwent, IBM_TDB	4/20/2005	HV



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

NOTICE OF ALLOWANCE AND FEE(S) DUE

23990 7590 05/17/2005
DOCKET CLERK
P.O. DRAWER 800889
DALLAS, TX 75380

EXAMINER

VARTANIAN, HARRY

ART UNIT

PAPER NUMBER

2634

DATE MAILED: 05/17/2005

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/839,719	04/20/2001	Paul F. Struhsaker	WEST14-00016	1196

TITLE OF INVENTION: APPARATUS AND METHOD FOR CREATING SIGNAL AND PROFILES AT A RECEIVING STATION

APPLN. TYPE	SMALL ENTITY	ISSUE FEE	PUBLICATION FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	NO	\$1400	\$300	\$1700	08/17/2005

THE APPLICATION IDENTIFIED ABOVE HAS BEEN EXAMINED AND IS ALLOWED FOR ISSUANCE AS A PATENT PROSECUTION ON THE MERITS IS CLOSED. THIS NOTICE OF ALLOWANCE IS NOT A GRANT OF PATENT RIGHT THIS APPLICATION IS SUBJECT TO WITHDRAWAL FROM ISSUE AT THE INITIATIVE OF THE OFFICE OR UPO PETITION BY THE APPLICANT. SEE 37 CFR 1.313 AND MPEP 1308.

THE ISSUE FEE AND PUBLICATION FEE (IF REQUIRED) MUST BE PAID WITHIN THREE MONTHS FROM THE MAILING DATE OF THIS NOTICE OR THIS APPLICATION SHALL BE REGARDED AS ABANDONED. THE STATUTORY PERIOD CANNOT BE EXTENDED. SEE 35 U.S.C. 151. THE ISSUE FEE DUE INDICATED ABOVE REFLECTS A CREDIT FOR ANY PREVIOUSLY PAID ISSUE FEE APPLIED IN THIS APPLICATION. THE PTOL-85B (OR AN EQUIVALENT) MUST BE RETURNED WITHIN THIS PERIOD EVEN IF NO FEE IS DUE OR THE APPLICATION WILL BE REGARDED AS ABANDONED.

HOW TO REPLY TO THIS NOTICE:

I. Review the SMALL ENTITY status shown above.

If the SMALL ENTITY is shown as YES, verify your current SMALL ENTITY status:

A. If the status is the same, pay the TOTAL FEE(S) DUE shown above.

B. If the status above is to be removed, check box 5b on Part B - Fee(s) Transmittal and pay the PUBLICATION FEE (if required) and twice the amount of the ISSUE FEE shown above, or

If the SMALL ENTITY is shown as NO:

A. Pay TOTAL FEE(S) DUE shown above, or

B. If applicant claimed SMALL ENTITY status before, or is now claiming SMALL ENTITY status, check box 5a on Part B - Fee Transmittal and pay the PUBLICATION FEE (if required) and 1 the ISSUE FEE shown above.

II. PART B - FEE(S) TRANSMITTAL should be completed and returned to the United States Patent and Trademark Office (USPTO) with your ISSUE FEE and PUBLICATION FEE (if required). Even if the fee(s) have already been paid, Part B - Fee(s) Transmittal should be completed and returned. If you are charging the fee(s) to your deposit account, section "4b" of Part B - Fee(s) Transmittal should be completed and an extra copy of the form should be submitted.

III. All communications regarding this application must give the application number. Please direct all communications prior to issuance to Mail Stop ISSUE FEE unless advised to the contrary.

IMPORTANT REMINDER: Utility patents issued on applications filed on or after Dec. 12, 1980 may require payment of maintenance fees. It is the patentee's responsibility to ensure timely payment of maintenance fees when due.

PART B - FEE(S) TRANSMITTAL

Complete and send this form, together with applicable fee(s), to: Mail

Mail Stop ISSUE FEE
Commissioner for Patents
P.O. Box 1450
Alexandria, Virginia 22313-1450
(703) 746-4000

or Fax

INSTRUCTIONS: This form should be used for transmitting the ISSUE FEE and PUBLICATION FEE (if required). Blocks 1 through 5 should be completed where appropriate. All further correspondence including the Patent, advance orders and notification of maintenance fees will be mailed to the current correspondence address indicated unless corrected below or directed otherwise in Block 1, by (a) specifying a new correspondence address; and/or (b) indicating a separate "FEE ADDRESS" maintenance fee notifications.

CURRENT CORRESPONDENCE ADDRESS (Note: Use Block 1 for any change of address)

23990 7590 05/17/2005

DOCKET CLERK
P.O. DRAWER 800889
DALLAS, TX 75380

Note: A certificate of mailing can only be used for domestic mailings of Fee(s) Transmittal. This certificate cannot be used for any other accompanying papers. Each additional paper, such as an assignment or formal drawing, must have its own certificate of mailing or transmission.

Certificate of Mailing or Transmission

I hereby certify that this Fee(s) Transmittal is being deposited with the United States Postal Service with sufficient postage for first class mail in an envelope addressed to the Mail Stop ISSUE FEE address above, or being facsimile transmitted to the USPTO (703) 746-4000, on the date indicated below.

(Depositor's name)
(Signature)
(Date)

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/839,719	04/20/2001	Paul F. Struhsaker	WEST14-00016	1196

TITLE OF INVENTION: APPARATUS AND METHOD FOR CREATING SIGNAL AND PROFILES AT A RECEIVING STATION

APPLN. TYPE	SMALL ENTITY	ISSUE FEE	PUBLICATION FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	NO	\$1400	\$300	\$1700	08/17/2005

EXAMINER	ART UNIT	CLASS-SUBCLASS
VARTANIAN, HARRY	2634	375-222000

1. Change of correspondence address or indication of "Fee Address" (37 CFR 1.363).

- ☐ Change of correspondence address (or Change of Correspondence Address form PTO/SB/122) attached.
- ☐ "Fee Address" indication (or "Fee Address" Indication form PTO/SB/47; Rev 03-02 or more recent) attached. Use of a Customer Number is required.

2. For printing on the patent front page, list

- (1) the names of up to 3 registered patent attorneys or agents OR, alternatively,
- (2) the name of a single firm (having as a member a registered attorney or agent) and the names of up to 2 registered patent attorneys or agents. If no name is listed, no name will be printed.

1 _____

2 _____

3 _____

3. ASSIGNEE NAME AND RESIDENCE DATA TO BE PRINTED ON THE PATENT (print or type)

PLEASE NOTE: Unless an assignee is identified below, no assignee data will appear on the patent. If an assignee is identified below, the document has been filed for recordation as set forth in 37 CFR 3.11. Completion of this form is NOT a substitute for filing an assignment.

(A) NAME OF ASSIGNEE

(B) RESIDENCE: (CITY and STATE OR COUNTRY)

Please check the appropriate assignee category or categories (will not be printed on the patent): ☐ Individual ☐ Corporation or other private group entity ☐ Government

4a. The following fee(s) are enclosed:

- ☐ Issue Fee
- ☐ Publication Fee (No small entity discount permitted)
- ☐ Advance Order - # of Copies _____

4b. Payment of Fee(s):

- ☐ A check in the amount of the fee(s) is enclosed.
- ☐ Payment by credit card. Form PTO-2038 is attached.
- ☐ The Director is hereby authorized by charge the required fee(s), or credit any overpayment Deposit Account Number _____ (enclose an extra copy of this form).

5. Change in Entity Status (from status indicated above)

- ☐ a. Applicant claims SMALL ENTITY status. See 37 CFR 1.27.
- ☐ b. Applicant is no longer claiming SMALL ENTITY status. See 37 CFR 1.27(g)(2).

The Director of the USPTO is requested to apply the Issue Fee and Publication Fee (if any) or to re-apply any previously paid issue fee to the application identified above. NOTE: The Issue Fee and Publication Fee (if required) will not be accepted from anyone other than the applicant; a registered attorney or agent; or the assignee or other part interest as shown by the records of the United States Patent and Trademark Office.

Authorized Signature _____

Date _____

Typed or printed name _____

Registration No. _____

This collection of information is required by 37 CFR 1.311. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, Virginia 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 14 Alexandria, Virginia 22313-1450.

Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/839,719	04/20/2001	Paul F. Struhsaker	WEST14-00016	1196
23990	7590	05/17/2005		
DOCKET CLERK P.O. DRAWER 800889 DALLAS, TX 75380				
EXAMINER VARTANIAN, HARRY				
ART UNIT			PAPER NUMBER	
2634				
DATE MAILED: 05/17/2005				

Determination of Patent Term Adjustment under 35 U.S.C. 154 (b) (application filed on or after May 29, 2000)

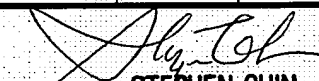
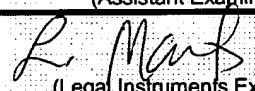
The Patent Term Adjustment to date is 836 day(s). If the issue fee is paid on the date that is three months after the mailing date of this notice and the patent issues on the Tuesday before the date that is 28 weeks (six and a half months) after the mailing date of this notice, the Patent Term Adjustment will be 836 day(s).

If a Continued Prosecution Application (CPA) was filed in the above-identified application, the filing date that determines Patent Term Adjustment is the filing date of the most recent CPA.

Applicant will be able to obtain more detailed information by accessing the Patent Application Information Retrieval (PAIR) WEB site (<http://pair.uspto.gov>).

Any questions regarding the Patent Term Extension or Adjustment determination should be directed to the Office Patent Legal Administration at (571) 272-7702. Questions relating to issue and publication fee payments should be directed to the Customer Service Center of the Office of Patent Publication at (703) 305-8283.

Issue Classification 	Application No.	Applicant(s)	
	09/839,719	STRUHSAKER ET AL.	
	Examiner	Art Unit	
	Harry Vartanian	2634	

ISSUE CLASSIFICATION									
ORIGINAL					CROSS REFERENCE(S)				
CLASS	SUBCLASS				CLASS	SUBCLASS (ONE SUBCLASS PER BLOCK)			
375	222				375	224			
INTERNATIONAL CLASSIFICATION									
H	0	4	B	1/38					
H	0	4	L	5/16					
				/					
				/					
				/					
Harry Vartanian 4/20/2005 (Assistant Examiner) (Date)					 STEPHEN CHIN SUPERVISORY PATENT EXAMINER TECHNOLOGY CENTER 2800 (Primary Examiner) (Date)				
 (Legal Instruments Examiner) (Date)									
					Total Claims Allowed: 20				
					O.G. Print Claim(s)				
					1				
					O.G. Print Fig.				
					4				

☐ Claims renumbered in the same order as presented by applicant		☐ CPA		☐ T.D.		☐ R.1.47	
Final	Original	Final	Original	Final	Original	Final	Original
1	1		31		61		91
2	2		32		62		92
3	3		33		63		93
4	4		34		64		94
5	5		35		65		95
6	6		36		66		96
7	7		37		67		97
8	8		38		68		98
9	9		39		69		99
10	10		40		70		100
11	11		41		71		101
12	12		42		72		102
13	13		43		73		103
14	14		44		74		104
15	15		45		75		105
16	16		46		76		106
17	17		47		77		107
18	18		48		78		108
19	19		49		79		109
20	20		50		80		110
	21		51		81		111
	22		52		82		112
	23		53		83		113
	24		54		84		114
	25		55		85		115
	26		56		86		116
	27		57		87		117
	28		58		88		118
	29		59		89		119
	30		60		90		120
							121
							122
							123
							124
							125
							126
							127
							128
							129
							130
							131
							132
							133
							134
							135
							136
							137
							138
							139
							140
							141
							142
							143
							144
							145
							146
							147
							148
							149
							150
							151
							152
							153
							154
							155
							156
							157
							158
							159
							160
							161
							162
							163
							164
							165
							166
							167
							168
							169
							170
							171
							172
							173
							174
							175
							176
							177
							178
							179
							180
							181
							182
							183
							184
							185
							186
							187
							188
							189
							190
							191
							192
							193
							194
							195
							196
							197
							198
							199
							200
							201
							202
							203
							204
							205
							206
							207
							208
							209
							210

FORM PTO-1449 (REV. 7.80)		U.S. DEPARTMENT OF COMMERCE PATENT AND TRADEMARK OFFICE		ATTY. DOCKET NO. WEST14-00016		SERIAL NO. ~~09/8390.719~~ 09/839,719	
REFERENCES CITED BY APPLICANT (Use several sheets if necessary)				APPLICANT Paul F. Struhsaker, et al.			
				FILING DATE April 20, 2001		GROUP 2681	

DEC 30 2002
 PATENT & TRADEMARK OFFICE

U. S. PATENT DOCUMENTS							
*EXAMINER INITIAL	DOCUMENT NUMBER	DATE	NAME	CLASS	SUBCLASS	FILING DATE (if appropriate)	
H.V.	AA	5.978.650	11/02/1999	Fischer, et al.	455	3.1	01/21/1997

RECEIVED
 JAN 02 2003
 Technology Center 2600

FOREIGN PATENT DOCUMENTS							
DOCUMENT NUMBER	DATE	COUNTRY	CLASS	SUBCLASS	TRANSLATION		
					YES	NO	
H.V. AB	WD 96/34481	10/31/1996	PCT				
H.V. AC	WD 99/31837	06/24/1999	PCT				
H.V. AD	EP 0 800 285 A2	10/08/1997	EPO				

OTHER REFERENCES (Including Author, Title, Date, Pertinent Pages, Etc.)	

EXAMINER <i>Wong</i>	DATE CONSIDERED 9/16/04
-------------------------	----------------------------

*EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609; Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.

Notice of Allowability

Application No.

09/839,719

Examiner

Harry Vartanian

Applicant(s)

STRUHSAKER ET AL.

Art Unit

2634

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1. ☒ This communication is responsive to 12/29/2004.
2. ☒ The allowed claim(s) is/are 1-20.
3. ☒ The drawings filed on 12/29/2004 are accepted by the Examiner.
4. ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
 - a) ☐ All b) ☐ Some* c) ☐ None of the:
 1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

* Certified copies not received: _____.

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.

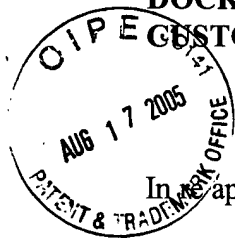
THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.

5. ☐ A SUBSTITUTE OATH OR DECLARATION must be submitted. Note the attached EXAMINER'S AMENDMENT or NOTICE OF INFORMAL PATENT APPLICATION (PTO-152) which gives reason(s) why the oath or declaration is deficient.
 6. ☐ CORRECTED DRAWINGS (as "replacement sheets") must be submitted.
 - (a) ☐ including changes required by the Notice of Draftsperson's Patent Drawing Review (PTO-948) attached
 - 1) ☐ hereto or 2) ☐ to Paper No./Mail Date _____.
 - (b) ☐ including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date _____.
- Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).
7. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

Attachment(s)

1. ☐ Notice of References Cited (PTO-892)
2. ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3. ☒ Information Disclosure Statements (PTO-1449 or PTO/SB/08), Paper No./Mail Date _____
4. ☐ Examiner's Comment Regarding Requirement for Deposit of Biological Material
5. ☐ Notice of Informal Patent Application (PTO-152)
6. ☐ Interview Summary (PTO-413), Paper No./Mail Date _____
7. ☐ Examiner's Amendment/Comment
8. ☐ Examiner's Statement of Reasons for Allowance
9. ☐ Other _____


STEPHEN CHIN
SUPERVISORY PATENT EXAMINE
TECHNOLOGY CENTER 2600



IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re application of: : Paul F. Struhsaker et al.
Application No. : 09/839,719
Filed : April 20, 2001
For : APPARATUS AND METHOD FOR CREATING SIGNAL
AND PROFILES AT A RECEIVING STATION
Group No. : 2634
Examiner : Harry Vartanian

Mail Stop Issue Fee
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

CERTIFICATE OF MAILING BY EXPRESS MAIL

The undersigned hereby certifies that the following documents:

- 1) Part B Issue Fee Transmittal (in duplicate);
- 2) Check in the amount of \$1,030.00 for issue fee (\$700.00), publication fee (\$300.00) and soft copies of patent (\$30.00);
- 3) Fee Transmittal for FY 2005 (in duplicate);
- 4) Letter to Official Draftsman;
- 5) Five (5) sheets of replacement drawings; and
- 6) A Postcard receipt

relating to the above application, were deposited as "Express Mail", Label No. EV640160554US with the United States Postal Service, addressed to: Mail Stop Issue Fee, Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450, on Aug. 17, 2005.

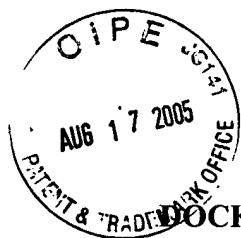
Date: 8/17/05

Kathy Cedar
Mailer

Date: Aug. 17, 2005

William A. Munck
William A. Munck
Reg. No. 39,308

P.O. Drawer 800889
Dallas, Texas 75380
Phone: (972) 628-3600
Fax: (972) 628-3616
E-mail: wmunck@davismunck.com



DOCKET NO.: WEST14-00016
Customer No.: 23990

PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Patent Application of : Paul F. Struhsaker et al.
Application No. : 09/839,719
Filing Date: : April 20, 2001
Title : APPARATUS AND METHOD FOR CREATING SIGNAL
AND PROFILES AT A RECEIVING STATION
Group Art Unit : 2634
Examiner : Harry Vartanian

Mail Stop Issue Fee
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

LETTER TO OFFICIAL DRAFTSMAN

In response to the Notice of Allowance mailed May 17, 2005, Applicant submits five (5) sheets of formal drawings (Figures 1-5) in the above-identified patent application.

Respectfully submitted,

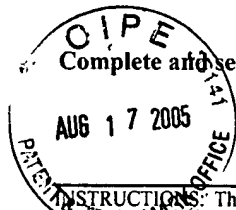
DAVIS MUNCK, P.C.

Date: Aug. 17, 2005

William A. Munck
Registration No. 39,308

P.O. Drawer 800889
Dallas, Texas 75380
Tel: (972) 628-3600
Fax: (972) 628-3616
Email: wmunck@davismunck.com

PART B - FEE(S) TRANSMITTAL



Complete and send this form, together with applicable fee(s), to: **Mail**

**Mail Stop ISSUE FEE
Commissioner for Patents
P.O. Box 1450
Alexandria, Virginia 22313-1450**

or **Fax** (703) 746-4000

INSTRUCTIONS: This form should be used for transmitting the ISSUE FEE and PUBLICATION FEE (if required). Blocks 1 through 5 should be completed with appropriate information. All further correspondence including the Patent, advance orders and notification of maintenance fees will be mailed to the current correspondence address indicated unless corrected below or directed otherwise in Block 1, by (a) specifying a new correspondence address; and/or (b) indicating a separate "FEE ADDRESS" maintenance fee notifications.

CURRENT CORRESPONDENCE ADDRESS (Note: Use Block 1 for any change of address)

23990 7590 05/17/2005

DOCKET CLERK
P.O. DRAWER 800889
DALLAS, TX 75380

08/19/2005 MBELETE2 00000012 09839719

01 FC:1504 300.00 OP
02 FC:8001 30.00 OP
03 FC:2501 700.00 OP

Note: A certificate of mailing can only be used for domestic mailings of Fee(s) Transmittal. This certificate cannot be used for any other accompanying papers. Each additional paper, such as an assignment or formal drawing, must have its own certificate of mailing or transmission.

Certificate of Mailing or Transmission

I hereby certify that this Fee(s) Transmittal is being deposited with the United States Postal Service with sufficient postage for first class mail in an envelope addressed to the Mail Stop ISSUE FEE address above, or being facsimile transmitted to the USPTO (703) 746-4000, on the date indicated below.

KATHY CEDOR	(Depositor's name)
Kathy Cedor	(Signature)
8/17/05	(Date)

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/839,719	04/20/2001	Paul F. Struhsaker	WEST14-00016	1196

TITLE OF INVENTION: APPARATUS AND METHOD FOR CREATING SIGNAL AND PROFILES AT A RECEIVING STATION

APPLN. TYPE	SMALL ENTITY	ISSUE FEE	PUBLICATION FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	NO	\$1400	\$300	\$1700	08/17/2005

EXAMINER	ART UNIT	CLASS-SUBCLASS
VARTANIAN, HARRY	2634	375-222000

1. Change of correspondence address or indication of "Fee Address" (37 CFR 1.363).

- ☐ Change of correspondence address (or Change of Correspondence Address form PTO/SB/122) attached.
- ☐ "Fee Address" indication (or "Fee Address" Indication form PTO/SB/47; Rev 03-02 or more recent) attached. Use of a Customer Number is required.

2. For printing on the patent front page, list

- (1) the names of up to 3 registered patent attorneys or agents OR, alternatively,
- (2) the name of a single firm (having as a member a registered attorney or agent) and the names of up to 2 registered patent attorneys or agents. If no name is listed, no name will be printed.

1 _____

2 _____

3 _____

3. ASSIGNEE NAME AND RESIDENCE DATA TO BE PRINTED ON THE PATENT (print or type)

PLEASE NOTE: Unless an assignee is identified below, no assignee data will appear on the patent. If an assignee is identified below, the document has been filed for recordation as set forth in 37 CFR 3.11. Completion of this form is NOT a substitute for filing an assignment.

(A) NAME OF ASSIGNEE

Raze Technologies, Inc.

(B) RESIDENCE: (CITY and STATE OR COUNTRY)

Plano, Texas

Please check the appropriate assignee category or categories (will not be printed on the patent): ☐ Individual ☒ Corporation or other private group entity ☐ Government

4a. The following fee(s) are enclosed:

- ☒ Issue Fee
- ☒ Publication Fee (No small entity discount permitted)
- ☒ Advance Order - # of Copies 10

4b. Payment of Fee(s):

- ☒ A check in the amount of the fee(s) is enclosed.
- ☐ Payment by credit card. Form PTO-2038 is attached.
- ☒ The Director is hereby authorized to charge the required fee(s), or credit any overpayment Deposit Account Number 50-0208 (enclose an extra copy of this form).

5. Change in Entity Status (from status indicated above)

- ☒ a. Applicant claims SMALL ENTITY status. See 37 CFR 1.27. ☐ b. Applicant is no longer claiming SMALL ENTITY status. See 37 CFR 1.27(g)(2).

The Director of the USPTO is requested to apply the Issue Fee and Publication Fee (if any) or to re-apply any previously paid issue fee to the application identified above. NOTE: The Issue Fee and Publication Fee (if required) will not be accepted from anyone other than the applicant; a registered attorney or agent; or the assignee or other party interest as shown by the records of the United States Patent and Trademark Office.

Authorized Signature

William A. Munck

Date

Aug. 17, 2005

Typed or printed name

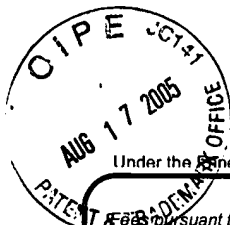
William A. Munck

Registration No.

39,308

This collection of information is required by 37 CFR 1.311. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, Virginia 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 14 Alexandria, Virginia 22313-1450.

Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.



Effective on 12/08/2004.

Pursuant to the Consolidated Appropriations Act, 2005 (H.R. 4818).

**FEE TRANSMITTAL
For FY 2005**☒ Applicant claims small entity status. See 37 CFR 1.27**TOTAL AMOUNT OF PAYMENT** (\$) 1,030.00**Complete if Known**

Application Number	09/839,719
Filing Date	April 20, 2001
First Named Inventor	Paul F. Struhsaker
Examiner Name	Harry Vartanian
Art Unit	2634
Attorney Docket No.	WEST14-00016

METHOD OF PAYMENT (check all that apply)☒ Check ☐ Credit Card ☐ Money Order ☐ None ☐ Other (please identify): _____☒ Deposit Account Deposit Account Number: 50-0208 Deposit Account Name: Davis Munck, P.C.

For the above-identified deposit account, the Director is hereby authorized to: (check all that apply)

☐ Charge fee(s) indicated below ☐ Charge fee(s) indicated below, **except for the filing fee**☒ Charge any additional fee(s) or underpayments of fee(s) under 37 CFR 1.16 and 1.17 ☒ Credit any overpayments**WARNING:** Information on this form may become public. Credit card information should not be included on this form. Provide credit card information and authorization on PTO-2038.**FEE CALCULATION****1. BASIC FILING, SEARCH, AND EXAMINATION FEES**

Application Type	FILING FEES		SEARCH FEES		EXAMINATION FEES		Fees Paid (\$)
	Fee (\$)	Small Entity Fee (\$)	Fee (\$)	Small Entity Fee (\$)	Fee (\$)	Small Entity Fee (\$)	
Utility	300	150	500	250	200	100	
Design	200	100	100	50	130	65	
Plant	200	100	300	150	160	80	
Reissue	300	150	500	250	600	300	
Provisional	200	100	0	0	0	0	

2. EXCESS CLAIM FEES

Fee Description	Fee (\$)	Small Entity Fee (\$)
Each claim over 20 or, for Reissues, each claim over 20 and more than in the original patent	50	25
Each independent claim over 3 or, for Reissues, each independent claim more than in the original patent	200	100
Multiple dependent claims	360	180

Total Claims	Extra Claims	Fee (\$)	Fee Paid (\$)	Multiple Dependent Claims	Fee (\$)	Fee Paid (\$)
_____ - 20 or HP = _____ x _____ = _____						
HP = highest number of total claims paid for, if greater than 20						
Indep. Claims	Extra Claims	Fee (\$)	Fee Paid (\$)			
_____ - 3 or HP = _____ x _____ = _____						
HP = highest number of independent claims paid for, if greater than 3						

3. APPLICATION SIZE FEE

If the specification and drawings exceed 100 sheets of paper, the application size fee due is \$250 (\$125 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s).

Total Sheets	Extra Sheets	Number of each additional 50 or fraction thereof	Fee (\$)	Fee Paid (\$)
_____ - 100 = _____ / 50 = _____ (round up to a whole number) x _____ = _____				

4. OTHER FEE(S)

Non-English Specification, \$130 fee (no small entity discount)

Other: Issue Fee (\$700), publication fee (\$300) and copies of patent (\$30)

Fees Paid (\$)

\$1,030.00

SUBMITTED BY

Signature	<i>W.A. Munck</i>	Registration No. (Attorney/Agent)	39,308	Telephone	972-628-3600
Name (Print/Type)	William A. Munck	Date	Aug 17, 2005		

This collection of information is required by 37 CFR 1.136. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 30 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.

If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.



1/5

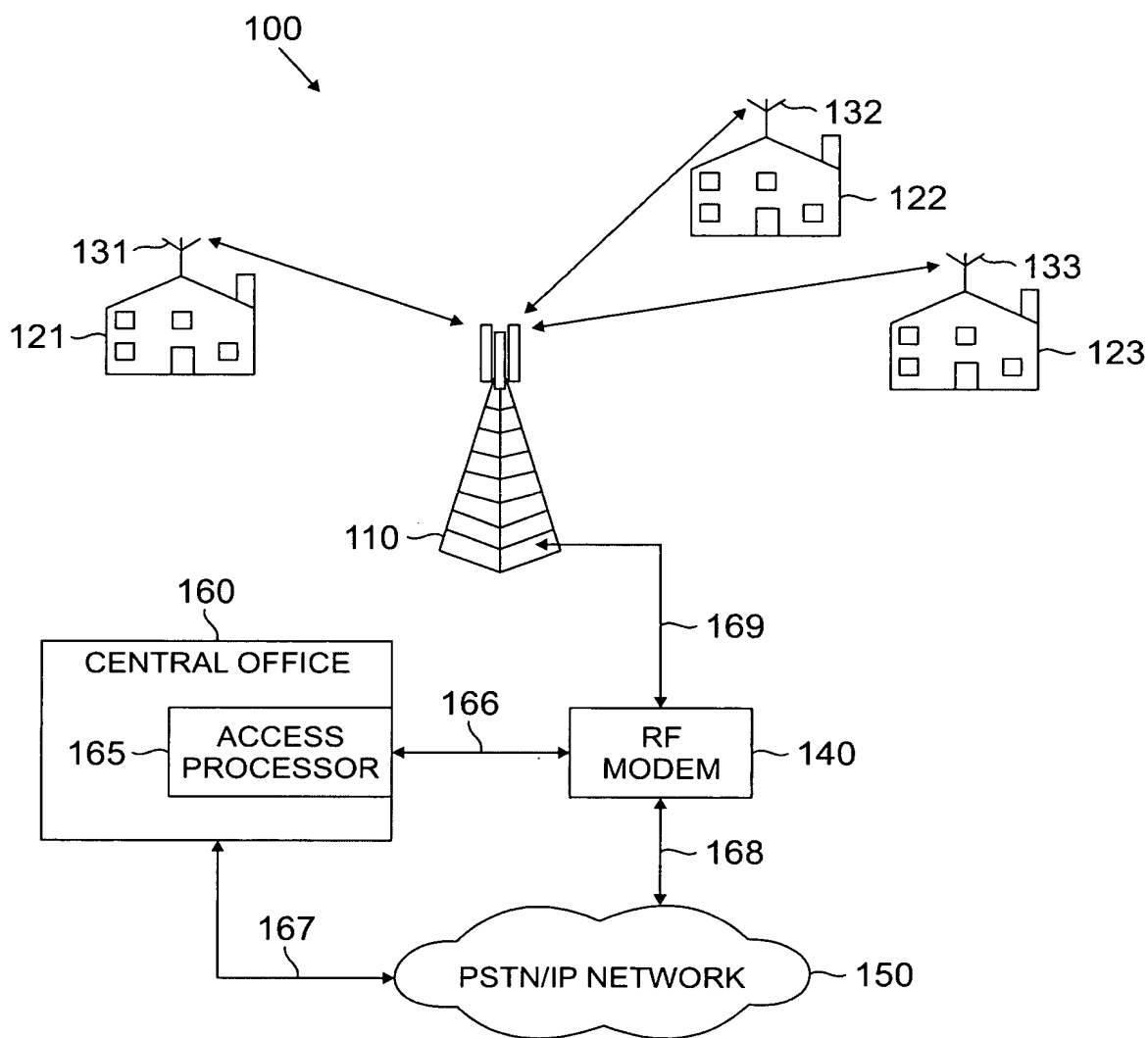


FIG. 1



Docket No.: WEST14-00016
Applicant: Paul F. Struhsaker et al.
Application No.: 09/839,719
Filing Date: April 20, 2001

REPLACEMENT

2/5

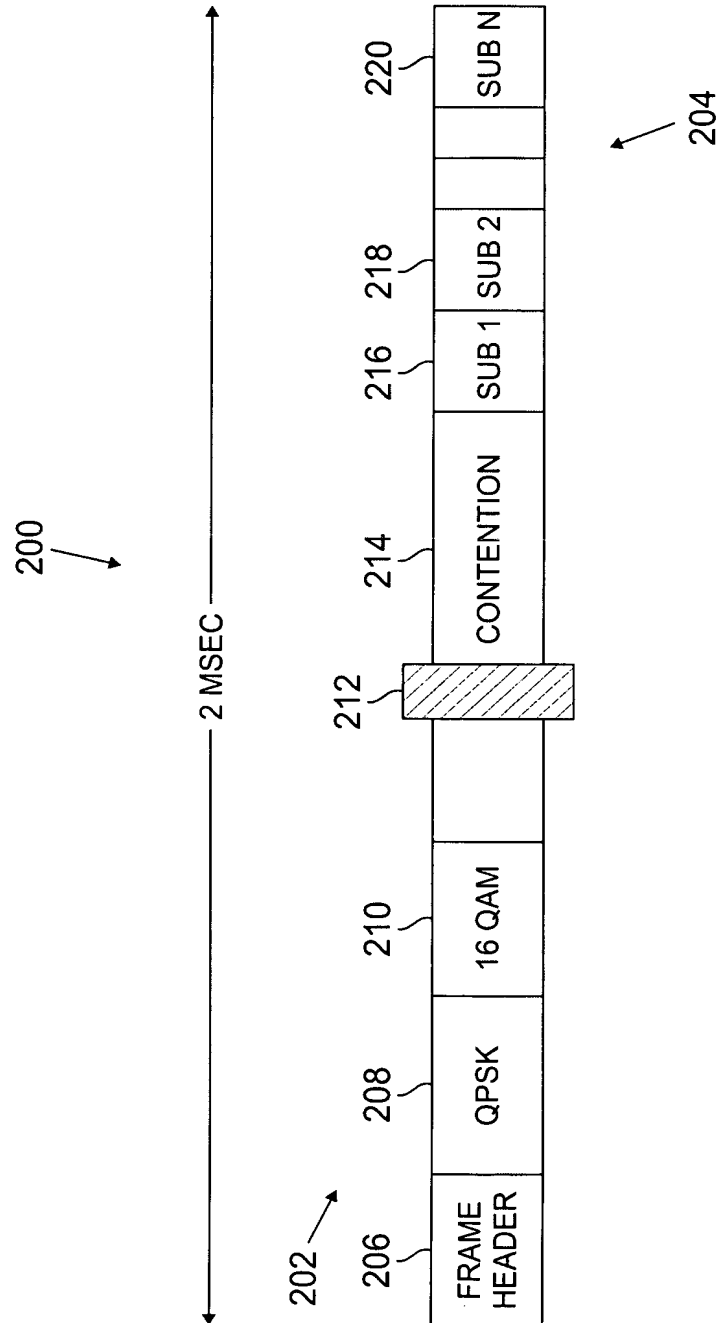


FIG. 2



3/5

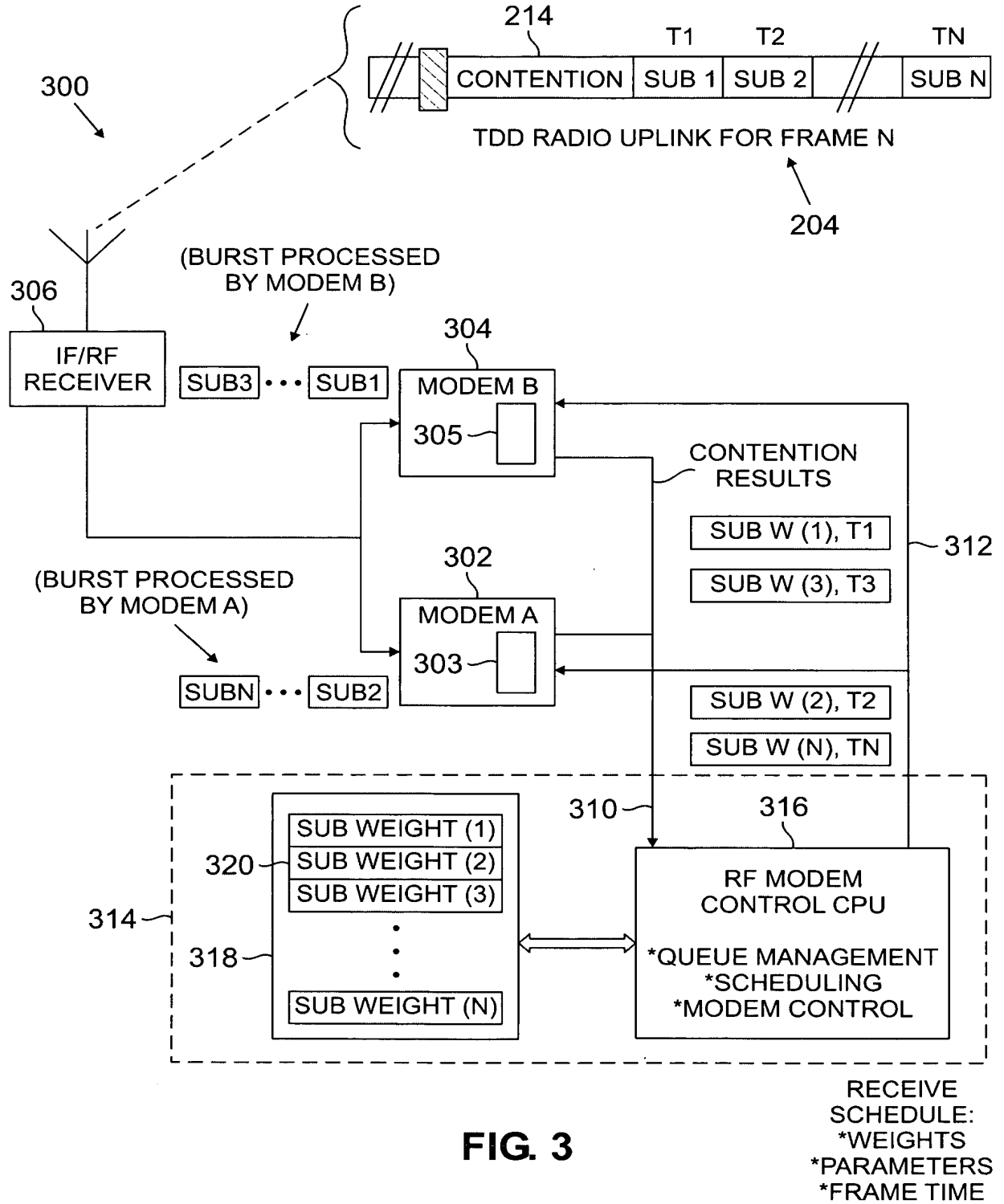


FIG. 3



4/5

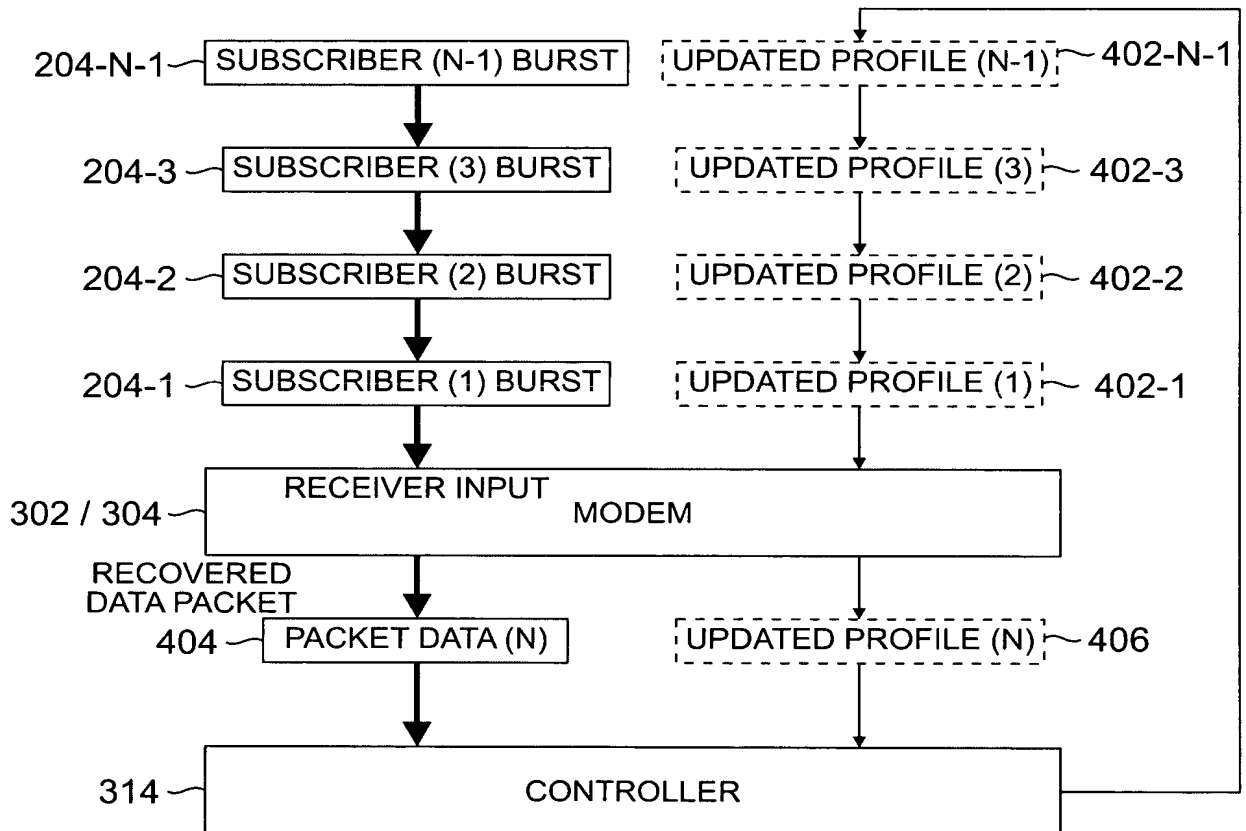


FIG. 4



5/5

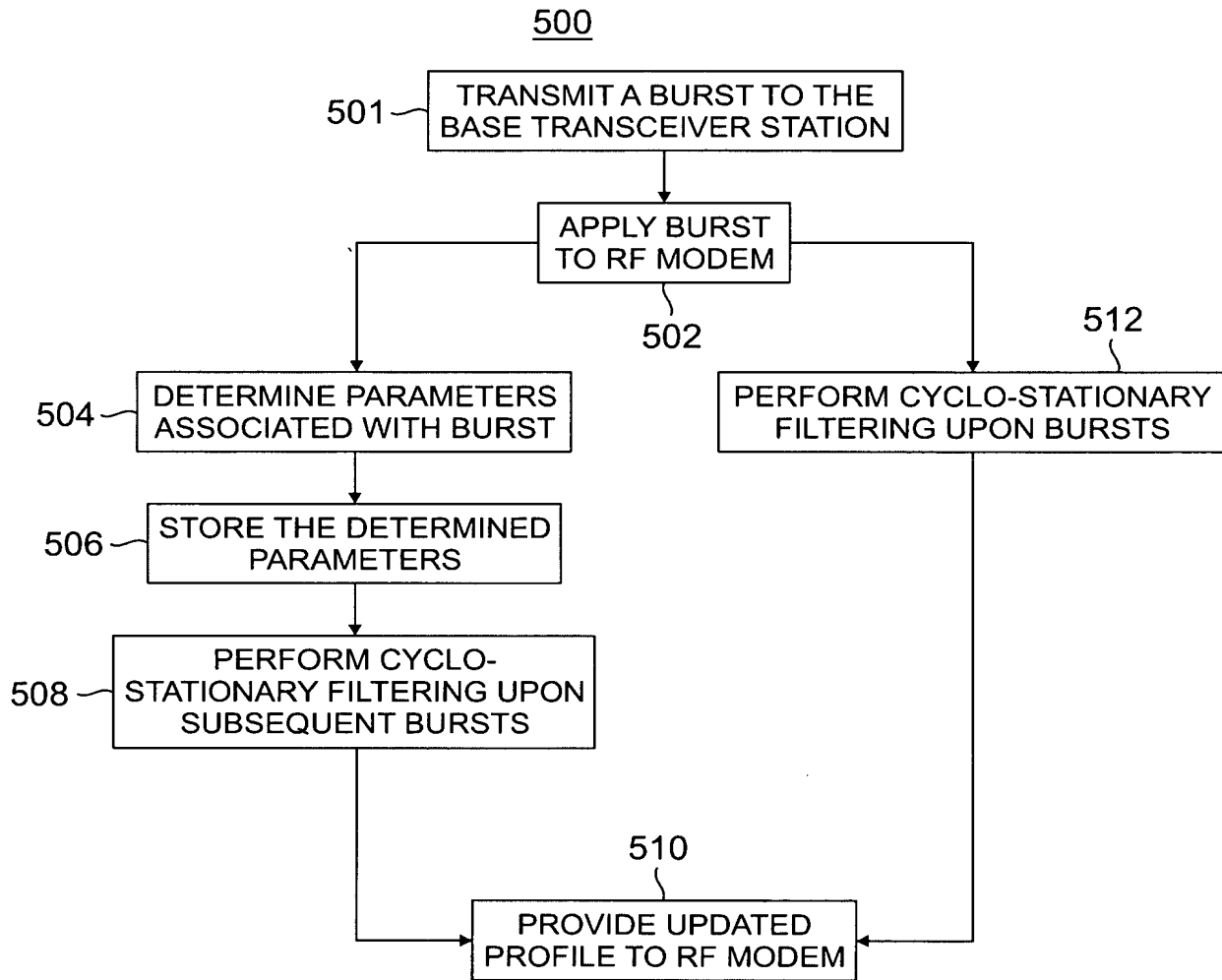


FIG. 5

Electronic Acknowledgement Receipt

EFS ID:	4441899
Application Number:	09839719
International Application Number:	
Confirmation Number:	1196
Title of Invention:	APPARATUS AND METHOD FOR CREATING SIGNAL AND PROFILES AT A RECEIVING STATION
First Named Inventor/Applicant Name:	Paul F. Struhsaker
Customer Number:	23990
Filer:	John Mockler/Keith Woods
Filer Authorized By:	John Mockler
Attorney Docket Number:	WEST14-00016
Receipt Date:	11-DEC-2008
Filing Date:	20-APR-2001
Time Stamp:	19:11:21
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	no
------------------------	----

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Petition to withdraw attorney or agent (SB83)	WithdrawalAsAttorney.pdf	285123 0aa4cd3f4979578e0f35c92c2e5c2d53fcaf64b8	no	4

Warnings:

Information:

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

New Applications Under 35 U.S.C. 111

If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371

If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office

If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

DOCKET NO.: WEST14-00016
CUSTOMER NO.: 23990

PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re application of: : Paul F. Struhsaker, et al.
U.S. Patent No. : 6,947,477
Issued : September 20, 2005
Application No. : 09/839,719
Filed : April 20, 2001
For : APPARATUS AND METHOD FOR CREATING
SIGNAL AND PROFILES AT A RECEIVING STATION
Art Unit : 2634
Examiner : Harry Vartanian
Confirmation No. : 1196

Commissioner for Patents
P.O. Box 1450
Alexandria, Virginia 22313-1450

Sir:

**REQUEST FOR WITHDRAWAL AS ATTORNEY OR AGENT AND
CHANGE OF CORRESPONDENCE ADDRESS**

The undersigned attorney, on behalf of and including the attorneys/agents associated with Customer No. 23990, hereby withdraw as attorneys or agents in connection with the above-identified matter.

The reasons for withdrawal are that the Owner/Applicant (1) has effectively discharged the practitioners by failing to respond and communicate with practitioners to reasonable requests concerning representation and/or (2) has failed to pay one or more bills rendered by the practitioners for an unreasonable period of time and/or has knowingly and freely assented to termination of the employment.

Accordingly, the practitioners believe that no further action on the part of the practitioners is necessary for withdrawal. However, as a precautionary matter, the practitioners have taken reasonable steps to avoid any foreseeable prejudice to the rights of the Owner/Applicant, including having performed the following:

- Given due notice to the Owner/Applicant that the practitioners are withdrawing from representation in this matter and have filed, or will be filing, the necessary papers with the Patent & Trademark Office,
- Delivered to the Owner/Applicant all papers and property to which the Owner/Applicant is entitled, or requesting instructions from the Owner/Applicant regarding disposition of the Owner/Applicant's files; and
- Notified the Owner/Applicant of any responses that may be due and the time frame within which Owner/Applicant must respond.

Please address all future correspondence to:

Mr. Michael S. Hynek
17519 Muirfield Drive
Dallas, Texas 75287

Respectfully submitted,

MUNCK CARTER, P.C.

Date: 11 Dec. 2009



John T. Mockler
Reg. No. 39,775

Docket Clerk
P.O. Drawer 800889
Dallas, Texas 75380
Phone: (972) 628-3600
Fax: (972) 628-3616
Email: jmockler@munckcarter.com

Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

**REQUEST FOR WITHDRAWAL
AS ATTORNEY OR AGENT
AND CHANGE OF
CORRESPONDENCE ADDRESS**

Patent Number	6,947,477
Issue Date	September 20, 2005
First Named Inventor	Paul F. Struhsaker
Art Unit	2634
Examiner Name	Harry Vartanian
Attorney Docket Number	WEST14-00016

To: Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Please withdraw me as attorney or agent for the above identified patent application, and

- ☐ all the practitioners of record;
- ☐ the practitioners (with registration numbers) of record listed on the attached paper(s); or
- ☒ the practitioners of record associated with Customer Number: 23990

NOTE: The immediately preceding box should only be marked when the practitioners were appointed using the listed Customer Number.

The reason(s) for this request are those described in 37 CFR :

- | | | | |
|---|---|--|--|
| ☐ 10.40(b)(1) | ☐ 10.40(b)(2) | ☐ 10.40(b)(3) | ☐ 10.40(b)(4) |
| ☐ 10.40(c)(1)(i) | ☐ 10.40(c)(1)(ii) | ☐ 10.40(c)(1)(iii) | ☐ 10.40(c)(1)(iv) |
| ☐ 10.40(c)(1)(v) | ☒ 10.40(c)(1)(vi) | ☐ 10.40(c)(2) | ☐ 10.40(c)(3) |
| ☐ 10.40(c)(4) | ☐ 10.40(c)(5) | ☐ 10.40(c)(6) Please explain below: | |

Certifications

Check each box below that is factually correct. WARNING: If a box is left unchecked, the request will likely not be approved.

- ☒ I/We have given reasonable notice to the client, prior to the expiration of the response period, that the practitioner(s) intend to withdraw from employment.
- ☒ I/We have delivered to the client or a duly authorized representative of the client all papers and property (including funds) to which the client is entitled.
- ☒ I/We have notified the client of any responses that may be due and the time frame within which the client must respond.

Please provide an explanation, if necessary:

Please see attachment.

[Page 1 of 2]

This collection of information is required by 37 CFR 1.36. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.

Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

REQUEST FOR WITHDRAWAL AS ATTORNEY OR AGENT AND CHANGE OF CORRESPONDENCE ADDRESS

Complete the following section only when the correspondence address will change. *Changes of address will only be accepted to an inventor or an assignee that has properly made itself of record pursuant to 37 CFR 3.71.*

Change the correspondence address and direct all future correspondence to:

A. ☐ The address of the inventor or assignee associated with Customer Number: _____

OR

B. ☒ Inventor or
Assignee name Michael S. Hynek

Address 17519 Muirfield Drive

City Dallas	State Texas	Zip 75287	Country USA
-------------	-------------	-----------	-------------

Telephone	Email
-----------	-------

I am authorized to sign on behalf of myself and all withdrawing practitioners.

Signature

John T. Mockler

Name

John T. Mockler

Registration No. 39,775

Address 600 Banner Place, 12770 Coit Road

City Dallas	State Texas	Zip 75251	Country USA
-------------	-------------	-----------	-------------

Date

11 Dec. 2008

Telephone No. 972-628-3600

NOTE: Withdrawal is effective when approved rather than when received.

[Page 2 of 2]

This collection of information is required by 37 CFR 1.36. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.

If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.

Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number

**PETITION TO ACCEPT UNINTENTIONALLY DELAYED PAYMENT OF
MAINTENANCE FEE IN AN EXPIRED PATENT (37 CFR 1.378 (c))**

Docket Number (Optional)

Mail to: Mail Stop Petition
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450
Fax: (571) 273-8300

NOTE: If information or assistance is needed in completing this form, please contact Petitions Information at (571) 272-3282.

Patent No. 6947477

Application Number 09839719

Issue Date 9/20/2005

Filing Date 4/20/2001

CAUTION: Maintenance fee (and surcharge, if any) payment must correctly identify: (1) the patent number (or reissue patent number, if a reissue) and (2) the application number of the actual U.S. application (or reissue application) leading to issuance of that patent to ensure the fee(s) is/are associated with the correct patent. 37 CFR 1.366(c) and (d).

Also complete the following information, if applicable

The above – identified patent

☐ Is a reissue of original Patent No. _____ original issue date _____
original application number _____
original filing date _____

☐ resulted from the entry into the U.S. under 35 U.S.C. 371 of international application _____
filed on _____

CERTIFICATE OF MAILING (37 CFR 1.89(a))

I hereby certify that this paper (*along with any paper referred to as being attached or enclosed) is being deposited with the United States Postal Service on the date shown below with sufficient postage as first class main in an envelope addressed to Mail Stop Petition, Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450, or facsimile transmitted to the U.S. Patent and Trademark Office on the date shown below.

Date

Signature

Typed or Printed Name of Person Signing Certificate

[page 1 of 3]

This collection of information is required by 37 CFR 1.378(c). The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to take 1 hour to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, Virginia 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Mail Stop Petition, Commissioner for Patents, P.O. Box 1450, Alexandria, Virginia 22313-1450**

If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.

Ex.1002.00228

1. SMALL ENTITY

☒ Patentee claims, or has previously claimed, small entity status. See 37 CFR 1.27.

2. LOSS OF ENTITLEMENT TO SMALL ENTITY STATUS

☐ Patentee is no longer entitled to small entity status. See 37 CFR 1.27(g)

3. MAINTENANCE FEE (37 CFR 1.20(e)-(g))

The appropriate maintenance fee must be submitted with this petition, unless it was paid earlier.

NOT Small Entity			Small Entity		
Amount	Fee	(Code)	Amount	Fee	(Code)
☐ \$ _____	3 ½ yr fee	(1551)	☒ \$ 490	3 ½ yr fee	(2551)
☐ \$ _____	7 ½ yr fee	(1552)	☐ \$ _____	7 ½ yr fee	(2552)
☐ \$ _____	11 ½ yr fee	(1553)	☐ \$ _____	11 ½ yr fee	(2553)

MAINTENANCE FEE BEING SUBMITTED \$ 490

4. SURCHARGE

The surcharge required by 37 CFR 1.20(i)(2) of \$ 1640 (Fee Code 1558) must be paid as a condition of accepting unintentionally delayed payment of a maintenance fee.

SURCHARGE FEE BEING SUBMITTED \$ 1640

5. MANNER OF PAYMENT

☐ Enclosed is a check for the sum of \$ _____

☒ Please charge Deposit Account No. 50-4207 the sum of \$ 2130

☐ Payment by credit card. Form PTO-2038 is attached.

6. AUTHORIZATION TO CHARGE ANY FEE DEFICIENCY

☒ The Director is hereby authorized to charge any maintenance fee, surcharge or petition deficiency to Deposit Account No. 50-4207

Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number

7. OVERPAYMENT

As to any overpayment made please

OR

Credit to Deposit Account No. 50-4207

Send refund check

WARNING:

Petitioner/applicant is cautioned to avoid submitting personal information in documents filed in a patent application that may contribute to identity theft. Personal information such as social security numbers, bank account numbers, or credit card numbers (other than a check or credit card authorization form PTO-2038 submitted for payment purposes) is never required by the USPTO to support a petition or an application. If this type of personal information is included in documents submitted to the USPTO, petitioners/applicants should consider redacting such personal information from the documents before submitting them to the USPTO. Petitioner/applicant is advised that the record of a patent application is available to the public after publication of the application (unless a non-publication request in compliance with 37 CFR 1.213(a) is made in the application or issuance of a patent. Furthermore, the record from an abandoned application may also be available to the public if the application is referenced in a published application or an issued patent (see 37 CFR 1.14). Checks and credit card authorization forms PTO-2038 submitted for payment purposes are not retained in the application file and therefore are not publicly available.

8. STATEMENT

The delay in payment of the maintenance fee to this patent was unintentional.

9. PETITIONER(S) REQUEST THAT THE DELAYED PAYMENT OF THE MAINTENANCE FEE BE ACCEPTED AND THE PATENT REINSTATED

/Matthew T Byrne/

Signature(s) of Petitioner(s)

4/26/2010

Date

Matthew T Byrne

Typed or printed name(s)

40934

Registration Number, if applicable

212-931-8560

Telephone Number

Byrne Poh LLP

Address

11 Broadway, Ste 865, New York, NY 10004

Address

37 CFR 1.378(d) states: "Any petition under this section must be signed by an attorney or agent registered to practice before the Patent and Trademark Office, or by the patentee, the assignee, or other party in interest."

ENCLOSURES



Maintenance Fee Payment



Surcharge under 37 CFR 1.20(i)(2) (fee for filing the maintenance fee petition)



Privacy Act Statement

The Privacy Act of 1974 (P.L. 93-579) requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. Accordingly, pursuant to the requirements of the Act, please be advised that: (1) the general authority for the collection of this information is 35 U.S.C. 2(b)(2); (2) furnishing of the information solicited is voluntary; and (3) the principal purpose for which the information is used by the U.S. Patent and Trademark Office is to process and/or examine your submission related to a patent application or patent. If you do not furnish the requested information, the U.S. Patent and Trademark Office may not be able to process and/or examine your submission, which may result in termination of proceedings or abandonment of the application or expiration of the patent.

The information provided by you in this form will be subject to the following routine uses:

1. The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C. 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether disclosure of these records is required by the Freedom of Information Act.
2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.
3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.
4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).
5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.
6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).
7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (i.e., GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.
8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspection or an issued patent.
9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

Electronic Acknowledgement Receipt

EFS ID:	7492503
Application Number:	09839719
International Application Number:	
Confirmation Number:	1196
Title of Invention:	APPARATUS AND METHOD FOR CREATING SIGNAL AND PROFILES AT A RECEIVING STATION
First Named Inventor/Applicant Name:	Paul F. Struhsaker
Customer Number:	23990
Filer:	Matthew T. Byrne
Filer Authorized By:	
Attorney Docket Number:	WEST14-00016
Receipt Date:	26-APR-2010
Filing Date:	20-APR-2001
Time Stamp:	20:43:55
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	no
------------------------	----

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Petition for review by the Office of Petitions.	6947477_sb0066.pdf	520665 871e5b8d5058ead9e4b135a2647d7d5ee4757d51	no	4

Warnings:

Information:

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

New Applications Under 35 U.S.C. 111

If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371

If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office

If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number

**PETITION TO ACCEPT UNINTENTIONALLY DELAYED PAYMENT OF
MAINTENANCE FEE IN AN EXPIRED PATENT (37 CFR 1.378 (c))**

Docket Number (Optional)

Mail to: Mail Stop Petition
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450
Fax: (571) 273-8300

NOTE: If information or assistance is needed in completing this form, please contact Petitions Information at (571) 272-3282.

Patent No. 6947477

Application Number 09839719

Issue Date 9/20/2005

Filing Date 4/20/2001

CAUTION: Maintenance fee (and surcharge, if any) payment must correctly identify: (1) the patent number (or reissue patent number, if a reissue) and (2) the application number of the actual U.S. application (or reissue application) leading to issuance of that patent to ensure the fee(s) is/are associated with the correct patent. 37 CFR 1.366(c) and (d).

Also complete the following information, if applicable

The above – identified patent

☐

Is a reissue of original Patent No. _____ original issue date _____

original application number _____

original filing date _____

☐

resulted from the entry into the U.S. under 35 U.S.C. 371 of international application _____

filed on _____

CERTIFICATE OF MAILING (37 CFR 1.89(a))

I hereby certify that this paper (*along with any paper referred to as being attached or enclosed) is being deposited with the United States Postal Service on the date shown below with sufficient postage as first class main in an envelope addressed to Mail Stop Petition, Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450, or facsimile transmitted to the U.S. Patent and Trademark Office on the date shown below.

Date

Signature

Typed or Printed Name of Person Signing Certificate

07/02/2010 CKHLUK 00000007 504207 6947477

01 FC:2551 490.00 DA

02 FC:1558 1640.00 DA

[page 1 of 3]

This collection of information is required by 37 CFR 1.378(c). The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to take 1 hour to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, Virginia 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Mail Stop Petition, Commissioner for Patents, P.O. Box 1450, Alexandria, Virginia 22313-1450

If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.

Ex.1002.00234

Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number

1. SMALL ENTITY

☒ Patentee claims, or has previously claimed, small entity status. See 37 CFR 1.27.

2. LOSS OF ENTITLEMENT TO SMALL ENTITY STATUS

☐ Patentee is no longer entitled to small entity status. See 37 CFR 1.27(g)

3. MAINTENANCE FEE (37 CFR 1.20(e)-(g))

The appropriate maintenance fee must be submitted with this petition, unless it was paid earlier.

NOT Small Entity			Small Entity		
Amount	Fee	(Code)	Amount	Fee	(Code)
☐ \$ _____	3 ½ yr fee	(1551)	☒ \$ 490	3 ½ yr fee	(2551)
☐ \$ _____	7 ½ yr fee	(1552)	☐ \$ _____	7 ½ yr fee	(2552)
☐ \$ _____	11 ½ yr fee	(1553)	☐ \$ _____	11 ½ yr fee	(2553)

MAINTENANCE FEE BEING SUBMITTED \$ 490

4. SURCHARGE

The surcharge required by 37 CFR 1.20(i)(2) of \$ 1640 (Fee Code 1558) must be paid as a condition of accepting unintentionally delayed payment of a maintenance fee.

SURCHARGE FEE BEING SUBMITTED \$ 1640

5. MANNER OF PAYMENT

☐ Enclosed is a check for the sum of \$ _____

☒ Please charge Deposit Account No. 50-4207 the sum of \$ 2130

☐ Payment by credit card. Form PTO-2038 is attached.

6. AUTHORIZATION TO CHARGE ANY FEE DEFICIENCY

☒ The Director is hereby authorized to charge any maintenance fee, surcharge or petition deficiency to Deposit Account No. 50-4207

Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number

7. OVERPAYMENT

As to any overpayment made please

- OR ☒ Credit to Deposit Account No. 50-4207
- ☐ Send refund check

WARNING:

Petitioner/applicant is cautioned to avoid submitting personal information in documents filed in a patent application that may contribute to identity theft. Personal information such as social security numbers, bank account numbers, or credit card numbers (other than a check or credit card authorization form PTO-2038 submitted for payment purposes) is never required by the USPTO to support a petition or an application. If this type of personal information is included in documents submitted to the USPTO, petitioners/applicants should consider redacting such personal information from the documents before submitting them to the USPTO. Petitioner/applicant is advised that the record of a patent application is available to the public after publication of the application (unless a non-publication request in compliance with 37 CFR 1.213(a) is made in the application or issuance of a patent. Furthermore, the record from an abandoned application may also be available to the public if the application is referenced in a published application or an issued patent (see 37 CFR 1.14). Checks and credit card authorization forms PTO-2038 submitted for payment purposes are not retained in the application file and therefore are not publicly available.

8. STATEMENT

The delay in payment of the maintenance fee to this patent was unintentional.

9. PETITIONER(S) REQUEST THAT THE DELAYED PAYMENT OF THE MAINTENANCE FEE BE ACCEPTED AND THE PATENT REINSTATED

<u>/Matthew T Byrne/</u>	<u>4/26/2010</u>
Signature(s) of Petitioner(s)	Date
<u>Matthew T Byrne</u>	<u>40934</u>
Typed or printed name(s)	Registration Number, if applicable
<u>212-931-8560</u>	
Telephone Number	
<u>Byrne Poh LLP</u>	
	Address
<u>11 Broadway, Ste 865, New York, NY 10004</u>	
	Address

37 CFR 1.378(d) states: "Any petition under this section must be signed by an attorney or agent registered to practice before the Patent and Trademark Office, or by the patentee, the assignee, or other party in interest."

ENCLOSURES

- ☒ Maintenance Fee Payment
- ☒ Surcharge under 37 CFR 1.20(i)(2) (fee for filing the maintenance fee petition)
- ☐ _____



UNITED STATES PATENT AND TRADEMARK OFFICE

Commissioner for Patents
United States Patent and Trademark Office
P.O. Box 1450
Alexandria, VA 22313-1450
www.uspto.gov

MAILED

JUL 06 2010
OFFICE OF PETITIONS

DOCKET CLERK
P.O. DRAWER 800889
DALLAS TX 75380

In re Patent No. 6,947,477
Issue Date: September 20, 2005
Application No.: 09/839,719
Filed: August 20, 2001
Attorney Docket No.: WEST14-00016

ON PETITION

This is a decision on the petition, filed April 26, 2010, under 37 CFR 1.378(c) to accept the unintentionally delayed payment of the 3.5-year maintenance fee for the above-identified patent.

The petition is **GRANTED**.

The patent issued September 20, 2005. The grace period for paying the 3.5 year maintenance fee expired at midnight September 21, 2009. Therefore, since the petition was filed within twenty-four months after the six-month grace period provided in 37 CFR 1.362(e), this petition was timely filed under the provisions of 37 CFR 1.378(c).

Accordingly, the maintenance fee in this case of \$490.00 along with the surcharge of \$1640.00 will be charged to deposit account 50-4207 and are accepted. The above-identified patent is hereby reinstated as of the mail date of this decision.

If petitioner desires to receive future correspondence regarding any Maintenance Fee Reminder which may be mailed concerning this patent, a Fee Address should be submitted to Maintenance Fee Division.

Telephone inquiries concerning this matter may be directed to the undersigned at (571) 272-3222.

Kenya A. McLaughlin
Petitions Attorney
Office of Petitions

cc:
Matthew T. Byrne
Byrne Poh LLP
11 Broadway
Suite 865
New York, NY 10004

Electronic Acknowledgement Receipt

EFS ID:	7990117
Application Number:	09839719
International Application Number:	
Confirmation Number:	1196
Title of Invention:	APPARATUS AND METHOD FOR CREATING SIGNAL AND PROFILES AT A RECEIVING STATION
First Named Inventor/Applicant Name:	Paul F. Struhsaker
Customer Number:	23990
Filer:	Matthew T. Byrne
Filer Authorized By:	
Attorney Docket Number:	WEST14-00016
Receipt Date:	11-JUL-2010
Filing Date:	20-APR-2001
Time Stamp:	12:17:16
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	no
------------------------	----

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Power of Attorney	9030101_145_US1_POA.pdf	114331 b7c6e8a56484f183233c10108b04dfa30d509cfa	no	2

Warnings:

Information:

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

New Applications Under 35 U.S.C. 111

If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371

If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office

If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

PATENT - POWER OF ATTORNEY OR REVOCATION OF POWER OF ATTORNEY WITH A NEW POWER OF ATTORNEY AND CHANGE OF CORRESPONDENCE ADDRESS	Patent Number	6,947,477
	Issue Date	9/20/05
	First Named Inventor	Struhsaker
	Title	Apparatus and Method for Creating Signal and Profiles at a Receiving...
	Attorney Docket Number	9030101.145-US1

I hereby revoke all previous powers of attorney given in the above-identified patent.

☐ A Power of Attorney is submitted herewith.

OR

☒ I hereby appoint Practitioner(s) associated with the following Customer Number as my/our attorney(s) or agent(s) with respect to the patent identified above, and to transact all business in the United States Patent and Trademark Office connected therewith:

70763

OR

☐ I hereby appoint Practitioner(s) named below as my/our attorney(s) or agent(s) with respect to the patent identified above, and to transact all business in the United States Patent and Trademark Office connected therewith:

Practitioner(s) Name	Registration Number

Please recognize or change the correspondence address for the above-identified patent to:

☒ The address associated with the above-mentioned Customer Number.

OR

☐ The address associated with Customer Number:

OR

☐ Firm or Individual Name:

Address

City

State

Zip

Country

Telephone

Email

I am the:

☐ Inventor, having ownership of the patent.

OR

☒ Patent owner.

Statement under 37 CFR 3.73(b) (Form PTO/SB/96) submitted herewith or filed on _____

SIGNATURE of Inventor or Patent Owner

Signature

Michael S. Hynek

Date

7-8-10

Name

Michael S. Hynek

Telephone

Title and Company

Manager, Access Solutions, Ltd.

NOTE: Signatures of all the inventors or patent owners of the entire interest or their representative(s) are required. Submit multiple forms if more than one signature is required, see below.☒ *Total of 1 forms are submitted.

This collection of information is required by 37 CFR 1.31, 1.32 and 1.33. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to take 3 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.

If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.

STATEMENT UNDER 37 CFR 3.73(b)Applicant/Patent Owner: Access Solutions, Ltd.Application No./Patent No.: 6,947,477Filed/Issue Date: 9/20/05Titled: Apparatus and Method for Creating Signal and Profiles at a Receiving StationAccess Solutions, Ltd. , a Texas limited partnership

(Name of Assignee)

(Type of Assignee, e.g., corporation, partnership, university, government agency, etc.)

states that it is:

1. ☒ the assignee of the entire right, title, and interest in;
2. ☐ an assignee of less than the entire right, title, and interest in
(The extent (by percentage) of its ownership interest is _____ %); or
3. ☐ the assignee of an undivided interest in the entirety of (a complete assignment from one of the joint inventors was made)

the patent application/patent identified above, by virtue of either:

- A. ☐ An assignment from the inventor(s) of the patent application/patent identified above. The assignment was recorded in the United States Patent and Trademark Office at Reel _____, Frame _____, or for which a copy therefore is attached.

OR

- B. ☒ A chain of title from the inventor(s), of the patent application/patent identified above, to the current assignee as follows:

1. From: P. Struhsaker and R. McKown To: Raze Technologies, Inc.

The document was recorded in the United States Patent and Trademark Office at
Reel 011729, Frame 0634, or for which a copy thereof is attached.

2. From: Raze Technologies, Inc. To: Access Solutions, Ltd.

The document was recorded in the United States Patent and Trademark Office at
Reel 012449, Frame 0730, or for which a copy thereof is attached.

3. From: _____ To: _____

The document was recorded in the United States Patent and Trademark Office at
Reel _____, Frame _____, or for which a copy thereof is attached.

☐ Additional documents in the chain of title are listed on a supplemental sheet(s).

- ☒ As required by 37 CFR 3.73(b)(1)(i), the documentary evidence of the chain of title from the original owner to the assignee was, or concurrently is being, submitted for recordation pursuant to 37 CFR 3.11.

[NOTE: A separate copy (i.e., a true copy of the original assignment document(s)) must be submitted to Assignment Division in accordance with 37 CFR Part 3, to record the assignment in the records of the USPTO. See MPEP 302.08]

The undersigned (whose title is supplied below) is authorized to act on behalf of the assignee.

Michael S. Hynek
Signature

7-8-10
Date

Michael S. Hynek

Manager

Printed or Typed Name

Title

This collection of information is required by 37 CFR 3.73(b). The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.

If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NUMBER	FILING OR 371(C) DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO./TITLE
09/839,719	04/20/2001	Paul F. Struhsaker	9030101.145-US1

CONFIRMATION NO. 1196

POA ACCEPTANCE LETTER



OC000000042603447

Date Mailed: 07/19/2010

70763
Byrne Poh LLP
11 Broadway, Ste 865
New York, NY 10004

NOTICE OF ACCEPTANCE OF POWER OF ATTORNEY

This is in response to the Power of Attorney filed 07/11/2010.

The Power of Attorney in this application is accepted. Correspondence in this application will be mailed to the above address as provided by 37 CFR 1.33.

/skiflemariam/

Office of Data Management, Application Assistance Unit (571) 272-4000, or (571) 272-4200, or 1-888-786-0101



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NUMBER	FILING OR 371(C) DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO./TITLE
09/839,719	04/20/2001	Paul F. Struhsaker	WEST14-00016

23990
DOCKET CLERK
P.O. DRAWER 800889
DALLAS, TX 75380

CONFIRMATION NO. 1196
POWER OF ATTORNEY NOTICE



Date Mailed: 07/19/2010

NOTICE REGARDING CHANGE OF POWER OF ATTORNEY

This is in response to the Power of Attorney filed 07/11/2010.

- The Power of Attorney to you in this application has been revoked by the assignee who has intervened as provided by 37 CFR 3.71. Future correspondence will be mailed to the new address of record(37 CFR 1.33).

/skiflemariam/

Office of Data Management, Application Assistance Unit (571) 272-4000, or (571) 272-4200, or 1-888-786-0101

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of: Paul F. Struhsaker et al. Conf. No.: 1196
Patent No.: 6,947,477 Issued: 9/20/2005
Application No.: 09/839,719 Filed: 4/20/2001
For: APPARATUS AND METHOD FOR CREATING SIGNAL AND PROFILES
AT A RECEIVING STATION

Director of the U.S. Patent and Trademark Office
Attn: Maintenance Fees
2051 Jamieson Avenue, Suite 300
Alexandria, VA 22314

**WRITTEN ASSERTION OF SMALL ENTITY STATUS IN CONNECTION WITH
PAYMENT OF 7.5 YEAR MAINTENANCE FEE**

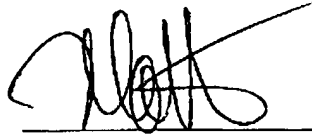
Dear Sir:

Please change the entity status of the above-referenced case from Large Entity to Small Entity. Pursuant to 37 C.F.R. § 1.27(c)(1), Small Entity Status is entitled to be asserted for the above-referenced patent.

In the event that Small Entity Status is not granted in the above-referenced case, the Director is hereby authorized to charge payment for the 7.5 year maintenance fee and the surcharge at the large entity rate to Deposit Account No. 50-4207.

In the event that any other fees are due in this case, the Director is hereby authorized to charge same to Deposit Account No. 50-4207.

Respectfully Submitted,



Matthew T. Byrne
Attorney for Patent Owner and Patentees
Registration No. 40,934

Date: September 20, 2013
Byrne Poh LLP
11 Broadway, Ste 1115
New York, NY 10004

Certificate of Facsimile Transmission

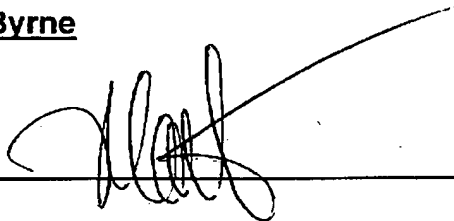
I hereby certify that this correspondence is being facsimile transmitted to the U.S. Patent and Trademark Office (Fax No. (571)273-6500)

on 9/20/2013.

Typed or printed name of person signing this certificate :

Matthew T Byrne

Signature



9/20/2013

POWER OF ATTORNEY TO PROSECUTE APPLICATIONS BEFORE THE USPTO

I hereby revoke all previous powers of attorney given in the application identified in the attached statement under 37 CFR 3.73(b).

I hereby appoint:

☒ Practitioners associated with the Customer Number:

164543

OR

☐ Practitioner(s) named below (if more than ten patent practitioners are to be named, then a customer number must be used):

Name	Registration Number	Name	Registration Number

as attorney(s) or agent(s) to represent the undersigned before the United States Patent and Trademark Office (USPTO) in connection with any and all patent applications assigned only to the undersigned according to the USPTO assignment records or assignment documents attached to this form in accordance with 37 CFR 3.73(b).

Please change the correspondence address for the application identified in the attached statement under 37 CFR 3.73(b) to:

☒ The address associated with Customer Number:

164543

OR

☐ Firm or Individual Name			
Address			
City	State	Zip	
Country			
Telephone	Email		

Assignee Name and Address:

General Access Solutions, Ltd.
3400 Welborn St., #216
Dallas, TX 75219

A copy of this form, together with a statement under 37 CFR 3.73(b) (Form PTO/SB/96 or equivalent) is required to be filed in each application in which this form is used. The statement under 37 CFR 3.73(b) may be completed by one of the practitioners appointed in this form if the appointed practitioner is authorized to act on behalf of the assignee, and must identify the application in which this Power of Attorney is to be filed.

SIGNATURE of Assignee of Record

The individual whose signature and title is supplied below is authorized to act on behalf of the assignee

Signature	/Michael S. Hynek/	Date	September 23, 2019
Name	Michael S. Hynek	Telephone	
Title	Manager of General Access, LLC which is GP of General Access I, Ltd., GP of Applicant		

This collection of information is required by 37 CFR 1.31, 1.32 and 1.33. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to take 3 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.

SCHEDULE A

Docket No.: 000189-0026-101 **Conf. No.:** 1196
Application No.: 09/839,719 **Patent No.:** 6,947,477

Total Assignments: 3

Application #: 09839719 Filing Dt: 04/20/2001 Patent #: 6947477 Issue Dt: 09/20/2005
PCT #: NONE Intl Reg #: Publication #: US20020097685 Pub Dt: 07/25/2002
Inventors: Paul F. Struhsaker, Russell C. McKown
Title: APPARATUS AND METHOD FOR CREATING SIGNAL AND PROFILES AT A RECEIVING STATION

Assignment: 1

Reel/Frame: 011729 / 0634 Received: 05/01/2001 Recorded: 04/20/2001 Mailed: 07/11/2001 Pages: 4

Conveyance: ASSIGNMENT OF ASSIGNORS INTEREST (SEE DOCUMENT FOR DETAILS).

Assignors: STRUHSAKER, PAUL F. Exec Dt: 04/19/2001
MCKOWN, RUSSELL C. Exec Dt: 04/19/2001

Assignee: RAZE TECHNOLOGIES, INC.
2540 EAST PLANO PARKWAY, SUITE 188
PLANO, TEXAS 75074

Assignment: 2

Reel/Frame: 012449 / 0730 Received: 01/15/2002 Recorded: 01/10/2002 Mailed: 03/06/2002 Pages: 8

Conveyance: ASSIGNMENT OF ASSIGNORS INTEREST (SEE DOCUMENT FOR DETAILS).

Assignor: RAZE TECHNOLOGIES, INC. Exec Dt: 12/20/2001

Assignee: ACCESS SOLUTIONS, LTD.
17519 MUIRFIELD
DALLAS, TEXAS 75287

Assignment:

Reel/Frame: 050326 / 0971 Received: 09/10/2019 Recorded: 09/10/2019 Mailed: 09/11/2019 Pages: 8

Conveyance: CHANGE OF NAME (SEE DOCUMENT FOR DETAILS).

Assignor: ACCESS SOLUTIONS, LTD. Exec Dt: 08/15/2011

Assignee: GENERAL ACCESS SOLUTIONS, LTD.
3400 WELBORN ST., #216
DALLAS, TEXAS 75219

STATEMENT UNDER 37 CFR 3.73(b)

Applicant/Patent Owner: GENERAL ACCESS SOLUTIONS, LTD.

Application No./Patent No.: See Schedule A Filed/Issue Date: See Schedule A

Titled: See Schedule A

GENERAL ACCESS SOLUTIONS, LTD. , Corporation
(Name of Assignee) (Type of Assignee, e.g., corporation, partnership, university, government agency, etc.)

states that it is:

1. ☒ the assignee of the entire right, title, and interest in;
2. ☐ an assignee of less than the entire right, title, and interest in
(The extent (by percentage) of its ownership interest is _____ %); or
3. ☐ an assignee of an undivided interest in the entirety of (a complete assignment from one of the joint inventors was made) the patent application/patent identified above by virtue of either:
 - A. ☐ An assignment from the inventor(s) of the patent application/patent identified above. The assignment was recorded in the United States Patent and Trademark Office at Reel _____ , Frame _____ , or for which a copy thereof is attached.

OR

- B. ☒ A chain of title from the inventor(s), of the patent application/patent identified above, to the current assignee as follows:
1. From: See Schedule A To: See Schedule A
The document was recorded in the United States Patent and Trademark Office at
Reel See Schedule A , Frame See Schedule A , or for which a copy thereof is attached.
 2. From: See Schedule A To: See Schedule A
The document was recorded in the United States Patent and Trademark Office at
Reel See Schedule A , Frame See Schedule A , or for which a copy thereof is attached.
 3. From: See Schedule A To: See Schedule A
The document was recorded in the United States Patent and Trademark Office at
Reel See Schedule A , Frame See Schedule A , or for which a copy thereof is attached.
- ☐ Additional documents in the chain of title are listed on a supplemental sheet(s).
- ☒ As required by 37 CFR 3.73(b)(1)(i), the documentary evidence of the chain of title from the original owner to the assignee was, or concurrently is being, submitted for recordation pursuant to 37 CFR 3.11.

[NOTE: A separate copy (i.e., a true copy of the original assignment document(s)) must be submitted to Assignment Division in accordance with 37 CFR Part 3, to record the assignment in the records of the USPTO. See MPEP 302.08]

The undersigned (whose title is supplied below) is authorized to act on behalf of the assignee.

/Michael S. Hynek/
Signature
Michael S. Hynek
Printed or Typed Name

September 23, 2019
Date
Manager of General Access, LLC which is GP of General Access I, Ltd., GP of Applicant
Title or Registration No.

SCHEDULE A

Docket No.: 000189-0026-101 **Conf. No.:** 1196
Application No.: 09/839,719 **Patent No.:** 6,947,477

Total Assignments: 3

Application #: 09839719 Filing Dt: 04/20/2001 Patent #: 6947477 Issue Dt: 09/20/2005
PCT #: NONE Intl Reg #: Publication #: US20020097685 Pub Dt: 07/25/2002
Inventors: Paul F. Struhsaker, Russell C. McKown
Title: APPARATUS AND METHOD FOR CREATING SIGNAL AND PROFILES AT A RECEIVING STATION

Assignment: 1

Reel/Frame: 011729 / 0634 Received: 05/01/2001 Recorded: 04/20/2001 Mailed: 07/11/2001 Pages: 4

Conveyance: ASSIGNMENT OF ASSIGNORS INTEREST (SEE DOCUMENT FOR DETAILS).

Assignors: STRUHSAKER, PAUL F. Exec Dt: 04/19/2001
MCKOWN, RUSSELL C. Exec Dt: 04/19/2001

Assignee: RAZE TECHNOLOGIES, INC.
2540 EAST PLANO PARKWAY, SUITE 188
PLANO, TEXAS 75074

Assignment: 2

Reel/Frame: 012449 / 0730 Received: 01/15/2002 Recorded: 01/10/2002 Mailed: 03/06/2002 Pages: 8

Conveyance: ASSIGNMENT OF ASSIGNORS INTEREST (SEE DOCUMENT FOR DETAILS).

Assignor: RAZE TECHNOLOGIES, INC. Exec Dt: 12/20/2001

Assignee: ACCESS SOLUTIONS, LTD.
17519 MUIRFIELD
DALLAS, TEXAS 75287

Assignment:

Reel/Frame: 050326 / 0971 Received: 09/10/2019 Recorded: 09/10/2019 Mailed: 09/11/2019 Pages: 8

Conveyance: CHANGE OF NAME (SEE DOCUMENT FOR DETAILS).

Assignor: ACCESS SOLUTIONS, LTD. Exec Dt: 08/15/2011

Assignee: GENERAL ACCESS SOLUTIONS, LTD.
3400 WELBORN ST., #216
DALLAS, TEXAS 75219

Electronic Acknowledgement Receipt

EFS ID:	37262432
Application Number:	09839719
International Application Number:	
Confirmation Number:	1196
Title of Invention:	APPARATUS AND METHOD FOR CREATING SIGNAL AND PROFILES AT A RECEIVING STATION
First Named Inventor/Applicant Name:	Paul F. Struhsaker
Customer Number:	70763
Filer:	Kevin Augustine Rieffel/Tracy Chu
Filer Authorized By:	Kevin Augustine Rieffel
Attorney Docket Number:	9030101.145-US1
Receipt Date:	25-SEP-2019
Filing Date:	20-APR-2001
Time Stamp:	11:29:29
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	no
------------------------	----

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Power of Attorney	000189-0026-101_POA.pdf	1911345	no	2
			e60a97082d918542381abb6595bed42f7fae81c9		

Warnings:

Information:					
2	Assignee showing of ownership per 37 CFR 3.73	000189-0026-101_Stmt_373b.pdf	855867 c52ad6597bc44e0fa991f546f32cd655ae506f03	no	2
Warnings:					
Information:					
Total Files Size (in bytes):				2767212	
This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503. <u>New Applications Under 35 U.S.C. 111</u> If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application. <u>National Stage of an International Application under 35 U.S.C. 371</u> If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course. <u>New International Application Filed with the USPTO as a Receiving Office</u> If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.					



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NUMBER	FILING OR 371(C) DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO./TITLE
09/839,719	04/20/2001	Paul F. Struhsaker	9030101.145-US1

CONFIRMATION NO. 1196

POWER OF ATTORNEY NOTICE



OC000000111686755

Date Mailed: 10/04/2019

70763
Byrne Poh LLP
11 Broadway, Ste 760
New York, NY 10004

NOTICE REGARDING CHANGE OF POWER OF ATTORNEY

This is in response to the Power of Attorney filed 09/25/2019.

- The Power of Attorney to you in this application has been revoked by the assignee who has intervened as provided by 37 CFR 3.71. Future correspondence will be mailed to the new address of record(37 CFR 1.33).

Questions about the contents of this notice and the requirements it sets forth should be directed to the Office of Data Management, Application Assistance Unit, at (571) 272-4000 or (571) 272-4200 or 1-888-786-0101.

/deelliott/



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NUMBER	FILING OR 371(C) DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO./TITLE
09/839,719	04/20/2001	Paul F. Struhsaker	000189-0026-101

CONFIRMATION NO. 1196

POA ACCEPTANCE LETTER



164543
Haley Guiliano LLP
75 Broad Street
Suite 1000
NEW YORK, NY 10004-3226

Date Mailed: 10/04/2019

NOTICE OF ACCEPTANCE OF POWER OF ATTORNEY

This is in response to the Power of Attorney filed 09/25/2019.

The Power of Attorney in this application is accepted. Correspondence in this application will be mailed to the above address as provided by 37 CFR 1.33.

Questions about the contents of this notice and the requirements it sets forth should be directed to the Office of Data Management, Application Assistance Unit, at (571) 272-4000 or (571) 272-4200 or 1-888-786-0101.

/deelliott/