
FORD MOTOR COMPANY, GENERAL MOTORS LLC, and
NISSAN NORTH AMERICA, INC.,¹
Petitioner,

v.

NEO WIRELESS LLC,
Patent Owner.

IPR2023-00763
Patent 10,447,450 B2

Before KRISTEN L. DROESCH, HYUN J. JUNG, and
STEPHEN E. BELISLE, *Administrative Patent Judges*.

Petitioners' Demonstratives

Argument Summary

7. A mobile device in a wireless packet system using a frame structure of multiple frames for transmission, each frame comprising a plurality of time intervals, each time interval comprising a plurality of orthogonal frequency division multiplexing (OFDM) symbols, and each OFDM symbol containing a plurality of frequency subcarriers, the mobile device configured to:

receive an identifier from a base station in a cell in which the mobile device is operating; and

receive a signal containing information from the base station over a segment of time-frequency resource, the segment having a starting time-frequency coordinate and the segment comprising N time-frequency resource units within a time interval, each unit containing a set of frequency subcarriers in a group of OFDM symbols, where $N=2, 4, \text{ or } 8$; and

recover the information from the received signal using the starting time-frequency coordinate and N in conjunction with the received identifier.

- **“mobile device”**

- Park (Ex. 1005) expressly states that the “invention” “relate[s]” to “mobile communication systems” and “can be applied to WiBro”
 - Confirmed by Yoon (Ex. 1023)

- **“N = 2, 4, or 8”**

- No dispute Park discloses $N=2$
- Claim 7 does not exclude “other plural” values
- ‘450 Patent states other values may be used
- Patent Owner relies on contrary extrinsic evidence for its narrow interpretation

- **Patent Owner raises no other disputes**

- No dispute on remaining claim limitations
- No dispute on reason to combine
- No dispute on level of skill in the art

“mobile device”

7. A mobile device in a wireless packet system using a frame structure of multiple frames for transmission, each frame comprising a plurality of time intervals, each time interval comprising a plurality of orthogonal frequency division multiplexing (OFDM) symbols, and each OFDM symbol containing a plurality of frequency subcarriers, the mobile device configured to:

- receive an identifier from a base station in a cell in which the mobile device is operating; and
- receive a signal containing information from the base station over a segment of time-frequency resource, the segment having a starting time-frequency coordinate and the segment comprising N time-frequency resource units within a time interval, each unit containing a set of frequency subcarriers in a group of OFDM symbols, where N=2, 4, or 8; and
- recover the information from the received signal using the starting time-frequency coordinate and N in conjunction with the received identifier.

Ex. 1001

Parties agree: preamble is limiting

Pet. 8

Overview of the Park Publication



US 20060039274A1

(19) United States

(12) Patent Application Publication
Park et al.

(10) Pub. No.: US 2006/0039274 A1
(43) Pub. Date: Feb. 23, 2006

(54) METHOD FOR DISCRETELY INDICATING RESOURCE ALLOCATION INFORMATION AND A METHOD FOR REDUCING LOAD WHEN INDICATING RESOURCE ALLOCATION INFORMATION

(30) Foreign Application Priority Data
Aug. 18, 2004 (KR) 65099/2004

Publication Classification

(51) Int. Cl.
H04J 11/00 (2006.01)

(52) U.S. Cl.

(57) ABSTRACT

A method for discretely indicating resource allocation information regardless of previous resource allocation in an Orthogonal Frequency Division Multiple Access wireless network system is disclosed. The method includes the steps of defining at least one allocation unit having different sizes and shapes and indexing a total resource region per each allocation unit, and indicating resource information allocated to each terminal of the OFDMA wireless network system based on predetermined allocation unit information and an index value of a predetermined allocation unit.

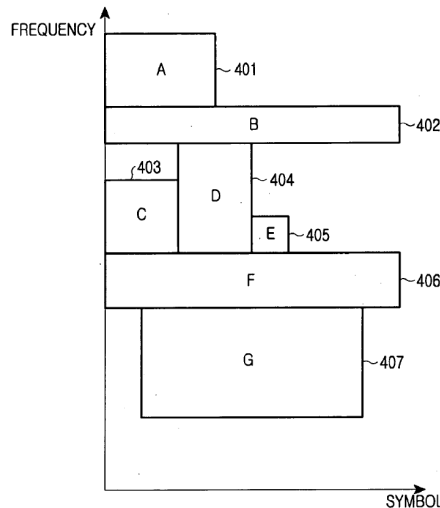
(75) Inventors: Won-Hyung Park, Seoul (KR); Sang-Bok Yun, Seongnam-si (KR)

Correspondence Address:
DILWORTH & BARRESE, LLP
333 EARLE OVERTON BLVD.
UNIONDALE, NY 11553 (US)

(73) Assignee: SAMSUNG ELECTRONICS CO., LTD., Suwon-si (KR)

(21) Appl. No.: 11/185,042

(22) Filed: Jul. 20, 2005



(57)

ABSTRACT

A method for discretely indicating resource allocation information regardless of previous resource allocation information in an Orthogonal Frequency Division Multiple Access wireless network system is disclosed. The method includes the steps of defining at least one allocation unit having different sizes and shapes and indexing a total resource region per each allocation unit, and indicating resource information allocated to each terminal of the OFDMA wireless network system based on predetermined allocation unit information and an index value of a predetermined allocation unit.

(Ex. 1005)

Park States “THE INVENTION” is “Related” to “Mobile” Communication Systems

US 2006/0039274 A1

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METHOD FOR DISCRETELY INDICATING RESOURCE ALLOCATION INFORMATION AND A METHOD FOR REDUCING LOAD WHEN INDICATING RESOURCE ALLOCATION INFORMATION

PRIORITY

[0001] This application claims the benefit under 35 U.S.C. 119(a) of an application entitled “Method For Discretely Indicating Resource Allocation Information And Method For Reducing Load When Indicating Resource Allocation Information” filed with the Korean Intellectual Property Office on Aug. 18, 2004 and assigned Serial No. 2004-65099, the contents of which are incorporated herein by reference.

BACKGROUND OF THE INVENTION

[0002] 1. Field of the Invention

[0003] The present invention relates to an Orthogonal Frequency Division Multiple Access (OFDMA) wireless communication system. More particularly, the present invention relates to a method for indicating resource allocation information in an OFDMA wireless communication system.

[0004] 2. Description of the Related Art

[0005] Next-generation mobile communication systems will transmit data with superior quality at a high transmission rate to provide subscribers with various improved multimedia services. Recent studies are being conducted on an Orthogonal Frequency Division Multiple Access (OFDMA) scheme to make it possible for the next-generation mobile communication systems to meet the above expectations.

[0006] According to the OFDMA scheme, resources are allocated to subscribers through a plurality of sub-carriers (for example, 512 sub-carriers or 1024 sub-carriers) pro-

vided in a frequency domain and a plurality of time slots, for example, 20 to 30 time slots) provided in a time domain to transmit upstream and downstream data.

[0007] FIG. 1 is a view illustrating a frequency domain structure of a WiBro stands for Wireless Broadband (WiBro) IEEE 802.16 system applied to an OFDMA system.

[0008] As shown in FIG. 1, total frequency is divided into a plurality of bands 101, 102, and each band consists of a plurality of sub-carriers.

[0009] A Bin or Tile may include a plurality of sub-carriers. That is, the Bin includes 9 sub-carriers provided in one OFDMA symbol and has 8 data tones. In addition, the Tile includes sequentially provided in one OFDMA symbol 8 pilot tones and 16 data tones.

[0010] In addition, the time axis (symbol) is divided into a preamble area 11, a diversity area 12, modulation and coding (AMC) area 13, and a data area 14.

[0011] The preamble area 11 is used for channel discrimination, channel estimation, synchronization and system information transmission. The diversity area 12 is used for allocating resources for diversity, and the AMC area 13 is used for allocating resources for transmission speed through a frequency-selective fading channel.

[0012] In addition, a safety channel is provided to prevent overlay.

[0013] DL/(UL)-MAP IE (Information Element) indicating resource allocation information in such a resource allocation structure is defined in Table 1 of the Institute of Electrical and Electronics Engineers (IEEE) 802.16-2004 standard.

[0014] Table 95(101) of IEEE 802.16-2004 standard.

TABLE 1

Table 95 – IE:ARO Compact DL-MAP-IE format for k

Syntax	Size	Notes
Compact_DL-MAP-IE		
()		
DL-MAP Type =1	3bits	Shall be set to zero
Reserved	1bit	
ICID-IE	Variable	
Nep code	4bits	Code of encoder packet
Nsch code	4bits	Code of allocated sub-carriers
Nband	Nb-Band bits	Number of bands, 0=0, 1=1, 2=2, 3=3, 4=4, 5=5, 6=6, 7=7, 8=8, 9=9, 10=10, 11=11, 12=12, 13=13, 14=14, 15=15, 16=16, 17=17, 18=18, 19=19, 20=20, 21=21, 22=22, 23=23, 24=24, 25=25, 26=26, 27=27, 28=28, 29=29, 30=30, 31=31, 32=32, 33=33, 34=34, 35=35, 36=36, 37=37, 38=38, 39=39, 40=40, 41=41, 42=42, 43=43, 44=44, 45=45, 46=46, 47=47, 48=48, 49=49, 50=50, 51=51, 52=52, 53=53, 54=54, 55=55, 56=56, 57=57, 58=58, 59=59, 60=60, 61=61, 62=62, 63=63, 64=64, 65=65, 66=66, 67=67, 68=68, 69=69, 70=70, 71=71, 72=72, 73=73, 74=74, 75=75, 76=76, 77=77, 78=78, 79=79, 80=80, 81=81, 82=82, 83=83, 84=84, 85=85, 86=86, 87=87, 88=88, 89=89, 90=90, 91=91, 92=92, 93=93, 94=94, 95=95, 96=96, 97=97, 98=98, 99=99, 100=100, 101=101, 102=102, 103=103, 104=104, 105=105, 106=106, 107=107, 108=108, 109=109, 110=110, 111=111, 112=112, 113=113, 114=114, 115=115, 116=116, 117=117, 118=118, 119=119, 120=120, 121=121, 122=122, 123=123, 124=124, 125=125, 126=126, 127=127, 128=128, 129=129, 130=130, 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Park Expressly Teaches Applying His Invention to “Wibro”

[0075] The present invention can be applied to the Wibro or IEEE 802.16 standards in various manners.

[0076] First, a new type indicating the MAP_IE scheme of the present invention can be added to an extension mode of DL_MAP IE TYPE and UL_MAP IE TYPE fields in Table 87 of the IEEE 802.16 (802.16-2004) standard.

[0077] Second, the MAP_IE scheme of the present invention can be represented by using a reserved value of DL_MAP IE TYPE and UL_MAP IE TYPE fields in Table 87 of the IEEE 802.16 (802.16-2004) standard.

[0078] Third, the present invention can be represented by using 1 bit of a reserved field in Table 95 H-ARQ Compact_DL_MAP IE of the IEEE 802.16 (802.16-2004) standard.

[0079] Fourth, it is also possible to newly define Table 95 of IEEE 802.16 (802.16-2004) such that the Table 95 may indicate the MAP_IE scheme of the present invention as well as the conventional scheme.

No limitation to, “fixed” devices.

(Ex. 1005)

Patent Owner Admits WiBro Supported “mobile subscribers”

- **Patent Owner Response (p. 1)**
 - “. . . Park indicates that these embodiments may be implemented in the context of a system that also supports ‘mobile subscribers’ such as WiBro . . .”
- **Patent Owner Response Ex. 2027**
 - Title: “Capacity Analysis Considering Channel Resource Overhead for **Mobile Internet Access (WiBro)**”
 - Abstract: “**Wireless mobile internet access** is becoming an important segment for the wireless industry. In this paper the new system, **WiBro**, being standardized in Korea is introduced.”

Yoon Teaches that “Mobile Stations” in WiBro Used Band AMC

Introduction to **WiBro Technology**

September 10, 2004

Soon Young Yoon

Telecom R&D Center
Samsung Electronics Co, Ltd.

Contents

- Background of WiBro Service
- WiBro Technology Overview
- Future Plan and Strategy

Ex. 1023

Yoon Teaches that “Mobile Stations” in WiBro Used Band AMC

PHY Characteristics (2)

❑ Performance Enhancement considering Mobility(1)

◆ H-ARQ

- Increase the efficiency of re-transmission resulting from fading and interference

◆ Band selection AMC & diversity subchannel

- Mobile stations request to select band selection AMC or diversity subchannel by monitoring channel status
- For slowly moving users : allocate band selection AMC subchannels which have high quality channel response to increase transmission efficiency and coverage
- For fast moving users : allocate diversity subchannels distributed over whole frequency band to maximize frequency diversity

Patent Owner Has No *Merits* Response to Yoon (Ex. 1023)

- **Patent Owner Response**
 - No mention of Yoon
- **Patent Owner Reply**
 - “Exhibit 1023 is *neither a scholarly nor a peer-reviewed source*.” (p. 13)
 - “a Samsung employee may have delivered the PowerPoint presentation in Exhibit 1023 in 2004 as *part of an aspirational vision* for WiBro” (p. 14)
- **Patent Owner does not dispute the *substance* of what Yoon teaches a POSITA**
 - **Consistent with Park, which applies to “mobile” and “WiBro”**

Patent Owner's Evidence Confirms Mobile Devices in WiBro Leveraged *Both* Diversity and Band AMC

Capacity Analysis Considering Channel Resource Overhead for Mobile Internet Access(WiBro)

Rami Lee, Jongcheol Kim, Jaehwang Yu, and Joosik Lee
Network Engineering Development Team
Network R&D Center, SK Telecom
Seoul, Korea
(rami_jckim, jhyu_jslee)@sktelecom.com

Dongwoo Kim
Department of Electrical Engineering and Computer Science
Hanyang University
Ausan, Korea
dkim@hanyang.ac.kr

Abstract—Wireless mobile internet access is becoming an such as fp and e-commerce. Best-effort service does not

Capacity Analysis Considering Channel Resource Overhead for Mobile Internet Access(WiBro)

standardized. WiBro means wireless broadband internet. It is to provide wireless internet access with PSS (Portable Subscriber Station) under the stationary and medium-speed mobile environment.

Some of the advantages of integrating cellular with WiBro include high data rate, low cost, the ubiquity of hot spots, and the offload of cellular spectrum. WiBro offers high-speed data service within specific and usually small areas. Wireless

mobile services through cdma2000 1X, 1X-EV-DO, and WCDMA systems has a plan to launch it in 2006 for the next mobile communication service

The organization of this paper is as follows. In Section II, the key features and specification of WiBro are introduced in detail. Channel resource overhead is derived in Section III. In Section IV, the analysis of CINR, coverage, and capacity is addressed. Finally, conclusions are drawn in Section V.

***Abstract*—Wireless mobile internet access is becoming an important segment for the wireless industry. In this paper the new system, WiBro, being standardized in Korea is introduced.**

Neo Wireless LLC, Exhibit 2027
Page 2027 - 1
IPR2023-00763, Ford Motor Co. v. Neo Wireless LLC

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Ex. 2027

DEMONSTRATIVE EXHIBIT – NOT EVIDENCE

11

Patent Owner's Evidence Confirms Mobile Devices in WiBro Leveraged Both Diversity and Band AMC

Capacity Analysis Considering Channel Resource Overhead for Mobile Internet Access(WiBro)

Rami Lee, Jungcheol Kim, Jaehwang Yu, and Joosik Lee
Network Engineering Development Team
Network R&D Center, SK Telecom
Seoul, Korea
(rami_jeckim_jhyu_jslee)@sktelecom.com

Abstract—Wireless mobile internet access is becoming an important segment for the wireless industry. In this paper the new system, WiBro, being standardized in Korea is introduced. We address some of the physical layer aspects and the corresponding impacts on system performance. To provide the solution for optimized network operation, we evaluate the capacity of WiBro in various network conditions with the developed system level simulator. Simulation results provide insight on how performance varies within the coverage area according to the values of system parameters. Also, we derive the adequate values to maximize capacity considering channel resource overhead.

Keywords—Wireless mobile internet system, WiBro, system level simulator, capacity, Optimized network operation

I. INTRODUCTION

The growing demands for advanced mobile multimedia let the wireless mobile internet access be developed rapidly. The new system named "WiBro" is proposed in Korea and is being standardized. WiBro means wireless broadband internet. It is to provide wireless internet access with PSS (Portable Subscriber Station) under the stationary and medium-speed mobile environment.

Some of the advantages of integrating cellular with WiBro include high data rate, low cost, the ubiquity of hot spots, and the offload of cellular spectrum. WiBro offers high-speed data service within specific and usually small areas. Wireless mobile systems, on the other hand, provide the wider area of service. The data rates with wireless mobile are however significantly slower than WiBro. This makes the integration of the two access technologies highly complementary.

WiBro service should provide seamless connectivity regardless of the place and time. Service shall support the various types of wireless multimedia applications and the various types of multimedia-enabled terminals such as handset, notebook, PDA, or smart phone. Service consists of three classes: real-time service, non-real time service, and best-effort service. Real-time service imposes delay constraints while requiring the guaranteed resource allocation during the session such as audio/video streaming and interactive game. Non-real time service does not impose any delay constraints while requiring the guaranteed resource allocation during the session

Department

such as flip and impose any data resource allocation e-mail [1] [2].

Coverage of types in the cell(400m), mac users at a velocity service while us with other network mobile communication following data downlink=512 k per user: downlink

WiBro will access solutions of the wireless very high data rate mobility cellular mobile services WCDMA system mobile communication

The organization the key features, detail. Channel Section IV, the addressed. Finally

II. KEY

WiBro has pl allows high bit channels with a designed to be n involving asym which has 42 O band.

Specification shows the frame with 1024-FFT. Modulation and

Uplink dedicated control channel consists of CQI, ACK, Ranging channels. CQI channel is used for C/I feedback for link adaptation with 8-ary orthogonal coding (QPSK symbol is used) and 1 uplink sub-channel is allocated to a CQICH (6tiles). ACK channel is used for H-ARQ (Hybrid Automatic Repeat and reQuest) with 8-ary orthogonal coding (QPSK symbol is used). H-ARQ is used for high quality and low latency in the downlink/uplink. A half of uplink sub-channel is allocated to an ACK/NAK CH (3tiles). Ranging channel is based on CDMA ranging. Ranging modes are differentiated by code and time slot and users are allowed to collide on the ranging channels. Two OFDMA symbols are for initial ranging/bandoff ranging and one OFDMA symbol is for periodic ranging and bandwidth request. In uplink, also, the proportion of diversity to band selection can be changed every frame.

Ex. 2027

Patent Owner's Evidence Confirms Mobile Devices in WiBro Leveraged Both Diversity and Band AMC

22. A passage of Exhibit 2027, which Dr. Albert does not address, confirms the evidence in Exhibit 1023 that, in WiBro, mobile subscribers used the band selection AMC aspect and thus would have leveraged Park's innovation.

23. Exhibit 2027 teaches that in the downlink "[t]he proportion of diversity to band selection can be changed every frame." (Ex. 2027, p. 2.) This statement, like the statements in Exhibit 1023 shown above, confirms that all WiBro subscribers leverage both diversity selection and band selection AMC regardless of whether they were fixed or mobile.

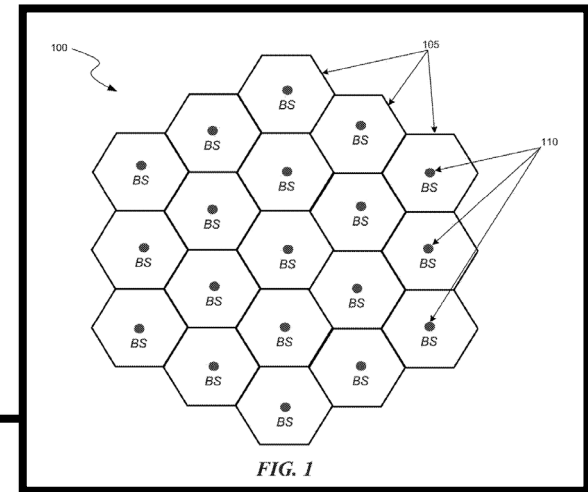
Ex. 1031, Dr. Cooklev's 2nd Decl.

Patent Owner's Reliance on Park's Mention of "fixed" is Misplaced

- **The '450 Patent expressly states that "mobile devices" are sometimes "fixed"**
 - Therefore, "fixed" does not mean "not mobile."
 - Pet. 19; Reply, 10
 - Ex. 1031, ¶7, 10, 24
- **Claim 7 requires a "mobile device" but does not require "motion" or "mobile users"**
 - Undisputed that "mobile" devices are often stationary
 - POR, 35; Ex. 2023, ¶ 86
 - **"Claim 7 does not recite or otherwise require 'mobile users,' support of 'mobile users,' or the application of a method to 'mobile users,' as argued by Patent Owner."**
 - Institution Decision, 28
- **Park describes "fixed" devices with respect to the "PRIOR ART"**
 - Park never limits his *invention* to non-mobile devices
 - Expressly states his "invention" is "related to" "next generation *mobile* communication systems" such as "WiBro"
 - Reply, 5

The '450 Patent Acknowledges “mobile devices” “may be fixed” (e.g., when they are stationary)

 US010447450B2	
(12) United States Patent Li et al.	
(54) METHOD AND SYSTEM FOR MULTI-CARRIER PACKET COMMUNICATION WITH REDUCED OVERHEAD	(10) Patent No.: US 10,447,450 B2 (45) Date of Patent: *Oct. 15, 2019
(71) Applicant: Neocific, Inc., Bellevue, WA (US) (72) Inventors: Xiaodong LI, Kirkland, WA (US); Haiming Huang, Bellevue, WA (US); Titus Lo, Bellevue, WA (US); Ruiteng Wang, Sammamish, WA (US) (73) Assignee: Neocific, Inc., Bellevue, WA (US) (*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days. This patent is subject to a terminal dis- claimer.	(52) U.S. CL. H04L 1/00 (2006.01) H04W 72/04 (2009.01) H04J 11/00 (2006.01) H04W 52/14 (2009.01) CPC H04L 5/0053 (2013.01); H04J 11/005 (2013.01); H04L 1/0003 (2013.01); H04L 1/0009 (2013.01); H04L 1/0029 (2013.01); H04L 5/006 (2013.01); H04L 5/0007 (2013.01); H04L 5/0044 (2013.01); H04L 27/2601 (2013.01); H04W 52/146 (2013.01); H04W 72/04 (2013.01); H04W 72/048 (2013.01); H04L 5/0094 (2013.01) (58) Field of Classification Search CPC H04L 5/0053; H04L 1/0003; H04J 11/005 See application file for complete search history. Primary Examiner — Chandrabas B Patel (74) Attorney, Agent, or Firm — Perkins Coie LLP



I. Wireless Communication Network

FIG. 1 is a representative diagram of a wireless communication network 100 that services a geographic region. The geographic region is divided into a plurality of cells 105, and wireless coverage is provided in each cell by a base station (BS) 110. One or more mobile devices (not shown) may be fixed or may roam within the geographic region covered by the network. The mobile devices are used as an interface between users and the network. Each base station is con-

Park's Fig. 1 "PRIOR ART" Disclosure

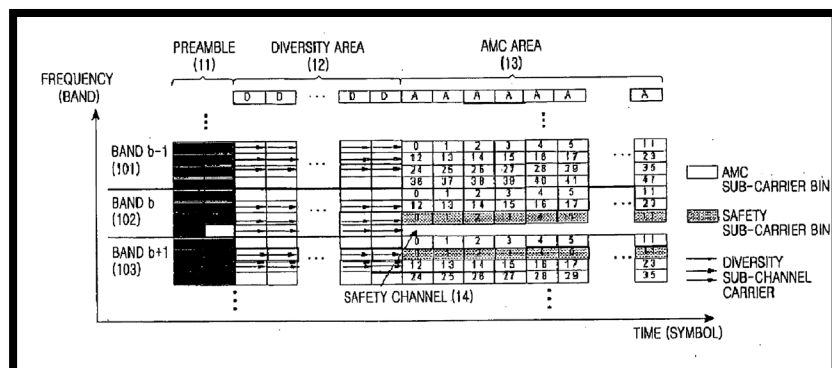


FIG. 1
(PRIOR ART)

Ex. 1005

[0010] In addition, the time axis (symbols) is divided into a preamble area 11, a diversity area 12 and an adaptive modulation and coding (AMC) area 13.

[0011] The preamble area 11 is used for base station discrimination, channel estimation, synchronization information and system information transmission. The diversity area 12 is used for allocating resources for mobile subscribers, and the AMC area 13 is used for increasing the transmission speed through a frequency-selective adaptive modulation for fixed subscribers.

“N = 2, 4 or 8”

7. A mobile device in a wireless packet system using a frame structure of multiple frames for transmission, each frame comprising a plurality of time intervals, each time interval comprising a plurality of orthogonal frequency division multiplexing (OFDM) symbols, and each OFDM symbol containing a plurality of frequency subcarriers, the mobile device configured to:

- receive an identifier from a base station in a cell in which the mobile device is operating; and

- receive a signal containing information from the base station over a segment of time-frequency resource, the segment having a starting time-frequency coordinate and the segment comprising N time-frequency resource units within a time interval, each unit containing a set of frequency subcarriers in a group of OFDM symbols, where N=2, 4, or 8; and

- recover the information from the received signal using the starting time-frequency coordinate and N in conjunction with the received identifier.

Park Discloses N = 2



US 2006/0039274A1

(19) United States

(12) Patent Application Publication
Park et al.

(10) Pub. No.: US 2006/0039274 A1
(43) Pub. Date: Feb. 23, 2006

(54) METHOD FOR DISCRETELY INDICATING RESOURCE ALLOCATION INFORMATION AND A METHOD FOR REDUCING LOAD WHEN INDICATING RESOURCE ALLOCATION INFORMATION

(30) Foreign Application Priority Data
Aug. 18, 2004 (KR) 65099/2004

Publication Classification

(51) Int. Cl. H04L 11/00 (2006.01)

(52) U.S. Cl. 370/208

(57) ABSTRACT

A method for discretely indicating resource allocation information regardless of previous resource allocation information in an Orthogonal Frequency Division Multiple Access wireless network system is disclosed. The method includes the steps of defining at least one allocation unit having different sizes and shapes and indexing a total resource region per each allocation unit, and indicating resource information allocated to each terminal of the OFDMA wireless network system based on predetermined allocation unit information and an index value of a predetermined allocation unit.

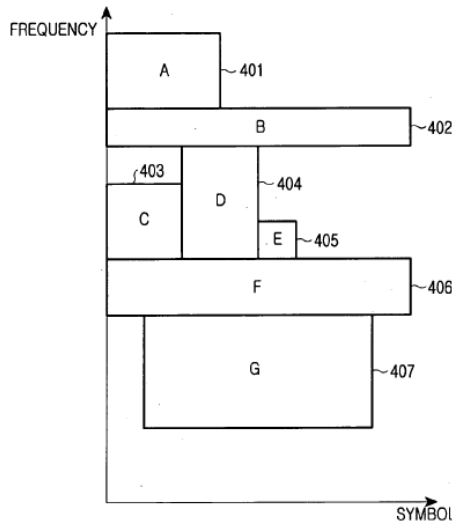
(75) Inventors: Won-Hyoung Park, Seoul (KR); Sang-Boh Yun, Seongnam-si (KR)

Correspondence Address:
DILWORTH & BARRESE, LLP
333 EARLE OVERTON BLVD.
UNIONDALE, NY 11553 (US)

(73) Assignee: SAMSUNG ELECTRONICS CO., LTD., Suwon-si (KR)

(21) Appl. No.: 11/185,042

(22) Filed: Jul. 20, 2005



Ex. 1005

[0052] The resource allocation regions shown in FIG. 4 can be simply represented by using the allocation unit as shown in FIG. 3. That is, B 402 and C 403 can be represented as b(0) and c(8), respectively.

[0053] In addition, A 401 can be represented as c(0) and c(1). This means continuous resource allocation regions can be simply represented by assigning a start allocation unit index and a total number of the allocation units.

INDEX 0	INDEX 1	INDEX 2	INDEX 3
INDEX 4	INDEX 5	INDEX 6	INDEX 7
⋮			
INDEX M-8	INDEX M-7	INDEX M-6	INDEX M-5
INDEX M-4	INDEX M-3	INDEX M-2	INDEX M-1

FIG.3C

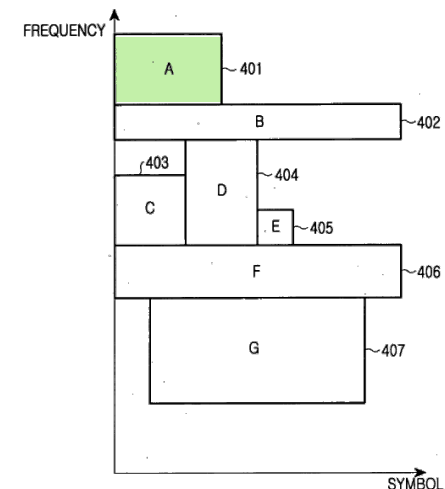


FIG.4

Park Discloses $N = 2$

graph. Park also discloses another example where $N = 2$, as recited in claim 7.

In addition, [allocation region] A 401 can be represented as $c(0)$ and $c(1)$. This means continuous resource allocation regions can be simply represented by assigning a start allocation unit index and a total number of the allocation units.

Park [0053], [0051] (explaining that Figure 4 shows “resource allocation regions,” including A 401); *see also id.* [0046]-[0049] (explaining that Figures 3A-3D

Pet. 34

172. One of those additional possibilities expressly includes $N=2$ as claimed. Starting with the allocation units depicted in Figure 3C, Park discloses that resource allocation region A 401 shown in Figure 4 “can be represented as $c(0)$ and $c(1)$.” Park [0053]. In allocation mode “01,” this means that the resource allocation region A 401 can be expressed as the start allocation unit “ $c(0)$ ” and the number of allocation units “2.” Park expressly confirms this understanding. Park [0053] (describing the same example as an example of a “continuous resource allocation region” that “can be simply represented by assigning a start allocation

Ex. 1003, Cooklev Decl.

DEMONSTRATIVE EXHIBIT – NOT EVIDENCE

Patent Owner Does Not Dispute Park Discloses $N = 2$

- **Patent Owner Response**

- Focused on Park's disclosure of *other values* for N
- “Petitioner relies on Park for the disclosure of this limitation, but admits that ***Park does not limit the number (“N”) of its “allocation units” to 2, 4, or 8—or to any other number.***”
 - “Park, which ***permits N to be anything***”
 - POR 36-38
- **Never disputes Park discloses $N = 2$**

- **Patent Owner Sur-Reply**

- Focused on Park's disclosure of *other values* for N
- **Never disputes Park discloses $N = 2$**

Patent Owner's Sole Argument is Claim Construction: *plural N = only 2, 4 or 8*

- **Patent Owner Response**

- “The Plain Meaning Of The Claims Confirms That It **Excludes Plural N Other Than N = 2, 4 or 8.**”
 - POR, 38

- **Patent Owner Sur-Reply**

- “THE CLAIM REQUIRES ‘N = 2, 4, 8,’ **EXCLUDING OTHER PLURAL VALUES.**”
 - Sur-Reply, 18

The '450 Patent Teaches $N=1$ and Uses Open Ended Language For Other Values

When the zones are further subdivided into time-frequency segments in accordance with certain rules, a mapping of packet streams to segment may be achieved using a one-dimensional offset with respect to the origin of the zone rather than the two-dimensional (i.e. starting time-frequency coordinate and ending time-frequency coordinate relative to the starting point of the zone) mapping method discussed above. Calculation of such an offset may require knowledge of a modulation and coding scheme that is associated with a particular packet stream. For example, Table 1 below sets forth representative modulation and forward-error correction (FEC) coding schemes (MCS) that may be used for voice packet streams under various channel conditions.

TABLE 1

MCSI	Modulation	Coding rate	Information bits	Raw symbols	Units
1	16QAM	$\frac{1}{2}$	160	80	1
2	QPSK	$\frac{1}{2}$	160	160	2
3	QPSK	$\frac{1}{4}$	160	320	4
4	QPSK	$\frac{1}{8}$	160	640	8

Using basic resource units as the granularity of a location offset to the packet stream reduces the number of bits required to represent its location with the zone 605a. For example, to support a maximum of 64 VoIP calls in a cell, a maximum of $64 \times 8 = 512$ units might be used, assuming that every voice packet is transmitted using the lowest MCS. Therefore, a 9-bit number is sufficient to represent a VZI. In practice, different voice packets may be transmitted using different MCSs, some with $MCSI=1$, some with $MCSI=4$, so on so forth. According to statistics, a shorter bit-length than the maximum needed, for example 8 bits, may be used for VZI for practical purpose.

Ex. 1001, 7:28-39; Ex. 1031, ¶31

Ex. 1001, 6:22-45; Ex. 1031, ¶31

The Alleged Benefits of N=2, 4, or 8 Are Achieved By *Other* Values of N

Alleged Benefit	Achieved by <i>Other</i> Values of N
<p>“limiting N may further reduce overhead by linking the segment size to the modulation scheme” POR 41-42</p>	<ul style="list-style-type: none">• Nothing in the ‘450 Patent states that other values of N <i>lack</i> this alleged benefit• Patent Owner admits N = 1 achieves this benefit<ul style="list-style-type: none">• POR, 43• N=16 (next table value) achieves the same benefit<ul style="list-style-type: none">• Ex. 1031, Cooklev Decl. ¶37-38
<p>“limiting N may remedy the prior art’s ‘irregular’ arrangement of segments” POR 41, 44-45</p>	<ul style="list-style-type: none">• Nothing in the ‘450 Patent states that other values of N <i>lack</i> this alleged benefit• Patent Owner admits N = 1 achieves this benefit<ul style="list-style-type: none">• POR, 45• N=16 (next table value) achieves the same benefit<ul style="list-style-type: none">• Ex. 1031, Cooklev Decl. ¶37-38

The Alleged Benefits Are Achieved By Other Values of N

When the zones are further subdivided into time-frequency segments in accordance with certain rules, a mapping of packet streams to segment may be achieved using a one-dimensional offset with respect to the origin of the zone rather than the two-dimensional (i.e. starting time-frequency coordinate and ending time-frequency coordinate relative to the starting point of the zone) mapping method discussed above. Calculation of such an offset may require knowledge of a modulation and coding scheme that is associated with a particular packet stream. For example, Table 1 below sets forth representative modulation and forward-error correction (FEC) coding schemes (MCS) that may be used for voice packet streams under various channel conditions.

TABLE 1

MCSI	Modulation	Coding rate	Information bits	Raw symbols	Units
1	16QAM	1/2	160	80	1
2	QPSK	1/2	160	160	2
3	QPSK	1/4	160	320	4
4	QPSK	1/8	160	640	8
5	BPSK	1/8	160	1280	16

“so on so forth”

Using basic resource units as the granularity of a location offset to the packet stream reduces the number of bits required to represent its location with the zone 605a. For example, to support a maximum of 64 VoIP calls in a cell, a maximum of $64 \times 8 = 512$ units might be used, assuming that every voice packet is transmitted using the lowest MCS. Therefore, a 9-bit number is sufficient to represent a VZI. In practice, different voice packets may be transmitted using different MCSs, some with MCSI=1, some with MCSI=4, so on so forth. According to statistics, a shorter bit-length than the maximum needed, for example 8 bits, may be used for VZI for practical purpose.

Ex. 1001, 7:28-39; Ex. 1031, ¶31



Ex. 1031, Cooklev Decl., ¶37

Patent Owner Relies on *Extrinsic Evidence* to “exclude” Other “plural” Values of N

A. The Plain Meaning Of The Claims Confirms That It Excludes Plural N Other Than N = 2, 4 Or 8.

Claim 7 recites:

... the segment comprising N time-frequency resource units within a time interval, ..., where N = 2, 4 or 8.

Ex. 1001 [450 Pat.] cl. 7.

As Mr. Alberth explains:

The plain meaning of the claim requires that N, when plural, must “equal” 2, 4 or 8. Of course, if N equals another number, such as 7, it does not “equal” 2, 4 or 8. Thus, based on the plain meaning, N, when plural, must be selected from one of 2, 4 or 8, to the exclusion of any plural N other than N = 2, 4 or 8.⁵ This is because the claim expressly recites “N = 2, 4 or 8.” It does not recite, for example, that “N can equal *at least* 2, 4 or 8.”

Ex. 2023 [Alberth-2nd-Decl.] ¶ 89; *see also Insituform Techs., Inc. v. Cat Contr., Inc.*, 99 F.3d 1098, 1106 (Fed. Cir. 1996) (“the claim is specific as to the number

II. THE REPLY’S ARGUMENTS CONFIRM THAT THE CLAIM REQUIRES “N = 2, 4, 8,” EXCLUDING OTHER PLURAL VALUES.

Claim 7 recites that the mobile device is configured to “receive a signal” “over a segment of time-frequency resource,” “and the segment comprising N time-frequency resource units,” “where N=2, 4 or 8.” Ex. 1001 [‘450 Patent] cl. 7. Petitioner argues that Park discloses this limitation because Park discloses that N can be “any” number, and therefore may happen to also be “N=2, 4, or 8.” Ex. 1003 [Cooklev-Decl.] ¶ 180; Pet., 38-39. As the POR (at 38-41) explained, however, the plain meaning of the claim requires that N, when plural, must equal 2, 4 or 8, to the exclusion of other plural values. As the POR (at 41-49) further explained, the specification readily confirms the plain meaning of the claim, because, *e.g.*, it explains that limiting N as claimed achieves benefits beyond what Park’s unbounded possibilities for N would. As discussed in the following subsections, Petitioner’s Reply fails to refute any of this.

POR, 38

PO SUR-REPLY, 18

Patent Owner's Extrinsic “Benefits” Argument is Unfounded

- **Patent Owner's expert asserts that $N = \text{“only” } 2, 4 \text{ or } 8$ has “benefits” over other values of N**
 - POR, 41-29
 - PO Sur-Reply, 18
- **But the purported “benefits” are not claimed**
 - Ex. 1031, ¶133
- **Patent Owner admits $N=1$ (Table 1) provides the *same* benefits**
 - POR, 43, 45
- **Other values of N achieve the same benefits**
 - Ex. 1031, Cooklev Decl. ¶37-38

The Use of “comprising” Indicates N Is Not Limited to “Only” 2, 4 or 8

- *Crystal Semiconductor Corp. v. TriTech Microelectronics Int'l, Inc.*, 246 F.3d 1336, 1348 (Fed.Cir.2001)
 - “In the parlance of patent law, the transition ‘comprising’ creates a presumption that the recited elements are only a part of the device, that **the claim does not exclude additional, unrecited elements.**”
- *Gillette Co. v. Energizer Holdings Inc.*, 405 F.3d 1367, 1371–73 (Fed. Cir. 2005)
 - Claim directed to a razor “comprising . . . a group of first, second, and third blades” **does not exclude razors with more than three blades.**”

‘450 Patent:

7. A mobile device in a wireless packet system using a frame structure of multiple frames for transmission, each frame comprising a plurality of time intervals, each time interval comprising a plurality of orthogonal frequency division multiplexing (OFDM) symbols, and each OFDM symbol containing a plurality of frequency subcarriers, the mobile device configured to:

receive an identifier from a base station in a cell in which the mobile device is operating; and

receive a signal containing information from the base station over a segment of time-frequency resource, the segment having a starting time-frequency coordinate and the segment comprising N time-frequency resource units within a time interval, each unit containing a set of frequency subcarriers in a group of OFDM symbols, where N=2, 4, or 8; and

recover the information from the received signal using the starting time-frequency coordinate and N in conjunction with the received identifier.

In re Varma v. IBM Corp., **816 F.3d 1352, 1362 (Fed. Cir. 2016)**

“Comprising” means that the claim can be met by a system that contains features over and above those specifically required by the claim element, but only if the system still satisfies the specific claim-element requirements: the claim does not cover systems whose unclaimed features make the claim elements no longer satisfied.

Patent Owner's “comprising” Cases Are Highly Distinguishable

Moleculon Research Corp. v. CBS, Inc.

793 F.2d 1261, 1271–72 (Fed. Cir. 1986)

3. A method for restoring a preselected pattern from sets of pieces which pieces have constantly exposed and constantly nonexposed surfaces, the exposed surfaces adapted to be combined to form the preselected pattern, which sets when in random engagement fail to display said preselected pattern which comprises:

a. engaging **eight cube pieces as a composite cube**;

b. rotating **a first set of cube pieces comprising four cubes** about a first axis;

c. rotating **a second set of four cubes about a second axis**; and

d. repeating steps (b) and (c) until the preselected pattern is achieved.

“The question before us is not whether, because of the transitional phrase ‘which comprises,’ the step reads on a step of an accused method which recites additional structure (hypothetically, ‘eight cube pieces and six metal plates’), but rather whether this step which recites engaging ‘eight cube pieces as a composite cube’ reads on a step which engages more than eight cube pieces as in the 3 × 3 × 3 Rubik’s Cube or the 4 × 4 × 4 Rubik’s Revenge.”

* * *

Based on our review of the patent, we hold that claim 3 is limited, at least for purposes of literal infringement, to a method for restoring a 2 × 2 × 2 composite cube. ***That interpretation follows not only from the language of step (a), but also from the way the eight cube piece composite cube is manipulated in steps (b), (c), and (d). These steps are limited to manipulating sets of four cubes only.***

Araujo v. E. Mishan & Sons, Inc.,

2022 U.S. Dist. LEXIS 115290 (S.D.N.Y. June 29, 2022)

I claim:

1. An exercise device to assist a person in the performance of abdominal crunches and exercises, wherein said person has buttocks and a back, said exercise device **consisting of**:

- a) a first member that supports the buttocks wherein said first member lays flat on a floor or other essentially planar surface, wherein said first member **comprises** a top surface having a top length and width, a bottom surface having a bottom length and width, and a plurality of edge surfaces each having a height that is the same on every edge, and further wherein:
 - the top surface supports the person's buttocks when he is seated thereon;
 - the entire top surface is essentially parallel to the bottom surface;

Plaintiff's requested construction of "comprises" in Claim 1(a) would illogically broaden the scope of the transitional term, "consisting of," by allowing the scope of Claim 1(a) to expand. See Multilayer Stretch Cling Film Holdings, Inc. v. Berry Plastics Corp., 831 F.3d 1350, 1359 (Fed. Cir. 2016) (referring to the "the exceptionally strong presumption that a claim term set off with `consisting of' is closed to unrecited elements").

* * *

Under this framework, the Court construes Claim 1 as setting forth four elements that the claim "consist[s] of": a first member, a second member, at least one hinge, and at least one spring. With respect to first member, that element is comprised of certain limitations as set forth in Claim 1(a). '276 Patent, column 4, lines 17-45. ***The Court will not construe the use of "comprises" within Claim 1(a) to expand the scope to include additional limitations that are not enumerated.***

Apple Inc. v. LBT IP I LLC,

IPR2020-01189, Paper 48, 20 (Dec. 15, 2023)

- **Claim Language:**

- “wherein the battery power level monitor measures a power level of the charging unit and adjusts a power level applied to location tracking circuitry responsive to one or more signal levels, ***the power level comprising a multitude of threshold values*** determined by a user or system administrator”

- **Petitioner:**

- Can the claim read on ***GPS*** signal level threshold values?

- **PTAB:**

- No. “ ‘the power level comprising a multitude of threshold values’ refers to a ***power level*** having threshold values, not something else having threshold values”

Yoon (Ex. 1023) is Prior Art

- The earliest claimed priority date of the '850 Patent is September 28, 2005

Introduction to WiBro technology: Soon Young Yoon (Samsung Electronics), Director/Head of 4G System Lab Next Generation System Team

- Yoon was presented on September 10, 2004
 - Session 3 (2:00-4:00 pm)
 - International Telecommunication Union Regional Seminar on Broadband Wireless Access for Asia Pacific Region
 - Busan, Korea
 - Ex. 1031, ¶14-17 (Cooklev Decl.)
 - Ex. 1032 (ITU Program)

 ITU-APT Regional Seminar on Broadband Wireless Access for Asia Pacific Region <i>Busan, Republic of Korea, 10 September 2004</i> 	
Program (v.12)	
Opening	
09:00-09:30 hrs	Welcome address: <i>Jingsung Choi</i> (LGE), Vice-President, Head of Mobile Communication Technology R&D Center and Seminar Chairman
(Chairman: J. Choi, LGE)	Broadband Convergence Network, <i>Chulsoo Kim</i> (Inje University, Rep. Korea), Professor
10:30-10:45 hrs Coffee break	
SESSION 2: Broadband Programs and System Implementation	
10:45-12:00 hrs	Regional and National Programs and System Implementation: - Canada: <i>Susan Johnston</i> (Industry Canada), Senior Policy Advisor, Asia - India: <i>Saty N. Gupta</i> (Telecom Regulatory Authority of India - TRAI), Advisor, Converged Networks - Japan: <i>Kazuhiro Inoue</i> (NTT Access Network Service Systems Laboratories), FWA Development Project - Australia: <i>Jonathan Withers</i> (Personal Broadband Australia - PBBA), Chief Technology Officer - Korea: <i>Woo-Yong Choi</i> (ETRI, Rep. Korea), Wireless LAN Services for Hotspot
12:00-12:30 hrs	Questions & answers
12:30-14:00 hrs	Lunch break
SESSION 3: Wireless Broadband Standards and Technology	
14:00-16:00 hrs	Standards Development: - ITU: <i>Akira Hashimoto</i> (NTT DoCoMo), Chairman, ITU-R WP 9B - ETSI BRAN Project: <i>Marianna Goldhammer</i> (Alvarion), BRAN Vice-Chair and HiperMAN Chair - IEEE 802.16 Working Group: <i>Ken Stanwood</i> , Vice-Chairman, 802.16 Working Group - TTA WiBro Project: <i>Dae-hyoung Hong</i> (TTA), Chairman, 2.3GHz Portable Internet Project Group Introduction to WiBro technology: <i>Soon Young Yoon</i> (Samsung Electronics), Director/Head of 4G System Lab, Next Generation System Team
16:00-16:15 hrs	Coffee break
SESSION 4: Regulatory aspects of Wireless Broadband	
16:15-17:15 hrs	Regulations and Advanced Wireless Broadband: <i>Marianna Goldhammer</i> (Alvarion), Director, Strategic Technologies National Regulations Case Study – China: <i>Xie Feibo</i> (China), Deputy -Director-General, Radio Regulatory Department, MII National Regulations Case Study – Australia: <i>Hendrik Prins</i> (Unwired), Consultant – Network Planning and Development
Panel Discussion	
17:15-17:45 hrs	How to foster regional and global cooperation for development of wireless broadband? Participants: speakers to be announced.
Closing	
17:45-18:00 hrs	Closing address: <i>G. Hugh Railton</i> (Asia-Pacific Telecommunity - APT), Deputy Executive Director Seminar closing: <i>Jingsung Choi</i> (LGE), Seminar Chairman

Yoon (Ex. 1023) is Prior Art

- The earliest claimed priority date of the '850 Patent is September 28, 2005
- Yoon was cited in the August 2005 publication of Hungary's Scientific Association for Infocommunications
- Ex. 1034, p. 7
- Ex. 1031, ¶17 (Cooklev Decl.)



Ex. 1034