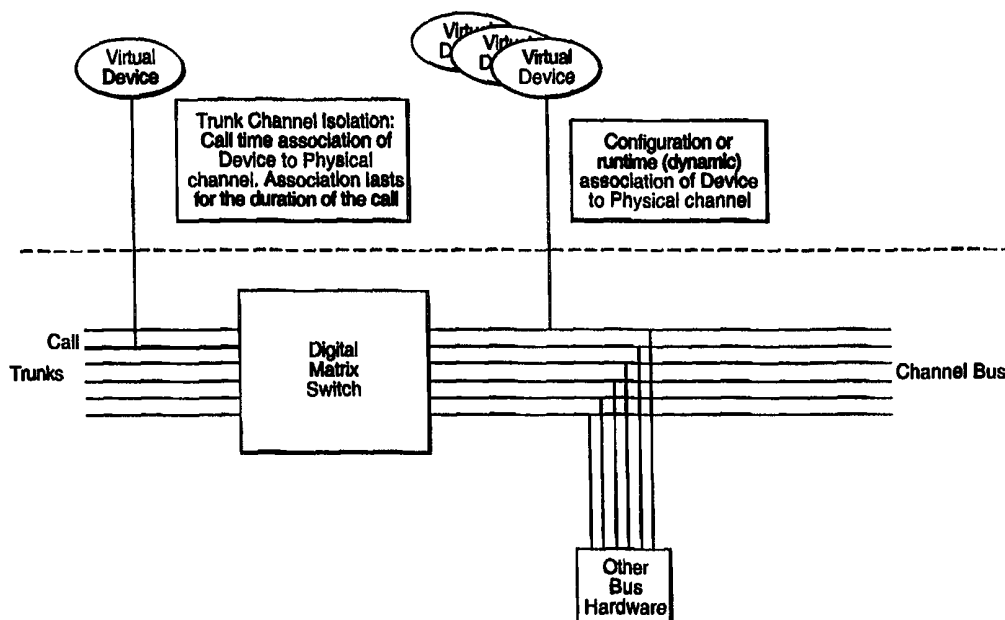




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(21) International Application Number: PCT/GB98/02751 (22) International Filing Date: 11 September 1998 (11.09.98) (30) Priority Data: 9719367.6 11 September 1997 (11.09.97) GB (71) Applicant (for all designated States except US): TRUST EEBG [GB/GB]; 31 St. George Street, London W1R 0HQ (GB). (72) Inventor; and (75) Inventor/Applicant (for US only): MAATS, Job, J. [NL/GB]; 31 St. George Street, London W1R 0HQ (GB). (74) Agent: MILLER STURT KENYON; 9 John Street, London WC1N 2ES (GB).		(81) Designated States: AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CU, CZ, DE, DK, EE, ES, FI, GB, GE, GH, GM, HR, HU, ID, IL, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, UA, UG, US, UZ, VN, YU, ZW, ARIPO patent (GH, GM, KE, LS, MW, SD, SZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG). Published <i>With international search report.</i> <i>Before the expiration of the time limit for amending the claims and to be republished in the event of the receipt of amendments.</i>

(54) Title: IMPROVEMENTS TO TELECOMMUNICATIONS**(57) Abstract**

The invention relates to a component for a communications system, the component comprising: a telephony device capable of making, receiving, monitoring and manipulating multiple simultaneous calls without requiring a physical termination line, channel or device; a device which enables the creation and manipulation of a series of new calls from a device currently connected to a remote party; and a device from which calls are automatically forwarded while retaining joint call control of the call with a currently connected destination device. Preferably, the communications system has a plurality of Nodes and Hubs wherein each Node and Hub has a star topology.

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IMPROVEMENTS TO TELECOMMUNICATIONS

The Digital Revolution is enabling new and more abstract mental models for perceiving and architecting the structured and unstructured elements of systems in ways that would previously not have been technically or commercially feasible. In the process systems design will be undergoing a paradigm shift from deterministic computing and structured record keeping about "what is known" to interaction management and probabilistic systems to virtually manipulate the known and to allow the unknown to emerge with structured and unstructured data becoming the extension of individual and collective minds. The paradigm shift essentially gives up on the illusion of perfect foresight with respect to "required" transaction data. The collapse of digital storage costs now makes it feasible to capture and collect all digital interactions between both "remote knowledge workers" and "same-time same-place" workers by enhancing these interactions through recording of additional links to enhance data thus creating collective historical memory in the form of globally accessible data warehouses.

Security and defence requirements during the Cold War Era dictated that ultimate control over communication was retained within the public sector while concerns about national security lead to a natural emphasis on weapons and associated developments. Wholesale dedication of resources to mathematical processing thus caused enormous, but very unbalanced, progress between computing and telecommunications during and immediately following the cold War Era.

The Post-Digital Revolution Era will be characterised by globally reducing dedication of GDP to defence accompanied by a broad freeing up of technologies and resources hitherto reserved for defence and national security. The liberalisation of global Telecommunications under the Treaty-based-rights in substantially all civilised countries as a result of the WTO negotiations, together with elimination of a multitude of sovereign granted monopolies (Banking, Insurance, Law, Accounting, Exchanges, Medicine) is in the process of creating a new marketplace, the Convergent Digital Market, which, except to the extent that interaction

and transaction inefficiencies still remain between networks is in reality one global market. In the digital world the interaction/transaction inefficiencies between and within the networks now define the vertical and horizontal separation of these markets far more than the historical basis for defining markets such as distance, nation-states/tax systems, social and legal systems/language or transaction protocols, which now all can be readily arbitrated, parsed and converted.

The boundaries to be transcended in the Post-Digital-Revolution Era no longer relate to the challenges of reducing per MB communication cost per mile or per MIPS processing cost. Quantum further declines in these arenas can confidently be expected, with halving of these costs every two years now one of the more widely accepted benchmarks. Human cognitive systems can now afford to purge from cognition those costs which for all intents and purposes are no longer relevant and where the odds of meaningful problems have now become incredible low. The prospective focus of system design is thereby shifting from stand-alone equipment with its associated access devices and interconnections to the design of networks of networks consisting of Nodes with an associated set of rights and obligations in terms of interface definitions whether it be from access devices from-anywhere, at any-time or from machine-to-machine. The focus of development thus shifts from traditional architectural issues such as optimising a stand-alone computer to innovations which address the emerging needs of the Post-Digital-Revolution relating to Switch-Nodes and Hubs which focus on all-in transaction and interaction cost which requires materially different systems architectures.

The unknown nature of tomorrow's environment dictates a lucid conceptual design with all elements of the system capable of being pulled together in real-time from a software/virtual point of view without requiring non-plannable changes in hardware anywhere within these increasingly more distributed and remote physical systems. The cost of hardware implementations thus explodes relative to immediately alterable virtual solutions. The generic hardware architecture to achieve global network design goals is referred to as a Secure SoftSwitch Server and the software is referred to as the SoftSwitch architecture with the Inter-Nexus Universal Connector representing a unique innovative technology which interconnects

the telecoms related hardware device drivers with the computing applications.

Implementations of the Universal Connector in JAVA and Active X and other high level component technologies facilitate the integration of telecommunications and computing making all features encapsulated in the world's telecoms infrastructure currently possibly only available to the thousands with specialised expertise, typically only capable of being acquired as a result of an extended period of employment with one of the proprietary switch manufacturers, the military or the security services to now become available to the many millions if not tens of millions who can manipulate visually virtual objects at reasonable levels of abstraction.

GENERIC FEATURES OF THE UNIVERSAL CONNECTOR

The Universal Connector is a sub-assembly for the Soft Switch part of a Node/Hub consisting of a series of three generic devices which manage communication and record interactions relating to the conveyancing between Nodes in a network capable of handling variable degrees of trust within precisely defined forensic standards. The architecture permits on-the-fly enhancement of interactions into transactions thereby not only permitting the traditional features of storage in unified mailboxes, object, relational and a variety of other databases, but permitting defined signals sent during a session within a dynamically defined context to acquire specific meanings to establish a contractual relationship between virtual counter-parties using current and extended EDI protocols.

The Universal connector's three devices are media independent (Fax, Video, Voice, Data etc.), bearer and transportation Protocol Independent (IP, ATM etc.) while handling connection and connection-less based devices in an identical manner (i.e both circuit-switching and packet switching use the same three devices thus allowing the choice between those modes to be made independent of the technological infrastructure on a higher level of abstraction through the use of a continuum based on specific dimensions that may be required for the particular Node from time to time or for particular classes of originators or terminators, such as security conditions, cost of various conveyancing services etc.) The architecture specifically recognises the communications conundrum that actions between originators of

communications are not capable of being defined and coordinated upfront thus requiring probabilistic technologies for allocation of resources and conveyancing to make any network "media mix" and "sequencing" insensitive while scaling issues can be limited to purely economic and contractual arrangements on conveyancing with pre-defined master-contracts resolving priority access-rights to resources.

The Universal Connector is explicitly uncoupled from both the remote pre-processing client access/termination devices (Human controlled devices such as WEB TV's, Fixed and Mobile Phones, Network Terminals, PC's, Printers, ATM's, Access Authorisation and Transaction Devices and Agent Driven Automated Devices such as other Autonomous Systems) and the wide variety of networks (Voice, X25, Telex, GSM, Satellite, DECT) permitting the Universal Connector to operate wholly independent of various Gateway technologies (Converters optimised for a specific incoming or outgoing datatype/formatted structures at various levels of abstraction) by constraining incoming data to a very narrow range of formats through pre-parsing and translating of incoming digital data from individual networks through server based pre-processors optimised to handle these activities efficiently. The uncoupling of the Universal Connector from both the Physical and Virtual Gateways and the Physical and Virtual Client Access Devices permits a star topology for each individual Node and Hub.

The Universal Connector is thus Hardware (Commodity processors such as Alpha, Intel Pentium etc., where appropriate supplemented with DSP and other functionally dedicated processors), Bus (H100, MVIIP etc.) and Operating Systems (NT, LINUX) independent while hardware resource brokering is Node and Trusted Network independent thereby permitting a precise dynamic intelligent rule-based definition for the sequence of processing of algorithms within the Nodes, the Network, or where permitted higher or lower security Networks. Switching choices can be exclusively based on the headers defined by global standard-setters (ITU and other Treaty based organisations, etc.) merely requiring a memory resident, super light weight, blindingly fast, record storage efficient, embedded database typically combining

a mixture of VON Neuman and Non-VON architecture to cost effectively achieve relatively constant look-up speeds independent of the size of the database.

The Inter-Nexus Look-Up acts like a Virtual Throttle in a double-funnelled Hour-Glass where all interactions and transactions have to pass through the Virtual Throttle which can be blind with respect to traffic, pretty much acting like a scanner from a rating (the process of allocating the elements of a composite transaction to internal and external subcontractors with precisely defined legal domiciles to meet both spirit and letter of the OECD transfer pricing guidelines), pricing (the process of establishing an aggregate price for a local Node delivered sub-assembly or whole service) and routing point of view. All decisions can thus be made on the fly with respect to real-time fraud control, accounting and conveyancing decisions and address/domain look-ups and thus routing decisions. The Throttle throughput becomes Non-Blocking through varying the error and the delay/latency rates by typically failing to look up every address for connection-less traffic where cost of errors and out-of-sequence arrivals from streaming on a batch-basis can be accommodated by fixing errors after-the-fact by either arranging for a "repeat" or "filling-in" through use of software technologies which avoid any perception of dissonance within the range of human cognitive systems.

The Inter-Nexus Look-Up Real-Time operation is secured through a narrow range of structured (i.e. with data formats defined by a precise global Inter-Lingua Dictionary to permit the data-dictionaries' expressions in any other language) pre-filtered records which minimise overheads while increasing robustness thus placing an insignificant load on database access relative to current state-of-the-art processing architectures. Anything beyond pure on-the-fly transaction recording (which provides audit data written to write-once, read-many recording devices) is delegated to distributable queuing/scripting and workflow transaction processing systems and data warehouses (frequently representing a mere aggregation or distributed copies of structured-interaction-data linked to a transaction, with automated who, what, where, and when type enhancements to facilitate query while a range of sorting logics and thesaurus routines permits the system to operate as an extension of any humans cognitive systems for both structured and unstructured data and searches without requiring pre-definition of display

mode, educational discipline, natural language and social/cultural orientation or NLP preferences).

The Universal Connector is a universal component for any Secure SoftSwitch. Configuration of specific Nodes within a network in terms of their actual hardware, software and data components thus reduces to conveyancing and other cost optimisations at a global level within a highly distributed architecture where any specific function can be delegated on-the-fly to any Node at any time. The distributed intelligence allows all critical function to be performed on the EDGE of the network thereby ensuring that Backbone Traffic can economically be transported in chunky structures with cost effective Inter-Node/Hub encryption technologies minimising Inter-Node latency within the Trusted Network.

Configuration of individual Nodes in terms of Hardware, Software and Data can thus scale up to any level through use of cost-efficient backbone technologies operating within a system between processors in close proximity. The description of the three generic devices which manage communication and record interactions relating to the conveyancing between Nodes in a network, capable of handling variable degrees of trust within precisely defined forensic standards, follows below:

(1) VIRTUAL TERMINATION DEVICE

Definition: A Virtual Termination Device (VTD) is a telephony device capable of making, receiving, monitoring and manipulating multiple simultaneous calls without requiring a physical termination line, channel or device. It is capable of dynamically establishing a physical termination point/resource to a call while retaining control of the call without transferring the call and without altering the calls' (progression) state.

Benefits: The more efficient use of call handling and processing resources.

By allowing physical devices such as automated voice processing resources to be allocated to a call on a dynamic or 'as required' basis, a call may be allocated a physical resource

- * from a pool of available resources to that device (e.g. DSP channels)
- * for a part of, or all the time, the call resides on the device

* without having to transfer the call to another device.

Example: A VTD can be used as a 'call distribution device' on which calls may be queued while being processed or waiting to be distributed to other devices. While queued, a call may (or may not) require in-queue processing depending on call time parameters (e.g. CLI) or on run-time parameters (e.g. expected time on queue). The device may allocate a DSP channel to the call from a system wide, or device specific, pool of DSP channels. It would also be possible to allocate a specific channel to groups of calls in the queue.

This contrasts with the currently available call queue handling solutions where either:- calls can only be handled in groups (RAD devices); or calls must be dedicated a resource regardless of requirement; or calls must be transferred to other specific voice processing devices.

(2) CONNECTION EMBEDDED DEVICE CONTROL (NAIL UP)

Definition: Connection Embedded Device Control (CEDC) allows for the creation and manipulation a series of new calls from a device currently connected to a remote party. If a connection (open voice channel) is set up between a remote device and a CEDC device, new calls (made or received) may be set up on the CEDC device and the original remote connection channel would be used as the physical termination point for the call. The initial connection to the CEDC device establishes a physical termination point for all subsequent calls on the device. The CEDC facility remains in service for the duration of the original connection.

The mechanism for creating and manipulating 'embedded' calls in CEDC devices is not specific. It may use a mechanism within the original connection (e.g. tones) or may be performed via a network connection to the CEDC device.

CEDCs are best implemented using 2 (sets) of addresses. One that establishes the original or 'outer' call, the other to establish embedded or 'inner' calls.

Benefits: A CEDC device is a remote control device. By establishing a telephony connection to it a remote party 'opens' the device and gets access to features that the remotely connected device does not have (e.g. TAPI control). This is much more than a Direct Inward

Service Access (DISA) feature, which simply gives a caller dial tone and allows the making of a single cheap rate call. CEDC gives access to the breadth of the CEDC devices' capabilities. This may include PC control, making and receiving multiple calls in series, membership if a call distribution group, silent monitoring.

Example 1: A call centre is run on a legacy switch which cannot relay CLI or DDĪ information to the caller or the call centre's contact management tool. These restrictions can be overcome by adding (a unit supporting) a series of CEDC devices that also support the features lacking in the legacy system. The callers may connect to the CEDC via the legacy kit. By retaining the legacy kit they reduce the hardware requirement of the CEDC unit and retain access to the features on the legacy switch.

Example 2: CEDC can be used to create a virtual call centre or virtual office. Staff of call centre agents can connect to the office or call centres CEDC devices from anywhere.

(3) DOMAIN MASTER DEVICES

Definition: A Domain Master Device (DMD) is device from which calls are automatically forwarded while retaining joint call control of the call with the currently connected destination device. Calls that arrive at the DMD effectively pass through the device. A DMD may be able to limit the number of call appearances and hence the number of calls passing through it. If all call appearances on the DMD are consumed the device may be considered as busy. DMDs may be configured with conditional forwarding addresses i.e. on busy or no answer.

Benefits: Via the use of a DMD, a human or automated supervisor can perform all of the following functions

- * monitor the call progress of calls passing through it.
- * monitor the current location of calls passing through it
- * control the level of call traffic through it.
- * manipulate any individual call passing through it - including 'intruding on the call'. As the Call is already on the device a new call need not be setup to intrude (as with current switch environments).

Example 1: A call centre may be supported by a call distribution device capable of queuing calls. If the call traffic gets too great calls may be sent to the queue to remain there for an excessive period of time. The queue may have a no answer time-out feature but it may be better if 'excess' calls were initially diverted away from the queue. By placing a DMD before the queue the call traffic could be limited.

Example 2: Calls on a specific DDI require monitoring for their entire life (even if they are transferred off the current destination PBX). By placing a DMD as the initial destination for these calls, simplifies this process. Currently this is a severe problem on most PBXs.

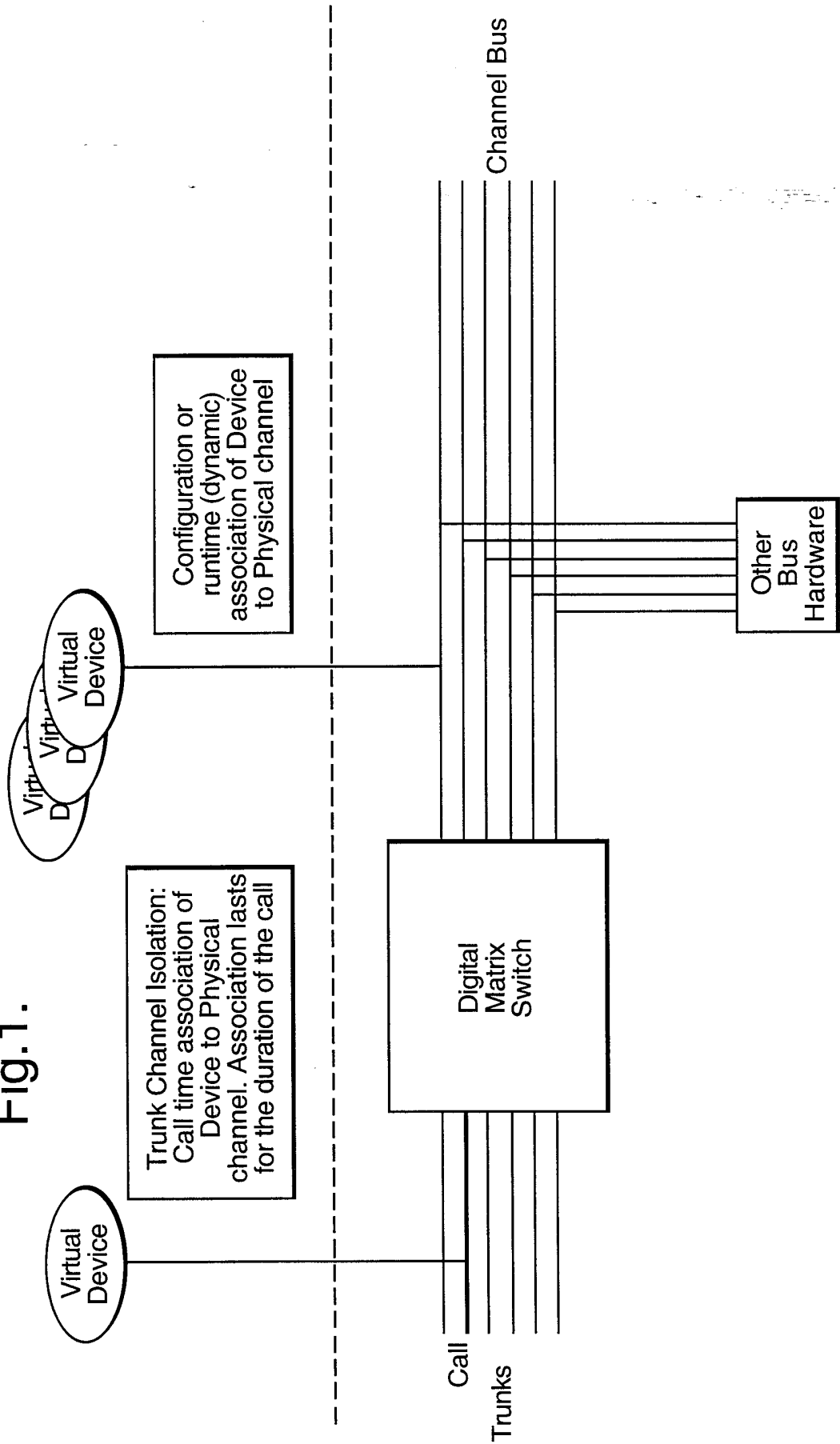
Either:

- * all trunks must be monitored and only pertinent information is filtered in
- * the entire PBX call traffic must be monitored and only pertinent information is filtered in
- * all possible call destinations must be monitored

CLAIMS

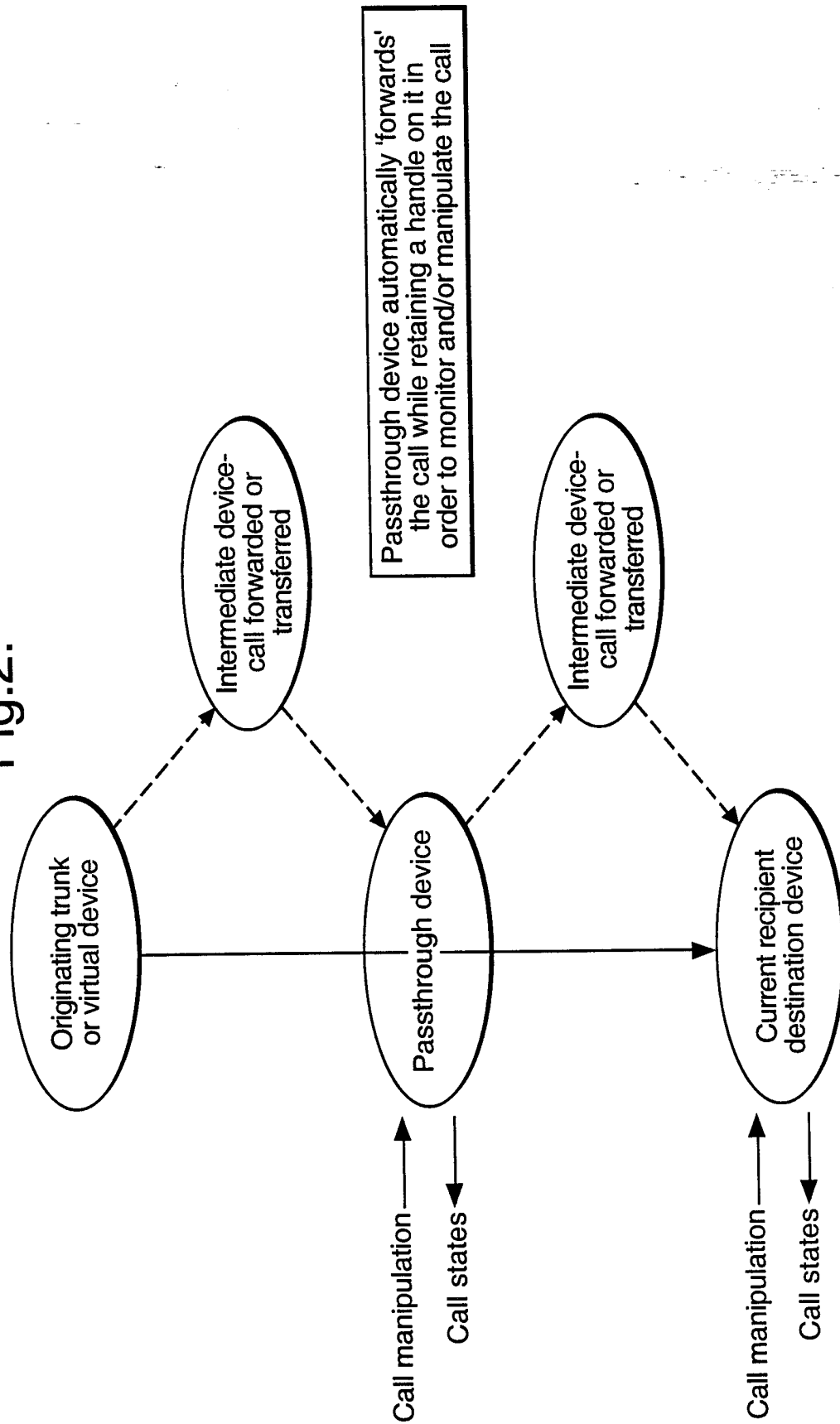
1. - A component for a communications system comprising:-
 - a telephony device capable of making, receiving, monitoring and manipulating multiple simultaneous calls without requiring a physical termination line, channel or device,
 - a device which enables the creation and manipulation of a series of new calls from a device currently connected to a remote party, and
 - a device from which calls are automatically forwarded while retaining joint call control of the call with a currently connected destination device.
2. A component for a communications system as claimed in claim 1, wherein the component records interactions relating to the conveyancing between Nodes in a Network.
3. A communications system including a component as claimed in claim 1 or claim 2.
4. A system as claimed in claim 3 having a plurality of Nodes wherein each Node has a star topology.
5. A system as claimed in any preceding claim having a plurality of Hubs wherein each Hub has a star topology.

Fig.1.



2/2

Fig.2.



INTERNATIONAL SEARCH REPORT

I. National Application No

PCT/GB 98/02751

A. CLASSIFICATION OF SUBJECT MATTER

IPC 6 H04M3/50

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

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 6 H04M

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

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

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
E	WO 98 55920 A (TRUST EEIG) 10 December 1998 see the whole document ----	1-5
A	US 4 328 396 A (THEIS PETER F) 4 May 1982 ----	
A	US 4 400 587 A (TAYLOR MICHAEL P ET AL) 23 August 1983 -----	

☐

Further documents are listed in the continuation of box C.

☒

Patent family members are listed in annex.

° Special categories of cited documents :

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

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

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

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

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

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

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

"&" document member of the same patent family

Date of the actual completion of the international search

26 January 1999

Date of mailing of the international search report

17.02.99

Name and mailing address of the ISA

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Authorized officer

Vandevenne, M

INTERNATIONAL SEARCH REPORT

International application No.
PCT/GB 98/02751

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

This International Search Report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. ☐ Claims Nos.:
because they relate to subject matter not required to be searched by this Authority, namely:

2. ☒ Claims Nos.: 1-5
because they relate to parts of the International Application that do not comply with the prescribed requirements to such an extent that no meaningful International Search can be carried out, specifically:
 - obscurities
 - lack of comprehensibility
 - no description of drawings

3. ☐ Claims Nos.:
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

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

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

1. ☐ As all required additional search fees were timely paid by the applicant, this International Search Report covers all searchable claims.

2. ☐ As all searchable claims could be searched without effort justifying an additional fee, this Authority did not invite payment of any additional fee.

3. ☐ As only some of the required additional search fees were timely paid by the applicant, this International Search Report covers only those claims for which fees were paid, specifically claims Nos.:

4. ☐ No required additional search fees were timely paid by the applicant. Consequently, this International Search Report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

Remark on Protest

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

INTERNATIONAL SEARCH REPORT

Information on patent family members

In. ational Application No

PCT/GB 98/02751

Patent document cited in search report		Publication date	Patent family member(s)	Publication date
WO 9855920	A	10-12-1998	NONE	
US 4328396	A	04-05-1982	US 4038216 A	26-07-1977
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US 4400587	A	23-08-1983	NONE	