FORM PTO-1595
1-31-92

01-13-2004

102720083

ET

U.S. Department of Commerce
Patent and Trademark Office
Attorney Docket No. 8953.0008-00
Attorney Customer Number: 22,852

To the Honorable Commissioner c
Please record the attached origina

ATTN. BOX ASSIGNMENTS

1. Name of conveying party(ies),.

Adaptive Broadband Limited

4-7-04

Additional name(s) of conveying party(ies) attached? ☐ Yes ☒ No

3. Nature of conveyance:

☒ Assignment ☐ Merger

☐ Security Agreement ☐ Change of Nam

☐ Other:

Execution Date: November 2, 2001

OIPE JC9

APR 07 2004

PATENT & TRADEMARK OFFICE

2. Name and address of receiving party(ies):

Name: Adaptive Broadband Corporation

Internal Address:

Street Address: 1143 Borregas Avenue

City: Sunnyvale

State:	CA	Zip Code:	94089

Additional name(s) & Address(es) attached?

☐ Yes ☒ No

4. Application number(s) or patent number(s): If this document is being filed together with a new application, the execution date of the application:

A. Patent Application Number(s):

09/537,743

B. Patent Number(s):

Additional numbers attached? ☐ Yes ☒ No

5. Name and address of party to whom correspondence concerning document should be mailed:

Name: FINNEGAN, HENDERSON, FARABOW, GARRETT & DUNNER, L.L.P.

Internal Address:

Street Address: 1300 I Street, N.W.

City: Washington, D.C.

State: Zip: 20005-3315

6. Total number of applications and registrations involved: 1

7. Total fee (37 CFR 3.41): $40

☒ Enclosed (Please charge deficiency to deposit account)

☐ Authorized to be charged to deposit account

8. Deposit Account No.: 06-0916

9. Statement and signature.

To the best of my knowledge and belief, the foregoing information is true and correct and any attached copy is a true copy of the original document.

Linda J. Thayer, Reg. No. 45,681

Linda J. Thayer
Signature

4/6/04
Date

Total number of pages including cover sheet, attachments and documents: 35

DATED 2 November 2001

(1) ADAPTIVE BROADBAND LIMITED (IN ADMINISTRATION)
AND
(2) ADAPTIVE BROADBAND CORPORATION
AND
(3) MARTIN FISHMAN and ROY BAILEY

ASSIGNMENT OF INTELLECTUAL PROPERTY RIGHTS

Taylor Vinters
Merlin Place
Milton Road
Cambridge CB4 0DP

Tel: 01223 423444
Fax: 01223 425446

Our Ref: JAA/RCE

5614342

THIS ASSIGNMENT is made the 2 day of November 2001

BETWEEN:

1 **ADAPTIVE BROADBAND LIMITED** in administration a company incorporated in England (registered number 3552746) whose registered office is at 180 Strand, London WC2R 2NT acting by one of its joint administrators **MARTIN FISHMAN** and **ROY BAILEY** of Arthur Andersen, PO Box 55, 180 Strand, London WC2R 2NT ("the Assignor");

2 **ADAPTIVE BROADBAND CORPORATION** a company incorporated in Delaware, USA having its principal place of business at 2055 Gateway Place, Suite 400, San Jose, CA 95710 USA ("the Assignee"); and

3 **MARTIN FISHMAN** and **ROY BAILEY** ("the Administrators") both of c/o Arthur Andersen, PO Box 55, 180 Strand, London WC2R 2NT.

RECITALS

(1) The Administrators were on 23 August 2001 appointed administrators of the Assignor by order of the High Court of Justice in England pursuant to a petition presented on 16 August 2001 (matter number 4998 of 2001).

(2) The Assignor is the owner of the Intellectual Property Rights (as hereinafter defined) used in the Business of the Assignor.

(3) The Assignor has agreed to assign to the Assignee all the Intellectual Property Rights (as hereinafter defined) used in the Business.

In consideration of the sum of one dollar (US$1.00) now paid by the Assignee to the Assignor (the receipt of which is hereby acknowledged by the Assignor) **IT IS HEREBY AGREED** as follows:

1 **INTEPRETATION**

In this Assignment, the following terms shall have the following meanings:-

1.1 **"the Business"** the business of the Assignor being research and development of wireless point to multipoint broadband communications

"the Intellectual Property Rights" all United States, foreign and international patents and patent rights (including all patents, patent applications, and any and all divisions, continuations, continuations-in-part, reissues, re-examinations and extensions thereof, and all invention registrations and invention disclosures); all trademarks and trademark rights, service marks and service mark rights, trade names and trade name rights, service names and service name rights (including all goodwill, common law rights and governmental or other registrations or applications for registration pertaining thereto), designs, trade dress, brand names, business and product names, Internet domain names, logos and slogans; all works of authorship, copyrights and copyright rights (including all common law rights and governmental or other registrations or applications for registration pertaining thereto, and renewal rights therefor); all sui generis database rights, ideas, inventions, (whether patentable or not), invention disclosures, improvements, technology, know-how, show-how, trade secrets, formulas, systems, processes, designs, methodologies, industrial models, databases, content, graphics, technical drawings, statistical models, algorithms, modules, computer programmes, technical documentation, business methods, work product, intellectual and industrial property licenses, proprietary information, customer lists, and documentation relating to any of the foregoing; all mask works, mask work registrations and applications therefor; all industrial designs and any registrations and applications therefor throughout the world; all computer software including all source code, object code, firmware, development tools, files, records and data, and all media on which any of the foregoing is recorded; all similar, corresponding or equivalent rights to any of the foregoing; and all documentation related to any of the foregoing including without limitation those listed on Schedule 1 hereto

1.2 The heading to the clauses of this Agreement are for convenience only shall not affect the construction of this Agreement.

1.3 In this Agreement unless the context otherwise requires:

1.3.1 references to this Agreement include the Schedules and appendices (if any);

1.3.2 references to clauses and Schedules are to be construed as references to the clauses of and Schedules to this Agreement;

1.3.3 references to the singular shall include the plural and vice versa;

1.3.4 all references to a statutory provision shall be construed as including references to any statutory modification, consolidation or re-enactment (whether before or after today's date) for the time being in force, all statutory instruments or orders made pursuant to it and any statutory provisions of which it is a consolidation re-enactment or modification.

2 **ASSIGNMENT**

The Assignor **HEREBY ASSIGNS** to the Assignee such right, title and interest as it has in and to the Intellectual Property Rights together with all statutory and common law rights connected thereto and together with all the rights of action, powers, benefits and immunities belonging to the same wherever in the world, including the right to sue for and obtain damages and other relief in respect of any act of infringement (whether past, present or future) of the Intellectual Property Rights or any of them or the violation of any common law rights connected with the Intellectual Property Rights.

3 **ASSIGNOR'S COVENANTS**

The Assignor covenants with the Assignee that it will execute all such further reasonable assignments, transfers, deeds, documents or other assurances (within its power) and do all further reasonable acts and things as the Assignee may require in order to become the legal and beneficial owner of the Intellectual Property Rights and otherwise to give effect to the terms of this Assignment at the cost of the Assignee and only up and until the discharge of the Administration Order .

4 **FACSIMILES AND COUNTERPARTS**

4.1 For the purpose of this Agreement, any copy, facsimile telecommunication or other reliable reproduction of a writing transmission or signature may be substituted for or used in lieu of the original writing transmission or signature for any and all purposes for which the original writing, transmission or signature could be used provided that such copy, facsimile telecommunication or other reproduction shall be a complete reproduction of the entire original writing, transmission or signature as the case may be.

4.2 This Agreement may be executed in any number of counterparts with the same effect as if all signatory parties had signed the same document. All counterparts shall be construed together and shall constitute one and the same instrument.

5 ADMINISTRATORS TO HAVE NO LIABILITY

5.1 The Assignee acknowledges to and agrees with the Administrators that the Administrators are a party to this Agreement and are executing it only for the purpose of taking the benefit of the acknowledgements given by the Assignee in this Agreement.

5.2 The parties agree that the Administrators act as agents of the Assignor and that neither the Administrators nor their firm shall incur any personal liability under this Agreement or in respect of anything arising directly or indirectly in connection with it and accordingly their personal liability is excluded.

5.3 It is agreed between the parties that Dan Scharre is signing the Agreement as the "responsible" party under the Court order and as such accepts no personal liability under this Agreement.

6 LIABILITY OF THE PURCHASER

Notwithstanding any other provision in this Agreement the Assignee shall have no liability whatsoever without limitation to any other party save for its obligations to direct Moseley to pay to the Assignor the sums which have been agreed to be paid in respect of this Assignment. This exclusion of liability shall operate to the maximum extent permitted by English law. The parties agree that this exclusion of liability is reasonable in all the circumstances.

7 ACCURACY OF THE SCHEDULE

The Assignee acknowledges and declares that it has satisfied itself or has had the opportunity to satisfy itself as to the accuracy of the Schedule of this Agreement and will make no claim against the Assignor or the Administrators if any of the items referred to in such Schedule are found to be missing or found to be incorrectly described whether in terms of quality quantity physical appearance or otherwise.

8 ENFORCEMENT BY THIRD PARTIES

The parties to this Agreement do not intend that any of its terms will be enforceable by virtue of the Contracts (Rights of Third Parties Act) 1999 by any person not a party to it.

9 NOTICES

Any notice or other communication required or permitted to be delivered to any party under this Agreement shall be in writing and shall be deemed properly delivered,

given and received when delivered (by hand, by courier or express delivery service or by telecopier) to the address or telecopier number set forth beneath the name of such party below (or to such other address or telecopier number as such party shall have specified in a written notice given to the other parties hereto) provided that in case of communication by telecopier a hard copy of the communication is forwarded to the addressee by courier or express delivery service:

the Assignor:	Adaptive Broadband Limited c/o Arthur Andersen, PO Box 55, 180 Strand, London WC2R 2NT (FAO Martin Fishman)
if to Assignee:	Adaptive Broadband Corporation 2055 Gateway Place, San Jose, CA 95110, USA With a copy to Moseley Associates Inc, 111 Castillian Drive, Santa Barbara, CA 93117, USA (for the attention of Jamal Hamdani)

10 **GOVERNING LAW AND JURISDICTION**

10.1 In relation to any issues raised or commenced by the Assignee, this Agreement shall be governed by and construed in accordance with English Law and the parties irrevocably agree that the Courts of England and Wales shall have jurisdiction in respect of any such dispute, suit, arbitration or proceedings. In relation to any issues raised or commenced by the Assignor, this Agreement shall be governed by and construed in accordance with the laws of California and the parties irrevocably agree that the United States Bankruptcy Court for the Northern District of California shall have jurisdiction in respect of any such dispute, suite arbitration or proceedings.

11 **ASSIGNMENT**

The Assignee shall be entitled to assign this Agreement but only with the prior written consent of the Administrators (such consent not to be unreasonably withheld) (save that the obligation to effect payment of the sum of one dollar (US$1.00) now paid by the Assignee to the Assignor may not be assigned) to any subsequent purchaser of the Intellectual Property Rights on the basis that the subsequent purchaser becomes responsible for all obligations of the Assignee under this Agreement.

SCHEDULE 1

INTELLECTUAL PROPERTY

1. All Intellectual Property Rights owned by the Vendors referred to in the Non-Exclusive Technology License, Manufactuing License and Supply Agreement dated 27 March 1998 made between Virata Limited and the Vendor.

2. All Intellectual Property Rights owned by the Vendor and listed in Part A of this Schedule.

3. All Intellectual Property Rights owned by the Vendor in the Patent Applications listed in Part B of this Schedule.

Rt

(Rt signs where page repla[illegible]
after signature by Martin Ashw[illegible]
Solicitor acting on behalf

SCHEDULE 1: PART A

ASSIGNED TECHNOLOGY

SCHEDULE 2 Part I - ASSIGNED TECHNOLOGY

The various IPRs fall into the following main categories:

- Hardware
- Software
- Published and presented papers
- Internal Documents, including:
  - diagrams
  - specifications
  - presentations
- Patent Applications:
  - Filed applications
  - Applications in progress
  - Identified Application

Each of these categories are further expanded in the following sections of this schedule.

Some of the elements included in these categories have been developed by sub-contractors working under contracts and purchase orders from ORL. Where this is the case these developments have been identified by their relevant ORL purchase order number, and are to be included in the list of IPR to be transferred to ABL.

HARDWARE

Initial Test-bed

1992: Initial prototype radio test-bed developed.

Number of discrete functionality blocks in individual metal shielded tin-boxes:

e.g. Fixed Oscillators
Mixers
PAs
LNAs

These building blocks were interconnected to conduct early research experiments into high bit rate data (10Mbps) transmission using a radio propagation frequency of 2.45GHz.

PC to PC point to point Link

December 1992 - Q3 1993: Follow-on development of initial test-bed.

PC ISA bus digital interface card, including early MAC prototype;
RX AGC IF board;
TX/RX Baseband board;
2.45GHz Front-end board.

This prototype was used as the initial test vehicle for sending ATM cells at an 'on-the-air' bit rate of 10Mbps. Hardware was optimised to support fast TX/RX turn-around times. More detailed experiments were conducted into end-to-end efficiency and to maintaining link QoS parameters. Initial MAC ideas were developed and tested.

Prototype Radio ATM System

Q3 1993 - End 1995: Re-design of PC-PC point to point link

New board-set:

Data recovery and MAC interface;
QPSK Baseband;
Modular 2.45GHz RF.

All boards are single eurocards, connected on a back-plane and boxed-up to form a Radio ATM Basestation. The basestation uses ATMos100 card for CPU and wired ATM network connection.

This 'grey-box' prototype system which has been running during most of the past 2 years and has been used for development of protocols, system software and demonstration applications.

Current ORL developed prototype product(s)

Q3 1996 – Q1 1998: A set of boards facilitating initial product assessments.

ORL 2.45GHz RF;
ORL combined dual frequency 5GHz RF & IF;
ORL generic Modem DSP;
ORL generic RUBY (MAC);
Backplane
All rack and case housing designs.

This configuration uses the Nortis ATM25 CPU card, which is part of the Background Technology listed in Schedule B of this document. All other boards have been designed in-house by ORL and include both radio and digital PCBs.

Hydrogen based prototype product

Q1 1998-date: A set of boards including:

ORL dual-band 5GHz RF v1.1
ORL Modem DSP (10K100 version)
Hydrogen MAC board
Hydrogen IP board
All rack and case housing designs

Included within all of the versions of hardware listed above are all designs for programmable gate arrays, such as PALs, Xilinx and Altera FPGA devices. The source of those designs are essentially written in High Level Descriptions languages (HDLs), and although not individually identified they are fundamental parts of the hardware named above. As such all hardware listed above includes all versions of programmable device designs respective to that piece of hardware. Included is all relevant documentation for these devices and pieces of hardware.

All IPR generated from the following ORL Purchase Orders:

PO No. 960790 to Plextek

Propagation Study at 5Ghz.

As per Plextek Proposal No: 6352V3, dated 30/09/96.

PO No. 960848 to Plextek

Design Study for 5Ghz radio.

As per Plextek Proposal No. 6356V1, dated 30/09/96.

PO No. 970009 to Plextek

Further Propagation Investigations.
As per Plextek Proposal 6443, dated 16/12/96.

PO No. 970282 to Plextek

RF and IF system specification and design.
As per Plextek proposal No. 7107V4.

PO No.s 971003 & 980241 to 4M Manufacturing Management

Design, Development and Production of Radio Case Metalwork.

SOFTWARE

Listed below are all the functional modules and respective source files which comprise the current implementation of the Radio ATM System software, a simplified and limited hand-over implementation and the new implementation of the Radio ATM System Software.

The Current Implementation is that which is used with the ORL Prototype Radio ATM System hardware as specified earlier in this schedule. The Limited Handover Implementation is a further development which is again targeted at the ORL prototype hardware.

The new implementation of the Radio ATM System Software is that which is to be targeted at the initial Product Prototype Hardware as defined earlier in this schedule. It retains and builds on much of the software developed for the Current Implementation and the Limited Handover Implementation.

As well as the various versions of System Software there is a number of underlying low-level support elements which have been developed, and these are targeted towards the embedded microcontrollers that are an essential part of the hardware designs. These components are further specified below.

Previous Implementation

The current implementation supports point-to-point wireless ATM connectivity between two wireless ATM access points. In order to emulate a mobile, an ATM device is attached to one access point, termed the mobile access point which then communicates to the wired network via the fixed access point.

The functionality of this implementation is contained in the following modules:

- "bridge" Bridging/relaying between ATM and RATM
- "loopback" ATM loopback driver (derived from ATMos ATM driver)
- "ratm" Radio ATM device driver (derived from ATMos ATM driver)
- "net" Modified MSNL module (derived from ATMos net process)
- "rrtest" Radio ATM test module
- "test" Radio ATM test module

Source files for these modules are contained in:

/project/radio/atmos/src/ratmbridge/

Runtime configuration files for the access points are contained in:

/project/radio/atmos/etc/

Limited Handover Implementation

The limited handover implementation is an extension of the current implementation which supports the handover of a single wireless ATM device between two access points. This also includes support for the timestamping of ATM cells with GPS time to enable the determination of cell transfer delay and cell delay variation both over the wired and wireless networks.

The functionality of this implementation is contained in the following modules:

- "bridge" Bridging/relaying between atm and ratm
- "relay" Application-layer and ATM-layer relaying of connections
- "loopback" ATM loopback driver (derived from ATMos atm driver)
- "ratm" Radio ATM device driver (derived from ATMos atm driver)
- "net" Modified MSNL module supporting multiple network devices (derived from ATMos net process)
- "rrtest" Radio ATM test module
- "test" Radio ATM test module
- "atm_timestamped" ATM device driver supporting timestamping of cells.
- "omnintpd" Interface to GPS (developed at ORL by CL students)

Source files for all but the last module are contained in:

/project/radio/software/develop/src/

Source files for the last module are contained in:

/project/cadmus/master_source/omnintpd/

Runtime configuration files for the access points are contained in:

/project/radio/atmos/etc/

New Implementation

The new implementation supports the registration and automatic handover of multiple mobile ATM devices and mobile ATM networks in a wireless ATM LAN.

The functionality of this implementation is contained in the following modules:

- "SP" Generic switching point library with path and connection signalling abstractions
- "utils" General utility functionality
- "BM" Low-level access point radio and meta-signalling management
- Low-level mobile and mobile access point radio and meta-signalling management
- "DLS" Domain Location Service CORBA implementation
- "FSP" Fixed switching point which runs on switch handling registration, booting, routing and connection setup, and handover of mobiles.
- "BSP" Base switching point which runs on fixed access point handling registration, booting, connection setup and handover of mobiles.
- "MSP" Mobile switching point which runs on mobile or mobile access point handling registration, booting, connection setup and handover.
- "loopback" ATM loopback driver (derived from ATMos atm driver)
- "atm" Modified ATM driver which supports VCI handover and proxy addresses
- "ratm" Radio ATM device driver (derived from ATMos atm driver)
- "net" Modified MSNL module supporting multiple network devices and VPIs (derived from ATMos net process)
- "relay" Application-layer and ATM-layer relaying of connections
- Network-side ATM ILMI address registration process (derived from Linux ATM ilmid Copyright © 1995 Telecommunications & Information Sciences Laboratory, The University of Kansas and Copyright © 1992 Michael Sample and the University of British Columbia. (not GPL)).
- User-side ATM ILMI address registration process (derived from Linux ATM ilmid Copyright © 1995 Telecommunications & Information Sciences Laboratory, The University of Kansas and Copyright © 1992 Michael Sample and the University of British Columbia. (not GPL)).
- "gsmp" GSMP version 1.1 controller process
- "saal" ATM Signalling Adaptation Layer process (derived from Linux ATM Copyright 1995-1997 EPFL-LRC, under GPL)
- "psa" Proxy Signalling Agent process (parts derived from Linux ATM Copyright 1995-1997 EPFL-LRC, under GPL)

Source files for these modules are contained in:

/project/radio/software/version1.0/
/project/radio/software/version2.0/
/project/radio/software/version3.0/
/project/radio/software/version3.1/

Runtime configuration files in:

/project/radio/atmos/etc/

Low Level Software

The software and firmware specified below is used in close co-operation with the microcontrollers embedded in the hardware designs of the system. The specific items identified below have been independently developed by ORL and are extensions to the core ATMos software which is to be licensed by ABL under a license agreement with another company separate from ORL.

Source for RUBY (MAC) board monitor ROM :

/project/atmos/source4.0/rom-extensions/minilzo
/project/atmos/source4.0/rom-extensions/ruby
/project/atmos/source4.0/rom-extensions/test_consoles

ATM25 CPU board cell-relay sources :

/project/radio/atmos/src/cell-relay

Sources for RUBY (MAC) board cell-relay, GSMP and ATM device drivers :

Ucos code:

/project/ucos/source1.0
/project/ucos/source1.0/atm
/project/ucos/source1.0/pool
/project/ucos/source1.0/timer
/project/ucos/source1.0/tsmp

Also included in the low level software is the files contained in /project/ucos/source1.0, this element being part of the Background Technology Specified in Schedule B.

UNIX utilities & scripts:

/project/atmos/utils/source/cstobj/format_image.c
/project/atmos/utils/source/cstobj/hextobin.c
/project/atmos/utils/source/minikm.103
/project/atmos/utils/sh/create_ucos_image
/project/atmos/utils/sh/create_xilinx_image

Modern Modelling Software

Simulation models of channels and modem implementations in:

/home/sdg/RATM
/home/sdg/Matlab files
/home/sdg/RATM_V5.1

Channel sounder processing files in:

/home/sdg/sounder

Build and support tools in

/home/jdp/src/python
/home/jdp/emacs

Management Software

SNMP MIB specification – defines the proposed SNMP management interface

/home/ct/mib_work/

Embedded HTTP server software

/project/radio/jbpn/cherokee/src

DOCUMENTATION

Papers

- "Low Latency Handover in a Wireless ATM LAN", John Naylon, Damian Gilmurray, John Porter, Andy Hopper, submitted to IEEE JSAC Special Edition on Wireless Access Broadband Networks.
- ORL Technical Report 96.5 "The ORL Radio ATM System, Architecture and Implementation", John Porter, Andy Hopper, Damian Gilmurray, Oliver Mason, John Naylon, Alan Jones.
- ORL Technical Report 94.2 "An ATM based protocol for Wireless LANs", John Porter, Andy Hopper.
- "Wireless ATM Service Scenarios", ATM Forum Contribution 96-1056
- "Wireless ATM Radio Access Layer Requirements", ATM Forum Contribution 96-1057
- "Tunnelled Signalling for the Support of Mobile ATM", ATM Forum Contribution 96-1699
- "Wireless ATM Handover Requirements and Issues", ATM Forum Contribution 97-0153
- "Wireless Mobile Terminal/Network Anchor Switch Handover Model", ATM Forum Contribution 97-0265

- "Handover Requirements for WATM Baseline Document", ATM Forum Contribution 97-0266
- "Surrogate Signalling Support for Mobile ATM Networks", ATM Forum Contribution 97-0533

Specifications

Various notes and specification files for the new implementation are contained in:

/project/radio/dpg/notes/

TCP/IP architecture proposals

Proposals for modifications to TCP/IP stack for the support of PPP

/home/ct/virata

Presentations

A number of PowerPoint presentations of all aspects of the Radio ATM system, including details of the three above implementations, are contained in:

/home/dpg/talk/ and in /project/radio/doc/rmm/presentations/

Internal Documents

All documentation contained in:

/home/jdp/doc

Web based documentation contained in

/project/radio/private_html

Internal documents contained in:

Yet to be compiled, but will include all working documents, notes, engineers note books, emails and any other day to day communications.

Diagrams

Diagrams of the registration and handover protocols for the new implementation and diagrams of the finite state machines of each protocol for the F8P, BSP and MSP are contained in:

/project/radio/dpg/doc/visio/

PATENT APPLICATIONS

Filed Applications

Precoding of Digital Radio Signals
UK Patent Application No. 9711217.1, filed on 30 May 1997

Frame scheduling and Access Point Synchronisation
UK Patent Application No. 9717918.8, filed on 22 August 1997

Improved Equalizer for Radio Networks
UK Patent Application No. 9807600.3, filed on 8th April 1998

Applications in Progress

Proxy Signalling for Wireless ATM Networks
First draft prepared, to be edited and filed by end of June.

Media Access Control (MAC) - to be split, see below
This has been be split into three separate applications as identified below

Applications identified and to be started

MAC 1 - Organisation of Internal Queues

MAC 2 - Arrangement of the Queuing Structure & Interaction with the Selective Transmission Mechanism

MAC 3 - Scheduling of the Receive/Transmit Portions of the Frame

Subscriber Unit - Access Point Relay

ATM Antenna

MulticastAP - Multiple Antennas

Further Equalizer Applications

WT Transmit Power control based on AP bursts

WT Frequency control based on AP bursts

PART 2

Licensed Intellectual Property

See Attached Schedule

SCHEDULE 2 Part II - LICENSED TECHNOLOGY

Listed below are the elements of Licensed Technology.

Hardware:

Nexus ATM25 CPU card.

The Nexus ATM25 CPU board was produced under sub-contract to ORL by a consultancy house, Nexus; it is further identified below by the ORL purchase orders placed for the specific design work.

PO Nos 950503 & 960589 to Nexus Electronics
Development of ATM25 CPU card.

Software:

Generic ATMos sources as found in:

/project/ucos/source1.0
/project/atmos/source4.0/rom
/project/atmos/source4.0/rom-extensions
/project/atmos/source4.0/rom-rubytest
/project/atmos/source4.0/config

Together with such patents, designs, copyrights, mask works, know how and other intellectual property rights as are owned by the Vendor and are used by ORL in the Activity as at the Completion Date.

SCHEDULE 1: PART B

PRELOADING FOR EQUALISERS - 19450

2. Preloading for Equalisers - 19450

2.1 Abstract

A decision feedback equaliser is preloaded with filter coefficients for training purposes. A data signal is received which includes a training sequence. A sample value of the training sequence is correlated with a stored equivalent training sequence and the peak correlation value is determined. A first set of correlation values is preloaded into a feedforward position of the DFE for use as initial feedforward filter coefficients before training and the outputs of a feedforward filter are used as initial feedback filter coefficients in a feedback portion of the DFE.

2.2 Inventor

John David Porter, Malcolm Paul Sellars to be added to US and EP

2.3 Priority Date

08/04/98

2.4 Application Details

GB	9807600.3	08/04/98	Status: Awaiting first Examination report Deadlines: No diarised deadlines
PCT	PCT/GB99/01081	08/04/99	Status: International Preliminary Examination Report received – national regional phase completed in US and EP
US	Not yet known	TBA	US application filed. Awaiting first OA.
European	99915888.4	TBA	Filed

3. Radio Communication System - 19451

3.1 Abstract

Data transmissions take place in a radio communication system between at least one base station and at least one remote station. The base station is able to transmit signals to and receive signals from the remote station whilst the remote station is in a predetermined area. A priority is assigned to each type of data to be transmitted and the type and priority of each forthcoming transmission is determined and stored. Data types of the highest priority are then transmitted prior to data types with lower priorities. Where there is more than one base station there will be a plurality of overlapping communication cells. The base stations broadcast signals in a first time period and remote stations transmit signals in a second time period. The base stations are coupled to a central controller which synchronises the first and second time periods used by the base stations in adjacent cells. The number of transmissions in each cell is monitored and the durations of each of the first and second time periods adjusted to improve the use of available transmission bandwidth. Transmissions from remote stations to base stations may be transmitted after a predetermined delay which is varied in dependence on the distance of the remote station from the base station.

3.2 Inventor

John David Porter

3.3 Priority

22/08/97

3.4 Application Details

Australia	88178/98	24/08/98	Status: Awaiting next communication from agent Deadline: No diarised deadlines
Brazil	PI9811385-	24/08/98	Status: Abandoned 5 Jun 2001
Canada	2300895	24/08/98	Status: Awaiting next communication from agent Deadline: No diarised deadlines
China	98808375.2	24/08/98	Status: Awaiting next communication Deadline: No diarised deadlines

Czech Republic	PV2000-598	24/08/98	Status: Abandoned 5 Jun 2001
European	98939778.1	24/08/98	Status: Awaiting first official action from EPO Deadline: No diarised deadlines
GB	9717918.8	22/08/97	Status: Awaiting first examination report Deadline: No diarised deadlines
Hungary	0006335	24/08/98	Status: Awaiting next communication from agent Deadline: No diarised deadlines
Indonesia	W-20000557	24/08/98	Status: Abandoned 15 August 2001
Japan		24/08/98	Status: Awaiting next communication from agent Deadline: No diarised deadlines
Korea	7001836	24/08/98	Status: Awaiting next communication from agent Deadline: No diarised deadlines
Mexico	1730	24/08/98	Status: Abandoned 5 June 2001
Norway	20000842	24/08/98	Status: Awaiting next communication from agent Deadline: No diarised deadlines
Poland	P339074	24/08/98	Status: Awaiting next communication from agent Deadline: No diarised deadlines
Russia	2000107145	24/08/98	Status: Abandoned 6 Jun 2001
US	09/510952	24/08/98	Status: Awaiting first Office Action Deadline: No diarised deadlines
PCT	PCT/GB98/02535	24/08/98	Status: Entered national/ regional phase in 17 countries Deadline: No diarised deadlines

4. Stabilized Precoder for Data Transmission – 19461

4.1 Abstract

A precoding scheme for digital data transmission across multipath channels is described, which improves on existing methods of precoder stability. This precoding scheme uses radial reduction of unstable roots to stabilize the precoder. Furthermore, in a broadband access system in which the precoding scheme is used, all of the precoding and equalization is performed in the subscriber units. This eliminates the problems of equalization and training delays occurring at the base station, thus allowing rapid demodulation of data arriving at the base station for several disparate subscriber terminals units.

4.2 Inventor

Malcolm Paul Sellars

4.3 Priority Date

19/02/99

4.4 Application Details

GB	9903920.8	19/02/99	Status: Awaiting first Esamination Report
US	09/506,381	18/05/00	Status: Received Notice of Allowance Deadline: 12 October 2001
PCT	PCT/GB00/00589	18/02/00	Status: International Search report received. Demand filed. Entering national/regional phase after Chapter II PCT due – 19/08/01

5. Data Communications Method and Data Signal – 19462

5.1 Abstract

A data communications method and data signal is presented wherein dynamic time-variable time-division duplexing can be achieved by virtue of control data in the form of a frame descriptor header, providing full a priori knowledge of every subscriber terminal in a cell of the expected contents, structure and/or timing of the remainder of the data to be transmitted onto a common channel in both the upstream and downstream direction in the remainder of the frame. The invention has the advantage that channel utilisation efficiency can remain high regardless of the symmetry of the upstream and downstream traffic.

5.2 Inventors

John David Porter, Walter Charles Vester

5.3 Priority Date

31/03/99

5.4 Application Details

Argentina	P000101392	28/03/00	Status: Awaiting first Office Action Deadline: Examination due – 28/03/03
Chile	2000-759	30/03/00	Status: Abandoned
GB	9907481.7	31/03/99	Status: Awaiting first Examination Report
US	09/540,995	31/03/00	Status: Awaiting first Office Action Deadline: No diarised deadlines
PCT	PCT/GB00/01125	24/03/00	Status: Demand filed Entering national/ regional phase after Chapter II PCT due – 30/09/01

6. Method and System for Compensating Signal Propagation Delay – 19463

6.1 Abstract

Propagation delay compensation in a wireless network comprising a central access point and multiple subscriber terminals is achieved by defining a registration time slot in which new subscriber terminals must first transmit network registration signals to the access point. The subscriber terminals by default transmit at the start of the time slot, and the access point times the delay from the start of the slot to the receipt of the subscriber terminal registration request, and then transmits this information back to the subscriber terminal. In all subsequent transmissions the subscriber terminal uses this information to delay its transmissions to compensate for differences in signal propagation delay between each subscriber terminal.

6.2 Inventors

John David Porter, Walter Charles Vester

6.3 Priority Date

31/03/99

6.4 Application Details

Argentina	P100101395	28/03/00	Status: Awaiting first Office Action Deadline: Examination due – 27/03/03
Chile	2000-738	29/03/00	Status: Abandoned
GB	9907482.5	31/03/99	Status: Awaiting first Examination Report
US	09/538,153	29/03/00	Status: Awaiting first Office Action Deadline: No diarised deadlines
PCT	PCT/GB00/01047	21/03/00	Status: Demand Filed Entering national/regional phase after Chapter II PCT due – 30/09/01

7. Method and System for Controlling Transmit Power of Network Nodes – 19464

7.1 Abstract

The transmit power of the subscriber terminals in a wireless network can be controlled by measuring the received power of a signal transmitted from an access point to a subscriber terminal at the subscriber terminal and then using the measured value as an index into a look-up table of transmit power attenuator settings. The use of a simple look-up table reduces the implementation complexity, since no complicated calculations must be performed to achieve effective power control.

7.2 Inventors

John David Porter, Walter Charles Vester

7.3 Priority Date

31/03/99

7.4 Application Details

Argentina	P000101396	28/03/00	Status: Awaiting first Office Action Deadline: Examination due – 27/03/03
Chile	2000-739	29/03/00	Status: Abandoned
GB	9907484.1	31/03/99	Status: Awaiting first Examination Report
US	09/537,743	30/03/00	Status: Awaiting first Office Action Deadline: No diarised deadlines
PCT	PCT/GB00/01054	29/03/00	Status: Demand filed Entering national/regional phase after Chapter II PCT due – 30/09/01

8. Method and System for Baseband Delay Compensation – 19465

8.1 Abstract

Subscriber turnaround time in a subscriber terminal which forms part of a time division duplex network can be reduced by providing a bi-directional signal path, or alternatively a separate transmit and receive signal path, within the subscriber terminal modem. This will allow received demodulated data to be processed concurrently with data to be subsequently sent, thus reducing the baseband processing delay.

8.2 Inventors

John David Porter, Walter Charles Vester

8.3 Priority Date

31/03/99

8.4 Application Details

[illegible]	[illegible]	[illegible]	[illegible]
Argentina	P000101393	28/03/00	Status: Awaiting first Office Action Deadline: Examination due – 27/03/03
Chile	2000-778	31/03/00	Status: Abandoned
GB	9907486.6	31/03/99	Status: Awaiting first Examination Report
US	09/537,740	30/03/00	Status: Awaiting first Office Action Deadline: No diarised deadlines
PCT	PCT/GB00/01044	21/03/00	Status: Demand filed Entering national/regional phase after Chapter II PCT due – 30/09/01

9. A Method and System for Automatic Retransmission of Data – 19466

9.1 Abstract

The integrated channel access mediation and automatic repeat query (ARQ) mechanism is provided wherein an acknowledgement array is generated at a receive terminal corresponding to the successful receipt of data packets from a sender terminal. The position of the flags in the array correspond precisely to the order in which the data packets were sent, and hence the position of each flag conveys packet identifier information, thus, reducing network overheads in sending identifier information explicitly. This has the primary advantage that spectral efficiency is increased.

9.2 Inventors

John David Porter, Walter Charles Vester

9.3 Priority Date

31/03/99

9.4 Application Details

Argentina	P000101394	28/03/00	Status: Awaiting first Office Action Deadline: Examination due – 27/03/03
Chile	2000-758	30/03/00	Status: Abandoned
GB	9907488.2	31/03/99	Status: Awaiting first Examination Report
US	09/537,742	30/03/00	Status: Awaiting first Office Action Deadline: No diarised deadlines
PCT	PCT/GB00/01040	21/03/00	Status: Demand filed Entering national/regional phase after Chapter II PCT due – 30/09/01

10. A Method and System for Data Traffic Scheduling – 19467

10.1 Abstract

A method and system for performing data traffic scheduling in a point-multipoint time division duplex network is disclosed, wherein data to be sent to and from a central access point and multiple remote subscriber terminals is respectively queued in respective traffic queues held at each terminal and in the access point, further phantom traffic queues reflecting the queues held at each subscriber terminal being further maintained at the access point in order to provide knowledge of the traffic to be sent on the uplink. A cell scheduler is further provided in the access point which acts to schedule transmission slots to each subscriber terminal in both the upstream and downstream directions based on the queued data traffic, the transmission slot scheduling then being communicated to each subscriber terminal in a broadcast manner.

10.2 Inventors

John David Porter, Walter Charles Vester

10.3 Priority Date

14/04/99

10.4 Application Details

GB	9908559.9	14/04/99	Status: Awaiting first Examination Report
US	09/548,183	13/04/00	Status: Awaiting first Office Action Deadline: No diarised deadlines
PCT	PCT/GB00/01285	06/04/00	Status: All deadlines passed. No national or regional phases entered

11. A Method and System For Wireless Connection to a Wide Area Network – 19468

11.1 Abstract

A method and system for providing wireless backhaul channels for use in a cellular radio network is disclosed wherein any of the subscriber terminals can be used as a backhaul terminal thus dispensing with the need for a dedicated backhaul terminal. In the preferred embodiment, the backhaul channel is integrated with the data channels provided for network payload communications, with the backhaul data being allocated the highest data priority and a traffic scheduler allocating the backhaul data time slots for transmission accordingly. This has the advantage that the bandwidth required for backhaul can be dynamically assigned to cope with the network loading at any time.

11.2 Inventors

John David Porter, Walter Charles Vester

11.3 Priority Date

21/05/99

11.4 Application Details

GB	9911924.0	21/05/99	Status: Withdrawn Deadline: No diarised deadlines
US	09/573,229		Status: Awaiting first Office Action Deadline: No diarised deadlines
PCT	PCT/GB00/01931	22/05/00	Status: All deadlines passed. No national or regional phases filed.
GB	0012398.4	22/05/00	Status Awaiting grant

12. Data Channel Allocation in a Wireless Network – 19469

12.1 Abstract

A dynamic channel allocation method and system for use in a wireless network operates by monitoring at least the allocated channel allocated to a particular network node to generate one or more channel metrics relating to radio conditions on the channel. The metrics generated are Received signal power, signal to noise ratio of transmissions on the network and long-term mean square of the equaliser error used in each terminal. The generated metrics are communicated back to the cell access point or the network control server over a signalling channel, and a new frequency is allocated to the cell if it is determined from the metrics that the presently allocated channel is suffering interference. The signalling channel is preferably an ATM VPI/VCI pair, such that signalling messages are transmitted as ATM cells which can be communicated across the wireless channel using the sane signalling frame as is used for payload cells.

12.2 Inventors

John David Porter, Walter Charles Vester (for British priority application)

John David Porter, Walter Charles Vester, Benedict Freeman (for PCT, US, British convention application)

12.3 Priority Date

11/06/99

12.4 Application Details

GB	9913697.0	11/06/99	Status: Abandoned in favour of later priority claiming application
US		12/06/00	Status: Awaiting first OA Deadline: No diarised deadlines
PCT	PCT/GB00/02242	09/06/00	Status: No Demand filed, Ch. I deadlines passed. No national or regional phases entered.
GB	0014349.5	12/06/00	Status: Awaiting second Exam report or grant. Divsional application filed. Deadline: No diarised Deadlines
GB	0114225.6	11/06/01	Divisional application of GB0015439.5 Status: Awaiting Search and Exam Report

13. Precoder for Data Transmission – 19470

13.1 Abstract

A Pragmatic Precoder which uses a Stability Predictor block to predict stability of the precoder. If the Stability Predictor block predicts instability, it deactivates the precoder, so that the data signal is transmitted without any precoding. A longer training sequence is attached to the front of the data packet to allow the receive equalizer to train correctly. If the Stability Predictor block predicts that the precoder will remain stable, then the precoder operates in a convention manner, except that stabilization methods, such as modulo operators, are not required because the precoder is known to be stable.

13.2 Inventor

Malcolm Paul Sellars

13.3 Priority Date

23/11/99

13.4 Application Details

GB	9927673.5	23/11/99	Status: Awaiting Search report.
US	09/717205	22/11/00	Status: Awaiting first OA

Proxy Signalling in an ATM Network - 19712

14.1 Abstract

A method of setting up a connection between two parties over a radio ATM network is provided. A remote, off-board agent, called the proxy signalling agent, is used to provide signalling and call control functionality for one or more network element(s). In order to receive and transmit signalling messages on behalf of the network element, a bi-directional virtual channel is provisioned, one for each port, from the network element to the proxy signalling agent. For each network element under the control of the proxy signalling agent, the proxy signalling agent provides signalling stacks, one for each of the elements ports, along with call admission control, routing and VCI allocation functions. This avoids the need for the network element to perform these functions.

The proxy signalling agent controls the network element's connection tables using a simple and low-level control protocol to effect changes in the connection state at that element, rather than using UNI. As the network element does not need to provide signalling stacks, it can be a low cost, low complexity device. By making these devices as simple as possible, the overall reliability of the network can be increased.

14.2 Inventor

John David Porter, Damian Peter Gilmurray and David William Pegler

14.3 Priority Date

No priority

14.4 Application Details

US	09/110,948	07/07/98	Status: Awaiting second OA or Notice of Allowance

Increasing Capacity and Improving Coverage of a Cellular Radio Network

Abstract

A wireless cellular communications network providing increased capacity and improved performance by virtue of overlaying existing cells with new cells, characterised in that the antenna beam patterns of the sectors of the overlay cells are offset from the antenna beam patterns of the original existing underlay cell sectors. This results in reduced antenna cusps, being regions of reduced antenna gain which occur between cell sectors in a conventional cellular network. Reducing antenna cusp ensures that radio link budgets can be maintained at a uniform level across the cell, and bit error rates can be kept as low as possible. The effect of the invention is therefore to increase cellular capacity to a further extent than is possible with conventional underlay/overlay network architecture.

Inventor

Benjamin Freeman

Priority Date

See filing date below

Application Details

GB	0103135.0	08/02/01	Status: Awaiting Search and Exam Report

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in the presence of)
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ADAPTIVE BROADBAND CORPORATION)
acting by)

~~Director~~ Responsible Individual Appointed

~~Director/Secretary~~ Secretary

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by MARTIN FISHMAN)
in the presence of)
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SIGNED AS A DEED by MARTIN FISHMAN)
who is duly authorised to sign)
for and on behalf of)
ROY BAILEY)
in the presence of)
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