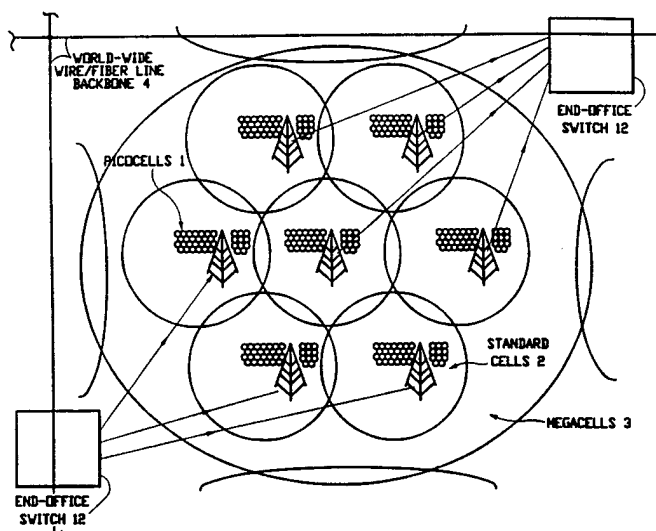




INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(51) International Patent Classification ⁶ : H04Q 7/20		A3	(11) International Publication Number: WO 98/32250
			(43) International Publication Date: 23 July 1998 (23.07.98)
(21) International Application Number: PCT/US98/01250 (22) International Filing Date: 15 January 1998 (15.01.98) (30) Priority Data: 60/035,698 17 January 1997 (17.01.97) US Not furnished 19 December 1997 (19.12.97) US (71) Applicant (for all designated States except US): THE REGENTS OF THE UNIVERSITY OF CALIFORNIA [US/US]; 22nd floor, 300 Lakeside Drive, Oakland, CA 94612-3550 (US). (72) Inventor; and (75) Inventor/Applicant (for US only): ACAMPORA, Anthony [US/US]; 6473 Avenida Cresta, La Jolla, CA 92037 (US). (74) Agent: FUESS, William, C.; Fuess & Davidenas, Suite II-G, 10951 Sorrento Valley Road, San Diego, CA 92121-1613 (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, GW, 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, 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 With international search report. Before the expiration of the time limit for amending the claims and to be republished in the event of the receipt of amendments. (88) Date of publication of the international search report: 25 March 1999 (25.03.99)	

(54) Title: HYBRID UNIVERSAL BROADBAND TELECOMMUNICATIONS USING SMALL RADIO CELLS INTERCONNECTED BY FREE-SPACE OPTICAL LINKS



(57) Abstract

Diverse communication terminals attach via broadband radio to a communications network at any of typically three hierarchical cell sizes; picocells (1), standard cells (2) and macro cells (3), increasing from, typically, a single building to a city to a region. Almost all telecommunications traffic transpires, however, within the lowest level picocells (1) to and from low cost base stations (11) that have typically one radio transceiver (111), four optical transceivers (112) an ATM switch (11) and an ATM controller (114). Each local base station (11) is interconnected to a regional end office switch (12), where a connection to a worldwide wire/fiber line communications backbone (4), upon a multi-hop mesh network (100) via short highly-focused free-space broadband directional optical links (10). By this free-space wireless broadband access, subscriber service requirements on the order of 20 Mbps peak rate and 10 Mbps average are provided.

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	ML	Mali	TR	Turkey
BG	Bulgaria	HU	Hungary	MN	Mongolia	TT	Trinidad and Tobago
BJ	Benin	IE	Ireland	MR	Mauritania	UA	Ukraine
BR	Brazil	IL	Israel	MW	Malawi	UG	Uganda
BY	Belarus	IS	Iceland	MX	Mexico	US	United States of America
CA	Canada	IT	Italy	NE	Niger	UZ	Uzbekistan
CF	Central African Republic	JP	Japan	NL	Netherlands	VN	Viet Nam
CG	Congo	KE	Kenya	NO	Norway	YU	Yugoslavia
CH	Switzerland	KG	Kyrgyzstan	NZ	New Zealand	ZW	Zimbabwe
CI	Côte d'Ivoire	KP	Democratic People's Republic of Korea	PL	Poland		
CM	Cameroon	KR	Republic of Korea	PT	Portugal		
CN	China	KZ	Kazakstan	RO	Romania		
CU	Cuba	LC	Saint Lucia	RU	Russian Federation		
CZ	Czech Republic	LI	Liechtenstein	SD	Sudan		
DE	Germany	LK	Sri Lanka	SE	Sweden		
DK	Denmark	LR	Liberia	SG	Singapore		
EE	Estonia						

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US98/01250

A. CLASSIFICATION OF SUBJECT MATTER

IPC(6) :H04Q 7/20

US CL :455/422

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)

U.S. : 455/422, 436, 437, 439; 370/331, 256, 397

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 practicable, search terms used)
APS

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	US 5,539,744 A (CHU et al.) 23 July 1996, abstract; fig. 5; fig. 22; col. 15: lines 54-67, col. 16: lines 1-22 and 51-67, col. 17: lines 1-16).	1-30
Y	US 5,553,069 A (UENO et al.) 03 SEPTEMBER 1996, abstract, figs. 3-6 and 9-10, col. 6: lines 58-67, col. 7: lines 1-46 and 60-67, col. 8: lines 1-18; col. 9: lines 30-54; col. 10: lines 14-38.	1-30
A	US 5,487,065 A (ACAMPORA et al.) 23 January 1996, abstract, col. 1: lines 14-67, col. 2: lines 1-59.	1-30
Y	US 5,420,863 A (TAKETSUGU et al.) 30 May 1995, abstract; figs. 9-10; col. 10: lines 22-67; col. 11: lines 1-44.	1-30

☐ Further documents are listed in the continuation of Box C. ☐ See patent family annex.

* Special categories of cited documents:	*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
A document defining the general state of the art which is not considered to be of particular relevance	*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
E earlier document published on or after the international filing date	*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
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)	*G* document member of the same patent family
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	

Date of the actual completion of the international search

21 DECEMBER 1998

Date of mailing of the international search report

08 FEB 1999

Name and mailing address of the ISA/US
Commissioner of Patents and Trademarks
Box PCT
Washington, D.C. 20231

Facsimile No. (703) 305-3230

Authorized officer

MYRON WYCHE

Telephone No. (703) 308-6729