IBM Proposal
For The Global Name
Registry Ltd

Outline to IBM's input to "NicName" proposal:

I - General Business Information

D2. IBM's full legal name, principal address, telephone and fax numbers, and e-mail address.

IBM United Kingdom limited

PO Box 41

North Harbour

Portsmouth

Hampshire

PO6 3AU

Tel.: 02392 561000
Fax: 02392 388914

D3. IBM's The addresses of all other business locations of the registry operator. (NB: This should be the country HQs outside of the UK).

International Business Machines Corporation

New Orchard Road

Armonk, New York 10504

IBM UK Ltd is one of the international group of companies within IBM World Trade, Europe/Middle East/Africa (IBM EMEA). IBM UK Ltd is a wholly-owned subsidiary of IBM EMEA which is, in turn, a wholly-owned subsidiary of the International Business Machines Corporation of Armonk, New York.

The diagram below shows the IBM EMEA (Europe, Middle East and Africa) regional presence.
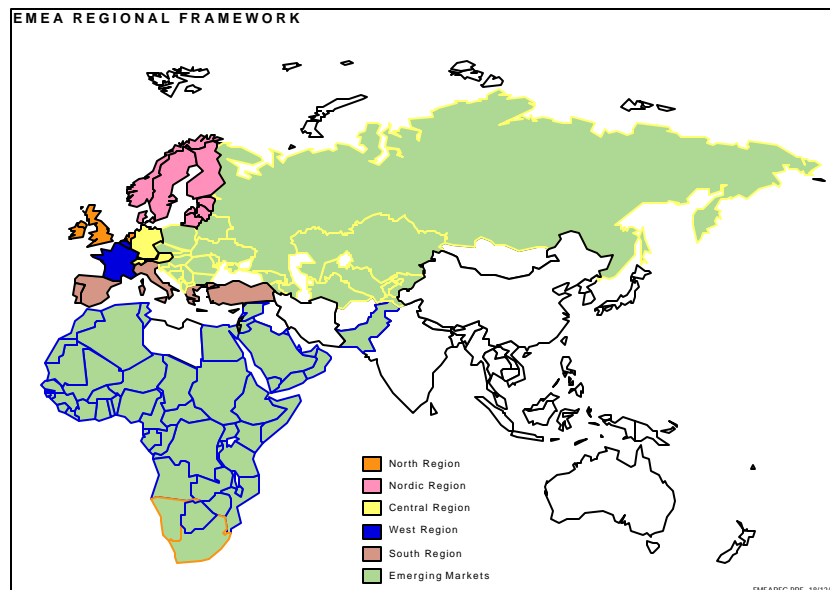
In EMEA, IBM has offices or operates in the following countries in addition to the United States:

Europe: Albania, Austria, Belarus, Belgium, Bosnia-Herzegovina, Bulgaria, CIS & Baltic, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Greenland, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Moldova, Netherlands, Norway, Poland, Portugal, Romania, Russia / Kazakhstan, Saudi Arabia, Slovakia, Slovenia, South Africa, Spain, Sweden, Switzerland, Turkey, Ukraine, United Kingdom.

Middle East: Bahrain, Egypt, Israel, Jordan, Kuwait, Lebanon, Oman, Qatar, Saudi Arabia, United Arab Emirates.

Africa: Algeria, Angola, Benin, Burkina Faso, Burundi, Cameroon, Cape Verde, Central African Republic, Chad, Congo, Djibouti, Equatorial Guinea, Eritrea, Ethiopia, Gabon, Gambia, Ghana, Guinea Bissau, Guinea, Ivory Coast, Lesotho, Liberia, MALAWI, Mali, Mauritania, Morocco, Mozambique, Namibia, Niger, Nigeria, Republic of Botswana, Reunion, Sao Tome, Senegal, Seychelles, Sierra Leone, South Africa, Sudan, Swaziland, Tanzania, Togo, Tunisia, Uganda, Yemen, Zaire, Zambia, Zimbabwe.

Americas: Anguilla, Antigua & Barbuda, Argentina, Aruba, Bahamas, Barbados, Bermuda, Bolivia, Brazil, British Virgin Islands, Canada, Cayman, Chile, Columbia, Dominica, Ecuador, Grenada, Guyana, Jamaica, Martinique, Mexico, Montserrat, Netherlands Antilles, Paraguay, Peru, Saint Kitts, Saint Lucia, Saint Vincent, Suriname, Trinidad and Tobago, Turks & Caicos Islands, United States, Uruguay, Venezuela.

The major IBM locations in the UK are:

BASINGSTOKE	PO Box 32, Alencon House, Alencon Link, Basingstoke, Hants, RG21 1EJ
BEDFONT LAKES	1 New Square, Bedfont Lakes, Feltham, Middlesex, TW14 8HB
BELFAST	4 Bruce Street, Belfast BT2 7JA
BRISTOL DUBLIN	Temple Way, Bristol, BS2 0JG Burlington road, Ballbridge, Dublin 4, Ireland
EDINBURGH	Buchan House, 21 St Andrew Square, Edinburgh, EH2 1AY
GREENOCK	PO Box 30, Inverkip Road, Spango Valley, Greenock, PA16 0AH
HURSLEY PARK	Hursley House, Hursley Park, Winchester, Hants, SO21 2JN
LEEDS	11 Albion Street, Leeds, LS1 5EU
MANCHESTER	Jackson House, Sibson Road, Sale, Cheshire, M33 1DB
NORTH HARBOUR (Head office)	PO Box 41, North Harbour, Portsmouth, Hants, PO6 3AU
NOTTINGHAM	City Gate West, Toll House Hill, Nottingham, NG1 5FN
SOUTH BANK	76 Upper Ground, South Bank, London, SE1 9PZ
WARWICK	PO Box 31, Birmingham Road Warwick, CV34 5JL
STAINES	Lotus Development United Kingdom Limited, Lotus Park, The Causeway, Staines, TW18 3AG

D4. IBM's core business type, (e.g., corporation, partnership, etc.)and law (e.g., US, UK) under which it is organised.

For the purpose of any contract in the UK, IBM UK is a Limited company organised under English law

D5. URL of IBM's principal world wide web site.

www.ibm.com

D6. Dun & Bradstreet D-U-N-S Number (if any)

Dunn & Bradstreet No.: 210151718

D7. Number of employees - UK and World-Wide

Number of Employees Worldwide

	1995	1996	1997	1998	1999
IBM/Wholly owned subsidiaries	225,347	240,615	269,465	291,067	307,401
Less than wholly owned subsidiaries	26,868	28,033	20,751	21,704	17,176
Complementary	38,000	37,000	43,000	36,900	29,800

IBM employees, including wholly owned subsidiaries, increased by more than 16,000 in 1999. The growth areas of the company, Global Services and the Software Group, continue to drive the increase; Global Services hired approximately 17,000 in 1999. Acquisitions also contributed to the increase. The company also continues to reduce its infrastructure and to withdraw from certain businesses, thereby offsetting some of the growth. For example, during 1999, IBM sold its Global Network to AT&T, resulting in the loss of about 5,300 employees.

The decrease in employees in the less than wholly owned subsidiaries over the last year reflects a number of entities that were converted to a wholly owned status, such as Global Services in India and MiCRUS in the U.S., or divested during the year. Partially offsetting the decrease was continued growth in Global Services, notably in Australia, and in a number of subsidiaries in China.

The company's complementary workforce is an approximation of equivalent full-

time employees hired under temporary, part-time and limited-term employment arrangements to meet specific business needs in a flexible and cost-effective manner. (NOTE: Above information is taken from the annual report).

Number of Employees in the UK

Year	1994	1995	1996	1997	1998	1999
Number	13,426	13,744	15,021	16,833	17,740	18,427

D8. Registry operator's total revenue (in US dollars) in the last-ended fiscal year.

$87,548 Million For the year ended December 31 1999.

D9.

N/A to IBM

D10. Name, telephone and fax number, and e-mail address of person to contact for additional information regarding this proposal. If there are multiple people, please list all their names, telephone and fax numbers, and e-mail addresses and describe the areas as to which each should be contacted.

Main IBM Contact:
David White,
IBM Network Generation Client Manager.
IBM (UK),
1, New Square,
Bedfont Lakes,
Feltham,
Middx.
TW14 8HB.
david_white@uk.ibm.com.
Tel.: +44(0)-7710-031042.

Backup Contact:
Ged Murphy,
IBM Network Generation Client Manager.
Address as above,
ged_murphy@uk.ibm.com
Tel.: +44-(0)-161-9056237

II. BUSINESS CAPABILITIES AND PLAN

D12. The second section of the Registry Operator's Proposal (after the "General Information" section) is a description of the registry operator's Business Capabilities and Plan. This section must include a comprehensive, professional-quality business plan that provides detailed, verified business and financial information about the registry operator. The topics listed below are representative of the type of subjects that will be covered in the Business Capabilities and Plan section of the Registry Operator's Proposal.

D13. The Business Capabilities and Plan section should consist of at least the following:

D13.1. <u>General description of IBM's capabilities</u>. This should describe general capabilities and activities. This description also offers IBM an opportunity to demonstrate the extent of its business and managerial expertise in activities relevant to the operation of the proposed registry. The following items should, at a bare minimum, be covered:

D13.1.1. <u>Company information</u>. Date of formation, legal status, primary location, size of staff, formal alliances, references, corporate or other structure, ownership structure.

Date of Formation

IBM was incorporated in the State of New York on June 15, 1911 as the Computing – Tabulating - Recording Co. (C-T-R), a consolidation of the Computing Scale Co. of America, The Tabulating Machine Co., and The International Time Recording Co. of New York. In 1924, C-T-R adopted the name International Business Machines

Legal status

IBM UK is a Limited company

Primary Location

US: IBM Corporation
         New Orchard Road
         Armonk, New York 10504

UK: IBM United Kingdom limited
         PO Box 41
         North Harbour
         Portsmouth
         Hampshire
         PO6 3AU

Size of Staff

307,401 employees IBM/Wholly owned subsidiaries

UK Formal alliances

2GL	Computeraid	GE Capital	KSE	Procon	Teknik
Acuma	Cotec	HBO	Longstreet	Protocol	Telecordia Technologies
AnIX	CP Business Sols	*i2* Technologies	Lysander	Reflex	The Database
Apex	CSF	IBS	Midblue	Roadtech	Thesaurus
Camborn	CSI	ICE	Midrange Networks	Rockcliffe	Travellog
Campbell Lee/Byford	CSL	IMS	MITL	SAP	Triangle
Cardinal	Diskus	Intentia	Morse	Siebel Systems	Trilogy
Catalyst	Ernst and Young	JBA	Northdoor	Syan	Typex
Cisco Systems	Fraser Wlliams	JBS	Panacea	Synetrix	Unitech
Comparex	Friedman Corp	Kalamazoo	Platinum Blue	TBC	Watsons
ComputaCenter	Frontline	KPOS	PR Tech	Tectrade	Wellcome

References

http://publib.boulder.ibm.com/

Corporate/Ownership Structure

IBM is in the business of providing customer solutions through the use of advanced information technology. The company operates primarily in a single industry utilizing several segments that create value by offering a variety of solutions that include, either singularly or in some combination, technologies, systems, products, services, software and financing.

Organizationally, the company's major operations consist of three hardware product segments—Technology, Personal Systems and Server; a Global Services segment; a Software segment; a Global Financing segment and a series of Enterprise Investments. The product segments are determined based on several factors including customer base, homogeneity of products, technology, delivery channels and other factors.

The Technology segment produces peripheral equipment for use in general purpose computer systems including storage and networking devices, advanced function printers and display devices. In addition, the segment provides components such as semiconductors and hard disk drives for use in the company's products and for sale to original equipment manufacturers (OEM). Major business units include Storage Systems, Microelectronics, Printer Systems and Networking Hardware.

The Personal Systems segment produces general purpose computer systems, including some system and consumer software, that operate applications for use by one user at a time (personal computer clients), or as servers, and display devices. Major brands include the Aptiva home PC's, IntelliStation workstations, Netfinity

servers, PC 300 commercial desktop and ThinkPad mobile systems. Consumer software brands include Crayola, Edmark and World Book Multimedia Encyclopedia. These products are sold primarily through reseller and retail channels.

The Server segment produces powerful multi-purpose computer systems that operate many open-network based applications and are used primarily by multiple users at the same time. They perform high-volume transaction processing and serve data to personal systems and other end-user devices. The servers are the engines behind the bulk of electronic business transactions, including e-commerce. Major brands include S/390, AS/400 and RS/6000. The segment's products are sold directly by the company and through business partner relationships.

The Global Services segment is the world's largest and most versatile information technology services provider, supporting computer hardware and software products, and providing professional services to help customers of all sizes realize the full value of information technology (IT). The segment provides its customers with services that include business and IT consulting, business transformational services like an ERP solution, e-business services and full scope services like strategic outsourcing or Total Systems Management services. The Global Services segment is uniquely suited to integrate the full range of the company's capabilities, including hardware, software and research.

The Software segment delivers operating systems for the company's servers and middleware for IBM and non-IBM platforms. Middleware includes application development, data management, networking, systems management, transaction processing, and messaging and collaboration. In addition to its own development, product and marketing effort, the segment supports more than 29,000 independent software vendors to ensure that the company's software and hardware offerings are included in those partners' solutions.

The Global Financing segment provides and facilitates a broad array of financing services for the company, its customers and its business partners. The primary focus is to leverage its financial structuring, portfolio management and partnering skills to expand the company's customer and partner base.

Enterprise Investments segment provides a spectrum of initiatives in information technology solutions, supporting the hardware, software and services segments of the company. The segment develops unique products designed to meet specific marketplace requirements and to complement the company's overall portfolio of products.

D13.1.2. <u>Current business operations</u>. **Core capabilities, services offered,**

products offered, duration of provision of services and products

- Co-ordinates world-wide requirements in 164 Countries
- 5 million customers
- 10,000 products & Service offerings
- 33 manufacturing plants in 14 countries
- 39 development laboratories in 12 countries
- 4 research labs
- 17 scientific centres

D13.1.3. Past business operations/entity history. History, date of formation, legal status/type of entity, initial services, duration of provision of services and products.

Please see D13.1.1

D13.1.4. Registry/database/Internet related experience and activities. Experience with database operation, Internet service provision.

Customer References

All England Lawn Tennis and Croquet Club-Wimbledon
London
UK

Industry: Computer Services
Project Start: 07/98
Project End: 06/99
Annual Revenue: <$5M
Employees: 25 - 49
Geography: EMEA
URL: http://www.wimbledon.org/

Special Handling Instructions:

Any potential external use of customer information contained in this Customer Reference database record must first be reviewed with the IBM account representative listed below. It is the responsibility of the IBM person or any other organisation planning to use this reference to make sure that this is done. The IBM account representative will, as appropriate, contact the customer for review. Please do not contact the customer directly.

Customer Background:

The All England Lawn Tennis and Croquet Club (AELTC), which was responsible for staging the world's leading tennis tournament, is a private club founded in 1868. It was originally called The All England Croquet Club and its first ground was situated off Worple Road, Wimbledon.

The first meeting of The Lawn Tennis Championships in 1877 enjoyed a garden party atmosphere and attracted a few hundred spectators. Currently, the Championship is the only Grand Slam tennis event still held on grass. The tournament attracts an attendance of more than 430,000 people and through press, radio, and television a following of hundreds of millions throughout the world.

Business Need:

The AELTC was originally utilising a data management solution which was flat file based. AELTC needed to evolve its system to use DB2 where appropriate

Solution:

DB2 UDB is used as the data store for championship information and scores, feeding both the Internet and the intranet DB2 provides the data store for championship and player information that is referenced by players, staff, media, and the public. Real-time score information passed on to broadcasters is also captured in DB2. The system also stores and provides match histories and statistics to broadcasters. DB2 stores the information used to generate Internet Web pages and is used in the online Wimbledon Shop.

The database is accessed via a Web browser and runs on OS/2 and AIX platforms. Net.Data and Net.Commerce are also being used for the Internet applications.

Benefits of the Solution:

AELTC benefited from improved visibility and fast, near real-time access to championship information. Another benefit was the ability to provide online shopping via the Internet.

Software:

Data Management: DB2 UDB Enterprise Edition

Contact Info for this Reference:

IBM
Adrian Lee
Senior IT Specialist
UK
44-1-96-281-8822

Fax: 724-8822
Adrian Lee/UK/IBM@IBMGB

Customer Reference

WITHDRAWN.

D13.1.7. <u>**Staff/employees**</u>**. Current staff size, demonstrated ability to expand employee base, hiring policy, employee training, space for additional staff.**

Please see **D7** for information on current staff size, ability to expand employee base and space for additional staff. (Please note, in the last five years, IBM UK has employed over 4,500 personnel).

IBM believes that a diverse workforce, reflecting both the customers we serve and the society in which we operate, is important for competitive success. A key element in this approach is IBM's long standing commitment to equal opportunity.

Our equal opportunities policies work within the overall context of IBM's approach to people management, as, without a supportive culture, the appropriate attitudes to equal opportunity cannot be developed; and, without the correct attitudes, policies will be little more than words.

Over the years in IBM a distinctive value system has evolved based on three basic beliefs: "the pursuit of excellence", "service to the customer" and "respect for the individual". Our commitment to equal opportunity is founded upon sound business judgement and our belief in respect for the individual.

A clear equal opportunities policy statement is set out in the IBM Employee Handbook which is given to all employees on joining the company and which forms part of the contract of employment. In the Handbook, human resources policies are introduced as follows:

"IBM has always believed that its continued success depends on the skills and motivation of its employees. This is reflected in IBM's basic belief in respect for the individual. It follows from this that IBM should:

- Help all employees develop their potential and make the best use of their skills and abilities

- Pay and advance on merit

- Maintain two way communication between managers and employees, with opportunity for a fair hearing and equitable settlement of disagreements

- Value diversity in the workplace and provide equal opportunity for all employees.

IBM is fully committed to equal opportunity for all employees and applicants for employment and we meet, or exceed, all the requirements placed upon us by legislation.

Our aim is to create and sustain a working environment in which individual diversity is valued and all employees are able to contribute, grow and achieve their maximum potential. This means that decisions on employment, transfers, promotion, training, salaries and recognition are made only on the basis of business need, coupled with an individual's abilities, skills, experience, potential and contribution.

Discrimination in these decisions on grounds not directly related to job requirements is expressly forbidden.

IBM will not tolerate any actions, comments, jokes or other conduct in the workplace that create an intimidating or otherwise offensive environment. Whether it be sexual, racial, religious or of any other type, such behaviour is unacceptable.

Employee complaints of discrimination, harassment or other unacceptable behaviour will be investigated promptly. Any employee who is found to have engaged in discrimination, harassment, intimidation or other offensive behaviour will be subject to disciplinary action which may include dismissal."

This approach is reinforced by a similar statement contained in the IBM Code of Business Conduct which all professional and managerial employees sign up to on a regular basis and which, like the Employee Handbook, forms part of the contract of employment.

External benchmarking is carried out and IBM compares and exchanges information on equal opportunity policies and practice with other companies and organisations through both formal and informal networks. IBM is a member of Opportunity 2000, and The Employers Forum on Disability. The company is an approved user of the Department of Education and Employment's "double tick" symbol relating to the employment of the disabled.

It is the responsibility of every manager in IBM to implement equal opportunities policies and to ensure that the policies work in practice and are adhered to by all employees. A senior manager in Human Resources is responsible for monitoring developments and trends and for policy formulation.

D13.1.8. <u>Commercial general liability insurance</u>. Address/include amount of insurance policy, provider of policy, plans for obtaining additional insurance.

Insurance: Public Liability/Employers Liability/Professional Indemnity

This is a letter from IBM's Insurance Company. It expires 20th May 2001.

TO WHOM IT MAY CONCERN

MARSH

Your Reference
Our Reference   JCL. / JAW
Direct Telephone   0207 357 5454
Direct Facsimile   0207 357 5661

Date   17 May, 2000

Dear Sirs,

RE: IBM UNITED KINGDOM LTD AND/ OR SUBSIDIARY COMPANIES

We confirm that, as Insurance Brokers and Advisers to IBM United Kingdom Ltd, the following insurance has been effected on behalf of our client:

TYPE	**EMPLOYERS' LIABILITY**
INSURER	AIG Europe (UK) Ltd
POLICY NO.	EL/BC 010133
EXPIRY DATE	· 21st May 2000 to 20th May 2001.
LIMIT OF LIABILITY	GBP 5,000,000 any one occurrence; excess policies placed in the US provide cover up to the required limit of GBP 10,000,000 on your tender document.
INTEREST	Legal Liability at Law for death, disease or injury suffered by an employee arising out of the business activities of the Insured occurring during the policy period

TYPE	**PUBLIC/PRODUCTS LIABILITY**
INSURER	AIG Europe (UK) Ltd.
POLICY NO.	PL/BC 010133
PERIOD	21st May 2000 to 20th May 2001

An **MMC** Company

LIMIT OF LIABILITY	GBP 5,000,000 any one occurrence and in all in respect of Products Liability
INTEREST	Legal Liability at Law for injury or damage to third parties (not employees) or their property arising out of the Business Activities of the Insured

This letter is issued as matter of information only and confers no rights upon the recipient of this letter other than those provided by the policy. This letter does not amend, extend or alter the coverage afforded by the policy or policies as described herein.

Notwithstanding any requirement, term or condition of any contract or other document with respect to which this may be issued or pertain, the insurance afforded by the policies described herein is subject to all terms, conditions or exclusions of such policies. Limits shown may have been reduced by paid claims.

Yours sincerely

PP **Jonathan C. Linstow**
Client Executive
Global Risks Division

Insurance: Property Insurance

This is a letter from IBM's Insurance Company. It expires 31st December 2000

TO WHOM IT MAY CONCERN

MARSH

25 January 2000
Direct Line: 0171 357 5454

Dear Sirs

RE: IBM UK LIMITED

As Insurance Brokers to the above-named Company, we can confirm that property insurance coverage has been effected in respect of IBM's Global Assets as follows:

INSURED:	IBM UK and any subsidiary, affiliated or associated companies and/or corporations and the Insured's interest in partnerships and joint ventures as now exist or may hereafter be constituted or acquired and any party in interest which the Insured is responsible to insure.
INSURER:	WTCD Insurance Corporation Limited
POLICY NO:	WTCD-UK-001
PERIOD OF INSURANCE:	31 December 1999 to 31 December 2000
PERILS INSURED:	All Risks of Physical Loss of or Damage to Property, including Loss of Profit, Interdependency, Contingent Business Interruption, Inland & Ocean Transit and Boiler & Machinery.

MARSH

INTEREST: All Real and Personal Property including but not limited to Property owned, used, leased or intended for use by the Insured, or hereafter constructed, erected, installed or acquired, including whilst in the course of construction, erection, installation and assembly and Property of others in the Insured's care, custody and control.

LIMIT OF LIABILITY: US$4,000,000,000 per occurrence, subject to (inter alia) the following per occurrence sub-limits:

Unnamed Locations	US$125,000,000
Extra Expenses	US$500,000,000
Inland Transit	US$ 25,000,000
Ocean Cargo	US$ 25,000,000

DEDUCTIBLES:

Inland Transit/Ocean Cargo	US$	25,000
Leased/Hired Equipment	US$	10,000
All Other Losses	US$	250,000

OTHERWISE SUBJECT TO THE TERMS, CONDITIONS AND EXCLUSIONS OF THE MASTER POLICY.

Although we believe this information is true and correct, Marsh (UK) Ltd do not accept and specifically disclaim any responsibility whatsoever in relation to the information provided and the accuracy thereof.

We trust this information is satisfactory for your requirements.

Yours faithfully,

JONATHAN C. LINSTOW
CLIENT EXECUTIVE
GLOBAL RISKS DIVISION

U:\IBPDATA\COMMON\IBPLON\IBM\TWIMC\PDBI00.SAM

D13.2.6. Resources required to meet demand. Provide a detailed estimate of all resources (financial, technical, staff, physical plant, customer service, etc.) required to meet the estimated demands, using at least the 10%, 50%, and

90% confidence levels

CONTENT OF THIS SECTION WITHDRAWN.

D13.2.7. Plans for acquiring necessary systems and facilities. Describe plans for acquiring all necessary systems and facilities for providing the proposed services at each estimated demand level. Provide details as to the scope, cost, and vendor for any significant planned outsourcing.

Please see Appendix 1 Fig 1: Infrastructure and Fig. 2: Solution Template for The Global Name Registry Ltd

D13.2.8. Staff size/expansion capability. Plans for obtaining the necessary staff resources, capacity for expansion, hiring policy, employee training, space for additional staff, staffing levels needed for provision of expanded technical, support, escrow, and registry services.

Please see D7

D13.2.9. Availability of additional management personnel. How will management needs be filled?

Should additional management personnel be required, IBM can respond quickly by tapping into a large poll of skilled resource which they own. (Please see 13.1.1).

D13.2.10. Term of registry agreement. State assumptions regarding the term of any registry agreement with ICANN or the sponsoring organisation. Note that the .com/.net/.org registry agreement has a basic term of four years.

This can be discussed with the Client during the Contracts and Negotiation stage.

D13.2.11. Expected costs associated with the operation of the proposed registry. Please break down the total estimated operational costs by the sources of the costs for each estimated demand level.
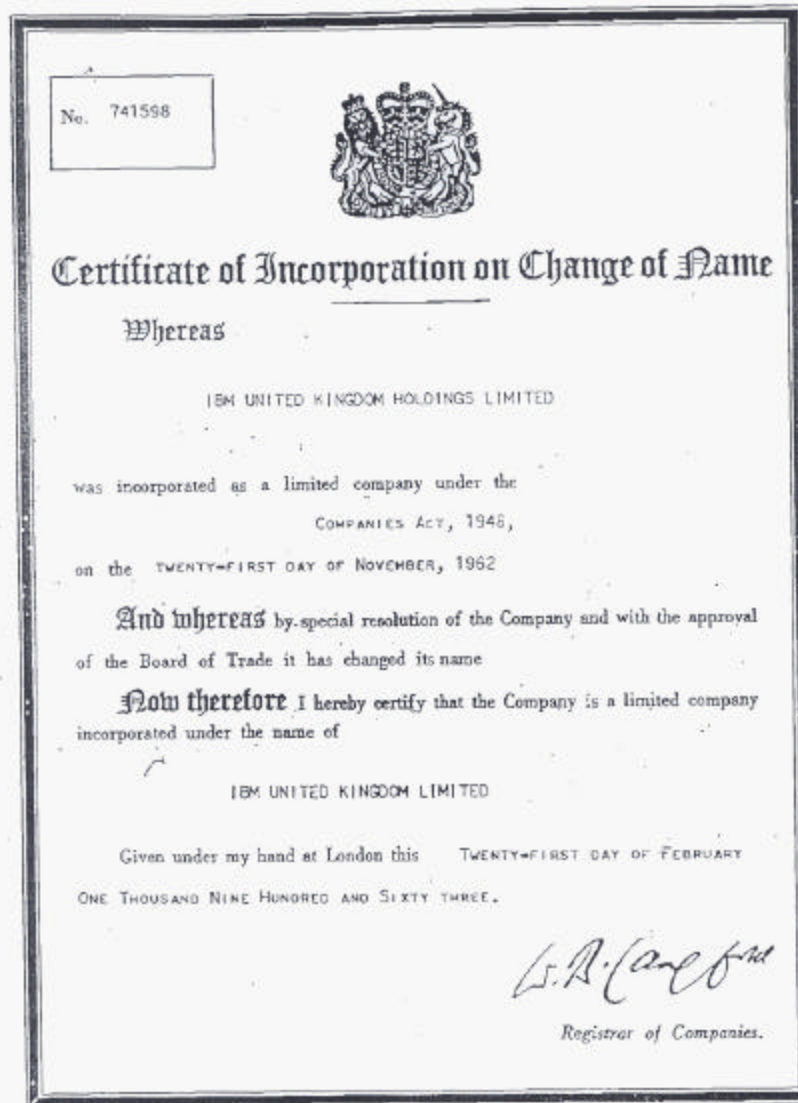
Please see Appendix 1 on E-Business Hosting Services. Costs associated with this service will become available and will be released to the Client during the Contracts and Negotiation discussions.

D13.2.15. Registry failure provisions. Please describe in detail your plans for dealing with the possibility of registry failure.

Please see IBM's technical response for protection against technical failure.

D13.4. Supporting documentation. The following documentation should be provided in support of the Business Capabilities and Plan section:

D13.4.1. Registry operator's organisational documents. Documents of incorporation (or similar documents).

No. 741598

Certificate of Incorporation on Change of Name

Whereas

IBM UNITED KINGDOM HOLDINGS LIMITED

was incorporated as a limited company under the

COMPANIES ACT, 1948,

on the TWENTY-FIRST DAY OF NOVEMBER, 1962

And whereas by special resolution of the Company and with the approval of the Board of Trade it has changed its name

Now therefore I hereby certify that the Company is a limited company incorporated under the name of

IBM UNITED KINGDOM LIMITED

Given under my hand at London this TWENTY-FIRST DAY OF FEBRUARY ONE THOUSAND NINE HUNDRED AND SIXTY THREE.

Registrar of Companies.

D13.4.2. <u>References</u>. A list of significant trade and credit references.

Customer	Industry	Server Platform	Database
AGME	**Insurance**	**S/390**	**DB2/CICS**
Discover Financial Services	**Banking Finance & Securities**	**RS/6000**	**Oracle**
McKessonHBOC	**Healthcare**	**RS/6000, NT (Netfinity), HP**	**Oracle, Sybase, SQL**

		(Netfinity), HP, DG	SQL
PBS	Banking Finance & Securities	S/390 NT (Netfinity)	DB2, CICS, IMS
Pitney Bowes	General Manufacturing	S/390, HP	DB2, Oracle
PreussenElektra	Utilities	S/390, RS/6000	DB2
Prudential Securities Inc.	Banking Finance & Securities	S/390	DB2
Safeway Stores PLC	Retail	S/390	DB2
SK C&C	Computer Services	S/390	DB2
Volvo Construction Equipment Group-Korea	General Manufacturing	HP	SAP
Winterthur Insurance	Insurance	S/390, RS/6000, Sun, NT (Compaq, Netfinity)	DB2
Zurich Financial Services	Insurance	NT(Compaq), Sun	Lotus Notes
EDS/Detroit Diesel	Computer services	S/390	Oracle
Cybergate Internet Services	ISP	RS/6000	NFS
Swisscom	Telecommunications	S/390	DB2

REMAINING CONTENT OF THIS SECTION WITHDRAWN.

D13.4.3. Annual report. The registry operator's most recent annual financial report (or similar document). Audited financials are preferred.

Please visit the following site to view IBM's annual report:
http://www.ibm.com/annualreport/1999

D13.4.5. Proof of insurance. Please provide proof of the insurance described

in item D13.1.8.

Please see D13.1.8

III. - TECHNICAL CAPABILITIES AND PLAN

D14. The third section of the Registry Operator's Proposal is a description of the registry operator's Technical Capabilities and Plan. This section must include a comprehensive, professional-quality technical plan that provides a detailed description of the registry operator's current technical capabilities as well as a full description of the operator's proposed technical solution for establishing and operating all aspects of the registry. The technical plan will require detailed, specific information regarding the technical capabilities of the proposed registry. The topics listed below are representative of the type of subjects that will be covered in the Technical Capabilities and Plan section of the Registry Operator's Proposal.

[INSTRUCTION: ICANN will extensively review and analyse this section of the Registry Operator's Proposal. The content, clarity, and professionalism of this section will be important factors in ICANN's evaluation of applications. We strongly recommend that those who are planning to apply secure professional assistance from engineers and/or other technical consultants to aid in the formulation of the technical plan and the preparation of the Technical Capabilities and Plan section of the Registry Operator's Proposal.]

D15. The Technical Capabilities and Plan section should consist of at least the following:

D15.1. Detailed description of the registry operator's technical capabilities. This should provide a detailed description of the registry operator's technical capabilities, including information about key technical personnel (qualifications and experience), size of technical workforce, and access to systems development tools. It should also describe the registry operator's significant past achievements. This description offers the registry operator an opportunity to demonstrate the extent of its technical expertise in activities relevant to the operation of the proposed registry.

Please see Appendix One for Product Descriptions and Estimated Costs

D15.2. Technical plan for the proposed registry operations. This should present a comprehensive technical plan for the proposed registry operations. In addition to providing basic information concerning the operator's proposed technical solution (with appropriate diagrams), this section offers the registry operator an opportunity to demonstrate that it has carefully analysed the technical requirements of registry operation. Factors that should be addressed in the technical plan include:

D15.2.1. General description of proposed facilities and systems. Address all locations of systems. Provide diagrams of all of the systems operating at each

location. Address the specific types of systems being used, their capacity, and their interoperability, general availability, and level of security. Describe in detail buildings, hardware, software systems, environmental equipment, Internet connectivity, etc.

The Clients preferred solution is e-business hosting   - for information on IBM's Comprehensive set of e-business hosting services please see Appendix 1

D15.2.2. <u>Registry-registrar model and protocol</u>. Please describe in detail.

MQSeries – Architecture Description
IBM's MQSeries is the software component which will be used to provide resilience and the underlying "rate controlling mechanism" to the registrar's application.

MQSeries basic functionality
MQSeries is a middleware product which provides "assured delivery" of messages from one system to another.
MQ Series supports about 34 different operating system platforms and its API is accessible from all the main programming languages.
It essence, MQSeries provides a simple programming API with a very small set of verbs of which the most commonly used are to Open or Close a connection and to Put and Get messages from queues.
MQSeries relieves the user's application program of the need to worry about handling error conditions on the transport layer, and making sure that if the connection is lost then the message is transmitted once and only once when the link is restored.

Rate Control
The rate control or "throttling" mechanism which the GNR application requires is an automatic consequence of the way MQSeries works. In cases of high or unusual demand, the registrar's application may be placing messages on the queue faster than the database application can process them. However, rather than the database application becoming overstressed and perhaps failing due to overload, the presence of MQSeries means that messages are buffered in the queues. The queues do get longer but the application is not overstressed and when the request rate drops off the application can catch up.

Fair Shares
GNR also require that each registrar be treated equally and that the application not allow one registrar to flood the system with a bulk demand to register a large number of domains at the same time. By designing the application to have a unique queue for each registrar, the database update application can be written to poll each queue in turn thus ensuring fair shares

Load balancing and failover
MQSeries 5.1 introduced support for clustering.

Using this facility, MQSeries could be set up such that in normal operation, for example, Registrar queues 1-50 defaulted to the first backend machine and queues 51-100 defaulted to the second backend machine. But if one machine failed, the other could take over processing all 100 queues.

The MQSeries family comprises five key elements:

- **MQSeries** -- is the core of the MQSeries family -- the base messaging servers and clients provide once, and once only, message and queuing capabilities on over 35 platforms.
- **MQSeries Adapter Offering** -- provides a framework and tools that build and customise MQSeries adapters for existing and new, pre-packaged or custom-developed applications.
- **MQSeries Everyplace** -- extends the capabilities of MQSeries base messaging to mobile workers using laptops, PDAs and telephones. It brings all the benefits of MQSeries messaging, including rock-solid security, to a failure-prone environment.
- **MQSeries Integrator** -- combines a one-to-many connectivity model, plus transformation, intelligent routing and information flow modelling. It facilitates the development of new application services that comprise the functions of multiple, disparate existing business systems.
- **MQSeries Workflow** -- a business process management system which facilitates the rapid development and management of the business processes that integrate the IT and organizational infrastructure of a company.

MQSeries allows you to

- Connect any commercial systems in business today.
- Ignore network disruptions - important data is always delivered.
- Use less time, skills and resources to become an e-business.
- Exploit rich support from MQSeries business partners.

The Equitable Life Assurance Society - Keith Anderson, Technical Consultant says:
"MQSeries, with its multiplatform capabilities provides the key link between all the elements of our system, enabling us to reuse business logic. Its versatility is unparalleled."

Highlights

- MQSeries is EuroReady and Year 2000 ready.
- Heterogeneous any-to-any connectivity from desktop to mainframe (over 35 of the most common industry platforms are supported– Unix on the Intel processor is represented by Linux client support and a full server implementation on Linux which is currently available as a technology preview)
- A comprehensive family of APIs designed to make coding for any messaging task straightforward.
- Allows business to integrate disparate islands of automation
- Time independent communication
- Assured one-time delivery

- MQSeries accounts for about three-quarters of the 1999 worldwide revenue for all embedded Message Oriented Middleware (MOM) according to Gartner Group.
- In 2000 the Application Integration software market will exceed 1B$ and by 2004 will be worth over 5B$ according to IDC.
- More than 350 of IBM's top 500 customers use MQSeries
- One major US organization uses MQSeries to transmit over 250 million messages per day.
- There are more than 2000 Certified MQSeries Specialists working for more than 650 different companies worldwide.

Performance:

In a press release dated 24 May 2000, IBM announced that its MQSeries message-queuing software beat Microsoft Message Queue (MSMQ) in enterprise performance tests. MQSeries was 15 times faster than MSMQ in some tests.

IBM's performance tests compared MQSeries 5.1 to MSMQ 2.0 on the Windows 2000 operating platform in express delivery mode. The tests simulated real-world enterprise customer message-queuing software requirements, stressing the entire client-server response path across heterogeneous environments.

Industry Recognition

This table shows some of the industry awards won by MQSeries during the past two years.

AWARD	DETAILS	DATE	FAMILY MEMBER
	EAI Vendor of the Year 2000	May 2000	MQSeries
	Datamation Product of the Year EAI/Middleware Category	Dec 1999	MQSeries Integrator
	Faulkner Application Excellence Award Managing Distributed Systems	September 1999	MQSeries

MQSeries Version 5

The Version 5 products are the most advanced of the MQSeries messaging offerings, providing further capabilities for the market-leading middleware to integrate applications and IT infrastructures. Available on AIX, HP-UX, OS/2 Warp, Sun Solaris, and Windows NT, Version 5 offers true business integration by making sure your IT systems don't constrain your ambitions for your business.

As businesses endeavour to apply information to ever broader scopes of process and organisation, the relationship between the business and its IT support becomes inextricably linked. The question of how to shape and steer this relationship becomes more and more urgent. Faster, easier, more reliable, flexible technology are key criteria. MQSeries Version 5 pushes the boundaries out ever further making it easier than ever before for customers to adopt and use messaging middleware.

New features in Version 5.1

- Clusters (or groups) of queue managers dynamically share workload among themselves, balancing workload and rerouting if a system component fails or network path becomes unavailable
- Administration of clusters of queue managers is made simpler and quicker and with less likelihood of operator error
- Queue managers in the same cluster can be on different platforms or physically remote from one another
- Publish/subscribe function ensures people and applications receive information on their chosen subjects
- Subscribers specifying topics of interest have great flexibility and can specify not just a name but a range of names, "wild card", or just prefixes, for example
- Publish/subscribe takes advantage of the robust messaging features of MQSeries, so delivery is assured, and transactional integrity is maintained when published information updates corporate databases
- MQSeries for Windows NT uses the Windows NT Performance Monitor, allows valid Windows NT user IDs, uses the Windows NT registry for storing configuration data, and provides a set of Component Object Model (COM) classes that allow ActiveX applications to access MQSeries programming interfaces

- Also for Windows NT there are graphical tools and applications for installing, administering, and exploring the product, and a Web-based administration server
- Message queues can be up to 2GB
- Scalability and performance improvements include multiple application processes which speed throughput, and an improvement for persistent critical messages
- Support for the new environments of HP-UX Version 11 and AIX Version 4.3, demonstrating IBM commitment to support the latest versions of the most popular platforms
- Improved Java programming interface, and the Java client and bindings are combined in a single Java package to make the task of programming simpler.
  MQSeries for AS/400 will be enhanced to provide functional parity with the other MQSeries V5.1 products on UNIX platforms.

Please see Figure 3 A diagram of the MQ Configuration.

D15.2.3. Database capabilities. Database size, throughput, scalability, procedures for object creation, editing, and deletion, change notifications, registrar transfer procedures, grace period implementation, reporting capabilities, etc.

The next few pages describe the functions and capabilities of the IBM DB2 Universal Database which will be used to store the master copy of the GNR registry.

DB2 Universal Database Capabilities

The DB2 Universal Database builds upon the stability and performance of DB2 on the mainframe and provides the features required in a distributed database product. DB2 Universal Database (UDB) is IBM's relational database server solution for the UNIX, OS/2 and Windows NT/2000 operating environments. DB2 Universal Database supports the following key capabilities and benefits:

Superior scalability - DB2 Universal database can run on everything from laptops supporting mobile users to massively parallel systems with terabytes of data and/or thousands of users. It is the only database in the industry capable of scaling this breadth of systems with the same function. This allows you to minimise costs and maximise personnel skills by using a single database for all your application needs no matter what the scale. You can also rest assured that your applications will not fail because your database ran out of gas.

Multimedia extensibility - DB2 Universal Database allows you to extend the capabilities of the database to meet your specific organizational requirements. This includes the ability to support more advanced applications involving multimedia data such as documents, images, audio and video. You can now develop applications that use technology to gain competitive advantage in ways not previously possible or practical - and you can save costs by just extending DB2 to support these new applications.

Complete web-enablement - One of the key new application areas is e-business. DB2 Universal Database is fully integrated with web technology so that data can be easily accessed from the Internet or from your intranet with complete security. This allows you to quickly build e-business or Internet applications that will provide competitive advantage, greater customer service or reduced costs.

Universe of partner solutions - DB2 Universal Database is capable of supporting a broad range of data management applications with excellent performance and reliability. As a result, a large number of industry solution providers, including SAP, Baan, Peoplesoft Seibel and thousands more, have adopted DB2 to support their applications; or adapted their tools to support DB2. This allows you to more quickly satisfy your requirements by buying rather than developing solutions.

Business intelligence powerhouse - DB2 Universal Database has particular strengths in supporting business intelligence applications such as data warehousing and on-line analytical processing (OLAP). DB2 leads the industry in parallel database technology and query optimization resulting in the proven ability to help customers find competitive advantage, better customer service or reduced costs by mining their data for the knowledge required to make better decisions. Further, this does not require the additional expense of a specialised database. DB2 UDB provides a single database that can be used across an enterprise for all data management requirements from OLAP to OLTP.

Ease of use and management - DB2 Universal Database is one of the easiest databases in the industry to set up, use and manage. It includes a complete suite of GUI administration tools that allow for easy installation, administration and remote operations. It includes programmer-friendly tools to get an application up-and-running quickly, and user-friendly tools to make end-users immediately productive. Everything you need comes in the box, ready to go.

Universal access - DB2 Universal Database can be accessed from almost any client workstation over almost any network. Through built-in data replication and distributed transactions, it provides you with the flexibility of placing data anywhere in your network required for optimum service and productivity. Further, DB2 provides the most efficient and seamless integration of data on mainframe and midrange data servers in the industry allowing you to reduce costs and improve cycle-times by leveraging your current investments in data, hardware, software, and skills.

Multi-platform support - DB2 Universal Database is one of the most open database platforms available. It runs on the most popular UNIX and Intel server platforms including AIX, HP-UX, Solaris, Linux, NUMA-Q, OS/2 and Windows NT/2000. It supports all major industry standards relevant to distributed data so that it can be accessed using thousands of existing tools and applications, and can be easily managed within an open, network computing environment. These capabilities allow you to reduce costs and improve cycle-times by leveraging your current investments in data, hardware, software, and skills.

Bullet-proof reliability - DB2 Universal Database is setting the standard for quality and reliability in the client/server database industry. As more mission-critical applications are implemented on UNIX and Intel platforms, IBM's ability to bring mainframe-level reliability to this environment has become a major factor in choosing DB2. Better reliability and availability can reduce your costs, while scalability both within and across platforms can reduce the risk of dead-end projects.

Market leadership - IBM entered the client/server database market late. However, with its core competency in database technology and its renewed emphasis on software marketing, IBM has delivered more high-quality database technology to market faster than anyone else in the industry. DB2 Universal Database is the culmination of this effort. With DB2 Universal Database, you can rest assured that you are getting the best database technology available today from a vendor with a bright future and the best record of service and support in the industry.

In summary, with DB2 Universal Database you can:

- Support applications from business intelligence to transaction processing with a single high-value database allowing you to minimise costs, leverage the skills of your support personnel, and maximise your return on investment
- Easily web-enable enterprise data for your intranet or the Internet allowing you to go to market faster, gain competitive advantage and increase customer satisfaction
- Extend applications with new function, or scale them for more users or data allowing you to increase productivity, and provide more useful information to your user community

More than 70% of the world's major companies rely on DB2 to manage their mission-critical business applications.

Database Size, throughput and scalability

Storage Capacity: The amount of data to be stored is not excessively large by today's standards and two copies of the GNR registry will fit within the 420GB of usable data in the IBM Enterprise Storage Server (ESS). The ESS and DB2 UDB can each scale to multiple terabytes as and when necessary.

Throughput: We are aiming at a throughput of 40 registrations pr second.

REMAINING CONTENT WITHDRAWN.

Scalability:

CONTENT WITHDRAWN.

Backup: DB2 UDB databases can be backed up without taking the database offline. If the backup needs to be self-consistent then you do need to quiesce the database temporarily for this to happen. However if you are going to reconstruct the database from the backup and then replay the transaction log, the quiesce is not required.

Application Specific Details

Procedures for object creation, editing, and deletion, change notifications, registrar transfer procedures, grace period implementation, reporting capabilities, etc. fall within the scope of the application design and should be described in the GNR section of the document.

Information on HACMP

Design Options

GNR have created an application design which relies in updating databases on two separate backend systems in parallel, so that in the event of failure of either backend system the application can continue to run against the other database.

This section describes alternative high availability options for the backend database based on the use of "Off the Shelf" software solutions:

HACMP:

IBM's HACMP is the "High Availability Cluster MultiProcessing" software for AIX Version 4.3.

With a pair of systems, HACMP provides heartbeat monitoring of one systems from another. When one system detects that the other has failed (and it can distinguish between failure of the other system and failure of a network or a network adapter) – it takes over the IP address of the failing system and – through dual-access to the disks – and under the control of scripts - takes over the applications from the failed system. More complex HACMP configurations can be defined, for example when one system is a standby for each of two other systems.

A further option, HA-GEO, allows failover across geographically dispersed systems, thus guarding against the possibility that an entire data centre might be taken out (but a plane crash for example).

Highlights

- Enhanced system administration for monitoring clusters across networks
- Concurrent access to resources for outstanding application execution and scalability
- Configuration flexibility that encompasses the RS/6000® product line
- Extensive cluster management tools for installing, configuring and managing your highly available environment.
- Enhanced scalability to 32 nodes with the HACMP Enhanced Scalability (ES) feature for all RS/6000 products
- HACMP/ES provides proactive monitoring and reporting of possible hardware and/or software failures
- HACMP/ES users can choose product-defined and/or user-defined high availability events and resource monitors
- High availability reduces outages caused by both planned and unplanned events

- Dynamic reconfiguration and upgrades to the cluster while the cluster is operational

Product description

High Availability Cluster Multiprocessing (HACMP) for AIX® Version 4.3 is a control application that can link up to 32 RS/6000 servers or SP™ nodes when using the Enhanced Scalability feature into highly- available clusters. Clustering servers or nodes enables parallel access to their data, which can help provide the redundancy and fault resilience required for business-critical applications. HACMP includes graphical user interface-based tools to help install, configure, and manage your clusters in a highly productive manner.

Just as important, HACMP is flexible in configuration and use. Uniprocessors, symmetric multiprocessors (SMPs), and SP nodes can all participate in highly-available clusters. You can mix and match system sizes and performance levels as well as network adapters and disk subsystems to satisfy your application, network, and disk performance needs.

HACMP clusters can be configured in several modes for different types of processing requirements. Concurrent access mode fits environments where all of the processors must work on the same workload and share the same data. In mutual takeover mode, the processors share the workload and back each other up. Idle standby allows one node to backup any of the other nodes in the cluster.

Whichever mode you choose, HACMP provides data access and backup plans to help optimise application execution and scalability while helping to guard against costly outages and downtime. HACMP also enables server clusters to be configured for application recovery/restart to provide protection for your business-critical applications through redundancy.

HACMP/ES with RS/6000 Cluster Technology

Planned downtime can account for a large part of the total system downtime. HACMP allows planned downtime to be minimized by concurrently performing hardware, software and other maintenance activity while applications continue to run on other nodes. Service may be moved from one cluster node to another and then returned after the maintenance activity is complete.

Unplanned downtime can have one of two causes: hardware or software. Together with facilities provided by AIX operating system, HACMP can protect your operation from hardware failures, by automatically moving services from a failing node to other cluster nodes. Software failures that cause a node failure can be detected by HACMP, but software failures that interrupt system operation and do not result in a system failure or hang require the next step in availability technology represented by RS/6000 Cluster Technology (RSCT).

Utilising the Event Management component of RSCT, problems with the operation of software, such as process failure or exhaustion of system resources, can be detected and reacted to before they result in a critical failure.

By using RSCT, the industry's best[1] high availability solution got better. HACMP/ES allows you to protect your complete software infrastructure in ways that you previously would not have thought possible. No longer do you need to worry about

random, unexpected, or nagging software problems crippling your operation. HACMP/ES can monitor, detect, and react to these failures, allowing your system to remain operational. HACMP/ES can be configured to react to hundreds of system events. In addition to this advanced protection, RSCT allows HACMP/ES to support up to 32 nodes.

HACMP/ES also allows you to define additional cluster events. This allows unrivaled levels of availability using standard components, while providing protection against hardware failures and capabilities to perform concurrent maintenance.

Additional functions in HACMP

HACMP provides a choice of tools for installation, configuration and system administration tasks: use either AIX System Management Interface Tool (SMIT) or the Visual System Manager (VSM) GUI.

To help automate the configuration process, you can replicate existing clusters, first using the information captured by the Cluster Node Snapshot utility and then use the Quick Configuration utility to replicate the configuration at other sites. With the Dynamic Reconfiguration facility, you can add and remove cluster resources, such as processors, adapters, disk subsystems, and application software, without stopping cluster operations. In addition HACMP supports "rolling upgrades." This allows the cluster to be upgraded to a new version of HACMP or the operating system without taking your applications down. With the Cluster Single-Point-of-Control (C-SPOC) facility, common cluster administration tasks can be performed from any node in the cluster. And, with the HAView function, you can use Tivoli TME 10® NetView® for AIX graphical network management interface to monitor clusters and their components across the network from a single node.

The Concurrent Resource Manager of HACMP provides up to eight-way concurrent access to shared disks in a highly available cluster, allowing you to tailor the actions taken during a takeover to suit your business needs.

HACMP works well in conjunction with parallel database products like IBM DB2® UDB to build loosely coupled parallel clusters that provide high levels of systems availability. Data can be split or partitioned on up to 32 nodes for exceptionally scalable cluster performance and high availability.

For NFS environments, HACMP provides the HANFS for AIX feature, which defines two AIX systems as a single highly available NFS server, eliminating single points of failure. This server can survive hardware and software outages, and many planned outages, that can make a single system NFS server unavailable.

In SP clusters, your data is protected with the highly regarded Kerberos security protocol from the Massachusetts Institute of Technology/Open Software Foundation (MIT/OSF).

Putting HACMP to work

HACMP will help you:

- Establish a cost effective, highly efficient clustered environment for critical applications in a variety of industries -- retail point-of-sale, online banking, telemarketing, claims processing, or other transaction-oriented applications.
- Create a more complex concurrent access cluster where there is minimal fallover restart delay with up to eight systems active, running the same application and sharing the same physical resources
- Perform upgrades and maintenance to your system without disrupting work flow
- Build customised cluster-aware applications for your distributed network and monitor network activities with the Cluster Manager tool set
- Distribute applications across other RS/6000 platforms that share the disk and processor resources of clustered HACMP systems
- Improve disk reliability by combining with AIX's Logical Volume Manager disk mirroring
- Detect and compensate for system-wide hardware errors using the local and remote management facilities of AIX

Feature	Benefits
Horizontal scalability	- Boosts overall performance and capacity by sharing disk and/or processor resources of clustered systems, thereby spreading applications across RS/6000 servers - Provides scalable growth with reduced reinvestment and increased system availability - Enables mix of uniprocessor and multiprocessor nodes for application performance and disk sharing
Support for multiple availability configurations	- Allows tailoring of HACMP to your environment for a flexible solution that can change with your business - Allows growth for availability in either standby or mutual takeover modes in 2- to 32-node clusters
Cluster Manager	- Advises of HACMP cluster configuration changes - Allows access to all shared data within the cluster -- even if a system in the cluster fails
Takeover scripts	Offer several different ways to customise takeover actions in a cluster
Support for cluster management SMIT and VSM facilities	- Provides common interfaces (such as a drag-and-drop GUI) to make it easier to install and configure highly available cluster systems as well as maintain them on the network - Allows cluster management from a single system console for the cluster - Provides comprehensive highly available monitoring utilities to manage and tune clusters - Enables visualisation of relationships between cluster hardware and software resources
Cluster Single-Point-of-Control	- Enhances systems management by helping to reduce system administration errors and enabling system tasks to be performed once for all cluster nodes - Provides a single-server image so the cluster looks like a single system for reduced system administration

Feature	Benefits
Distributed Lock Manager	• Enables additional application-level facilities that can help co-ordinate concurrent executions, such as resource sharing on different platforms • Allows applications to simultaneously co-ordinate execution on complex clusters • Provides data integrity when sharing common data in a concurrent access cluster
Cluster Node Snapshot utility	• Saves configuration and configuration changes to facilitate cloning of additional clusters • Allows maintenance of multiple cluster configurations
Dynamic reconfiguration	• Enables continuous system maintenance without disruption • Allows cluster resources to be added or removed without disruption
Task Guide	• Minimises time and effort to create shared volume groups by dividing the task into discrete steps and automating commands
Enhanced scalability	• Provides support for 2 to 32 nodes • Incorporates RSCT technology to build proactive clusters • Allows detection of software failures
Compatibility with previous	• Reuses configurations to take advantage of current customer failover control scenarios
HACMP versions	• Makes transition easier, removing the necessity to reinstall or reconfigure clusters when upgrading from HACMP Version 3.1 or later
Support for Ethernet,® FDDI, Token-Ring, ATM, and Fibre Channel network	• Provides mix and match for existing networks • Includes dual-ring network failover for network reliability and flexibility • Allows multiple network attachment for primary and failover nodes with all nodes failover-capable
RS/6000 Cluster Technology	• Detects and reacts to hundreds of system events to protect your complete software infrastructure • Allows for support of up to 32 nodes with HACMP/ES • Unrivalled levels of availability using standard components

Database Replication

Another way to provide backup data in almost real time is to use the database replication capabilities of DB2. This would allow a replica of GNR's main DB2 database to be maintained automatically without the need for the application program to update two databases in synch. However there are performance trade-offs between the frequency of replication and its overhead.

Features at a glance

The IBM Data Replication solution is designed to help you meet the growing demands for data across your enterprise by delivering the right data in the right format into the right hands at the right time.

In general, replication systems can be used for various kinds of application support, including:

- Sharing host data with client/server and mobile applications, for example, to put data on laptops or where business transactions occur.
- Building data warehouses and business intelligence systems that enhance the company's decision-making effectiveness and competitive advantage.
- Maintaining backup systems that improve data availability.

Various applications impose various requirements on a replication system, but most replication needs fall into one of two general types: those that support operational applications, such as rehosted applications; and those that support informational applications, such as business intelligence systems. Many client/server applications require replication features which are a blend of these two general areas. IBM's suite of replication products address the key operational, informational, and administrative requirements of data replication.

What is replication

Replication is a process of maintaining a defined set of data in more than one location. It involves copying designated changes from one location (a source) to another (a target), and synchronising the data in both locations. The source and target can be in logical servers (such as a DB2 database or a DB2 for OS/390 subsystem or data-sharing group) that are on the same machine or on different machines in a distributed network.

A number of IBM products enable you to replicate data.
DB2 DataPropagator is a replication product for relational data. You can use it to replicate changes between any DB2 relational databases. You can also use it with other IBM products (such as DB2 DataJoiner and IMS DataPropagator) or non-IBM products (such as Microsoft SQL Server and Sybase SQL Server) to replicate data between a growing number of database products--both relational and nonrelational.

DB2 DataPropagator consists of three main components: administration interfaces, change-capture mechanisms, and the Apply program.
- You use the administration interfaces to create control tables, which store your replication criteria.
- After you set up your replication environment, the change-capture mechanism captures changes as they occur in the source database and stores them temporarily in tables.

The Apply program reads the tables and applies these changes to target databases, or copies data directly from the source database to the target databases.

D15.2.4. <u>Zone file generation</u>. Procedures for changes, editing by registrars, updates. Address frequency, security, process, interface, user authentication, logging, data back-up.

These functions fall within the scope of the application design and should be described in the GNR section of the document.

D15.2.5. <u>Zone file distribution and publication</u>. Locations of nameservers, procedures for and means of distributing zone files to them.

As part of the standard service IBM provides DNS facilities and with the geographical spread of the Universal Server Farms in America, Europe, Japan and Australia, IBM have the global reach to route or host DNS services according to a customer requirement. IBM can own the DNS on behalf of the customer, or can enable zone routing via the Network Interchange Points if the DNS is owned and maintained by a third party.

IBM has the ability to incorporate dedicated DNS servers (although the operational running of these will need further discussion during the Contracts and Negotiations stage).

D15.2.6. <u>Billing and collection systems</u>. Technical characteristics, system security, accessibility.

These functions fall within the scope of the application design and should be described in the GNR section of the document.

D15.2.7. <u>Data escrow and backup</u>. Frequency and procedures for backup of data. Describe hardware and systems used, data format, identity of escrow agents, procedures for retrieval of data/rebuild of database, etc.

The Clients preferred solution is e-business hosting - for information on IBM's comprehensive set of e-business hosting services please see Appendix 1

D15.2.8. <u>Publicly accessible look up/Whois service</u>. Address software and hardware, connection speed, search capabilities, co-ordination with other Whois systems, etc.

IBM does run its own high quality DNS service which sits on the IBM backbone network.

D15.2.9. System security. Technical and physical capabilities and procedures to prevent system hacks, break-ins, data tampering, and other disruptions to operations. Physical security.

The Clients preferred solution is e-business hosting - for information on IBM's Comprehensive set of e-business hosting services please see Appendix 1

D15.2.11. <u>System reliability</u>. Define, analyse, and quantify quality of service.

The Clients preferred solution is e-business hosting - for information on IBM's Comprehensive set of e-business hosting services please see Appendix 1

D15.2.12. System outage prevention. Procedures for problem detection,

redundancy of all systems, back up power supply, facility security, technical security, availability of back up software, operating system, and hardware, system monitoring, technical maintenance staff, server locations.

The Clients preferred solution is e-business hosting - for information on IBM's Comprehensive set of e-business hosting services please see Appendix 1

 (Please see Appendix 2: Sagitta Proposal for further information.)

D15.2.13. <u>System recovery procedures</u>. Procedures for restoring the system to operation in the event of a system outage, both expected and unexpected. Identify redundant/diverse systems for providing service in the event of an outage and describe the process for recovery from various types of failures, the training of technical staff who will perform these tasks, the availability and backup of software and operating systems needed to restore the system to operation, the availability of the hardware needed to restore and run the system, backup electrical power systems, the projected time for restoring the system, the procedures for testing the process of restoring the system to operation in the event of an outage, the documentation kept on system outages and on potential system problems that could result in outages.

The Clients preferred solution is e-business hosting - for information on IBM's Comprehensive set of e-business hosting services please see Appendix 1

D15.2.14. <u>Technical and other support</u>. Support for registrars and for Internet users and registrants. Describe technical help systems, personnel accessibility, web-based, telephone and other support, support services to be offered, time availability of support, and language-availability of support.

See Appendix X on E-Business Hosting Services.   Technical and other support can be discussed with the Client during the Contracts and Negotiation discussions.

D15.3 <u>Subcontractors</u>. If you intend to subcontract any the following:

all of the registry operation function;

any portion of the registry function accounting for 10% or more of overall costs of the registry function; or

any portion of any of the following parts of the registry function accounting for 25% or more of overall costs of the part: database operation, zone file generation, zone file distribution and publication, billing and collection, data escrow and backup, and Whois service

please (a) identify the subcontractor; (b) state the scope and terms of the subcontract; and (c) attach a comprehensive technical proposal from the subcontractor that describes its technical plans and capabilities in a manner similar to that of the Technical Capabilities and Plan section of the Registry Operator's Proposal. In addition, subcontractor proposals should include full information on the subcontractor's technical, financial,

and management capabilities and resources.

By signing this Registry Operator's Proposal, the undersigned certifies (a) that he or she has authority to do so on behalf of the registry operator and, on his or her own behalf and on behalf of the registry operator, (b) that all information contained in this proposal, and all documents attached to this proposal, is true and accurate to the best of his/her/its knowledge and information. The undersigned and the registry operator understand that any material misstatement or misrepresentation will reflect negatively on any application of which this proposal is a part and may cause cancellation of any delegation of a top-level domain based on such an application.

Appendix 1

- **e-business Hosting Services**

- **Figure 1: Infrastructure**

- **Intrusion Detection systems**

- **Figure 2: A diagram of the MQ configuration**

- **Product Descriptions and Estimated Cost**

e-business Hosting Services

World class data centres

IBM's e-business Hosting Centre facilities have high standards of physical security, strict environment controls and fast Internet connections with high-level network availability. The physical security controls are in place around-the-clock and include:

- Controlled access for designated personnel

- Alarm systems

- Video surveillance of public site facilities

Environmental controls in each data centre include:

- Smoke, fire and water leak detection systems

- UPS/CPS power feeds that ensure 99.99% power availability

- Heating, ventilation and air conditioning systems.

Select the right physical space to meet your needs

You can purchase different levels of space in the data centre depending on your requirements and budget. The choice varies from a single cabinet to an entire suite. A cabinet provides you with:

- Housing of standardised 19 inch servers

- 40 U of server space

- Front and back access with locked doors

- Conditioned 2 x 20 amp power per cabinet

- Pre-wired connectivity.

Additional space is provided in units of full cabinets. For customers with larger space needs we can build cages and suites on a custom basis:

- Cages are locked space with a minimum size of 18 (3x6) square metres

- Reserved space is available contiguous to your installed space should you wish to accommodate future growth.

Internet connectivity with bandwidth options that support your Web site activities

IBM's e-business Hosting Centres provide a high level of network availability. We will install, set up and maintain the equipment for your Internet connectivity. To meet your specific needs we can configure individual bandwidth policies for each Web site. Our bandwidth options are both scalable and flexible and features of this service include:

- Redundant Internet connectivity

- Committed and dedicated bandwidth.

On-site facilities for your staff

To support your people while they are working at our data centre we offer:

- Shared desk with power strip, telephone and fax service.

Dedicated customer support

To provide responsive solutions to all issues relating to your IBM service and to help with various system and administration tasks we will provide customer support that is available around-the-clock. As an IBM customer you will have a free telephone number for direct access to our dedicated customer care support centre.

Does our basic service meet all your business needs?

Each business is unique in their hosting requirements. In recognition of this we offer a basic   package to which further services can be added if appropriate. Simply select as many, or as few,   of the services you require to fully meet your business needs. A sample of some of these additional services are:

- Server and http monitoring, alerting and reporting

- Boundary firewall

- On site operations for tape handling and system restart

- Technical server assistance.

e-business Hosting Services from an industry leader

The people of IBM Global Services can work with you to help you realise your Internet business objectives. We offer a full range of hosting options to align with your Internet business objectives. From the provision of space for your Web servers, through to our custom, complex fully managed hosting solutions, IBM Global Services provides you flexibility to select the hosting services you need now and as your business grows.

Figure 1: Infrastructure

The Global Name Registry, hardware infrastructure
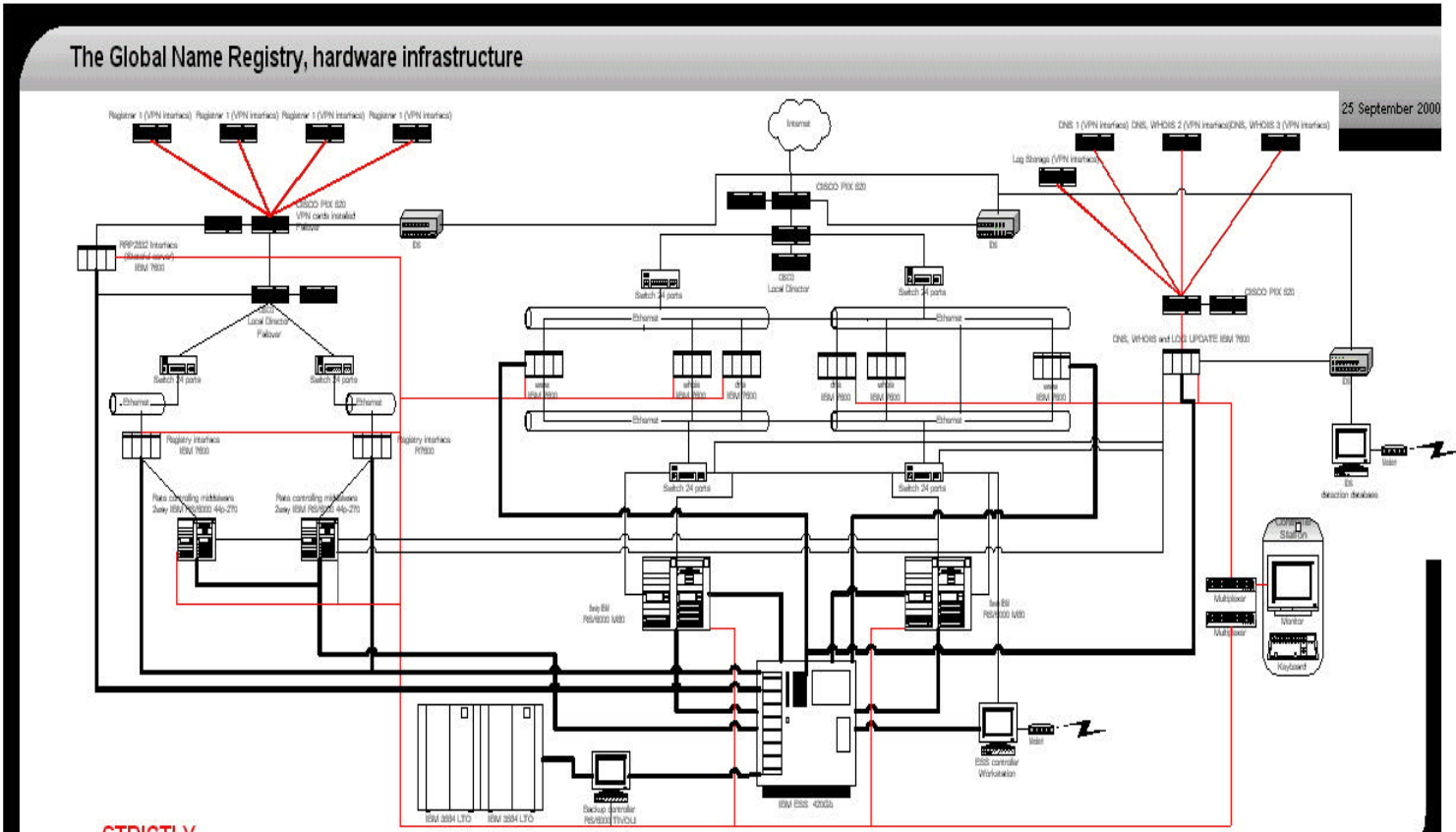
Intrusion Detection Systems
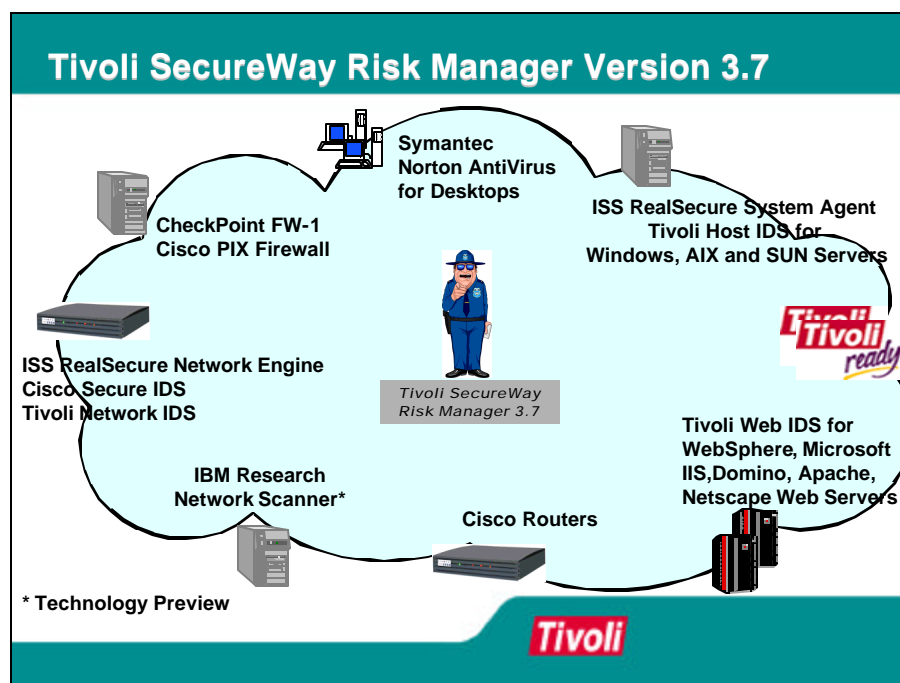
Enterprise Risk Management Overview

Tivoli SecureWay ®Risk Manager is the industry's first enterprise risk management solution for e-business security. This modular, cross-platform, open-standards-based enterprise risk management solution enables business partners and service providers to quickly manage threats —such as denial-of-service attacks, viruses, unauthorised accesses, and other forms of security violations — across their customers' enterprises. The diagram illustrates the Tivoli SecureWay Risk Manager capability to provide comprehensive enterprise risk management. Increasingly, security violations, attacks, and intrusions target the complete enterprise, not just a subsystem. Defending against these security threats requires an enterprise view of security, co-ordinated approach that can harness intelligence across the different security checkpoints within an enterprise.

With Tivoli SecureWay Risk Manager, business partners and service providers can centrally monitor and manage enterprise security systems including firewalls, routing infrastructure, network and host-based intrusion-detection systems, host-system security, antivirus systems, desktops, and content security. This enables them to intercept and resolve attacks as well as centrally analyse all relevant security alerts. Tivoli SecureWay Risk Manager supports continuous security improvement by identifying security "hot spots "in an enterprise network, and it enables effective correction of security policies that are affecting service levels and end-user productivity.

The Tivoli SecureWay Risk Manager can consolidate alert information received from
- Tivoli Web IDS for WebSphere and other servers,
- Tivoli Network and Host IDS (for AIX, NT and Sun)
- The IBM Research Network Scanner, currently available as a technology preview, which checks vulnerabilities at the application and transport layers,
- And is extensible through its use of open interfaces
    o The Common Intrusion Detection Framework (CIDF)
    o The Common Vulnerabilities and Exposures (CVE)
    o The Intrusion Detection Exchange Format (IDEF)
- Other products supported in a Tivoli Risk Manager framework and available today are
    o Checkpoint (Firewall-1 and VPN-1)
    o Symantec Norton AntiVirus
    o Axent (ESM, ITA)
    o ISS RealSecure

More information about Tivoli SecureWay Risk Manager can be found at http://www.tivoli.com/security.

Figure 2: A diagram of the MQ configuration
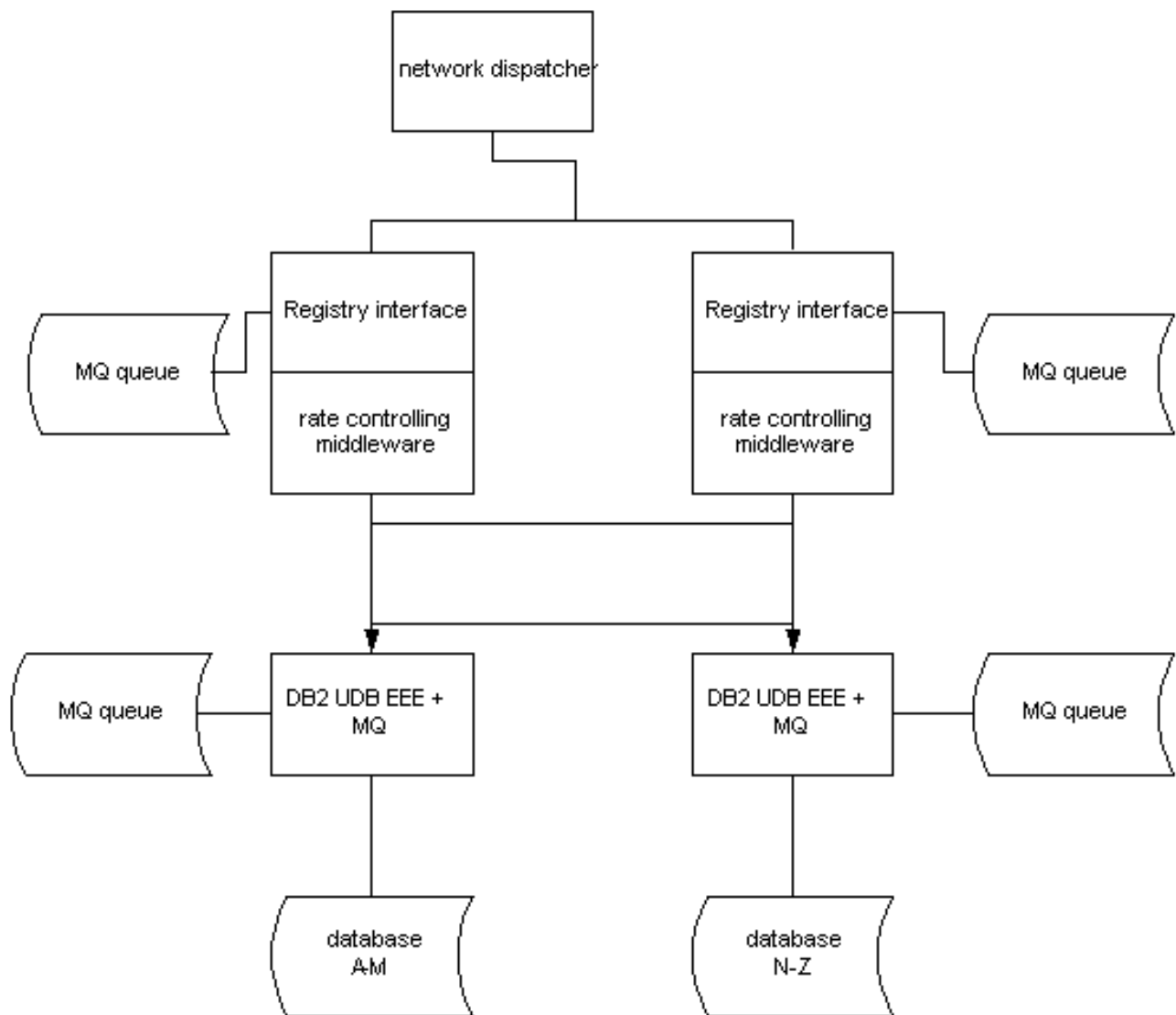
Product Descriptions and Estimated Costs

Component	Number
IBM 4500	7
Netfinity 7600	5
RS/6000 6 way M80	2
Backup solution 3584LTO	1
Cisco PIX firewalls internally	3
Cisco Local Director	2
IBM ESS	1
Netfinity 7600 in stock (not mounted)	2
Netfinity 7600 for other sites	6
Cisco PIX firewalls for other sites	3

Estimated Costs: Please note that prices are subject to confirmation

Model Type	Number	Price
M80	2	£330,000
S80	2	£624,876
44P-270	12	£312,000
B50	6	£51,000
F80	2	£102,000

All the prices above are in UK pounds sterling and are at list price.

Please note the table above details two options. These options are:
- **B50**
- **F80**

Software Portfolio

Machine	No Processors per machine	No of machines	Software	Notes
Registry Interface IBM Netfinity7600	1	2	MQ Series Server 5.1 for NT	If GNR wish to run a version of Unix on these systems, MS Series is available for Linux as a technology preview. Not available for FreeBSD.
Rate Controlling Middleware (RS/6000 44p - 270)	2	2	MQ Series Server 5.1 for AIX DB2 CAE	(CAE = Client Access Enabler – supplied with DB2 UDB EE – not charged separately)
Database (6-way IBM RS/6000 S80)	6	2	DB2 UDB EE WebSphere Application Server 3.5 Advanced Edition	WebSphere configured in case needed to provide tailored pages to the front end WWW machines
WWW – IBM Netfinity 7600	1	2	FreeBSD	Assume no IBM SW required
whois– IBM Netfinity 7600	1	2	FreeBSD	Assume no IBM SW required
DNS– IBM Netfinity 7600	1	2	FreeBSD	Assume no IBM SW required
DNS, WHOIS and LOG update IBM Netfinity 7600	1	2	FreeBSD	Assume no IBM SW required
Backup Controller RS/6000	1	1	Tivoli Storage Manager	
Controller Station (RS/6000)	1	1	Tivoli Systems Manager	Software to be priced to include client machines managed by TSM
Security Monitor (RS/6000)	1	1	Tivoli Risk Manager	
Intrusion Detection Systems				IBM is not supplying the IDS machines(?)

Note: Developer tools have not been configured. We would recommend WebSphere Studio for creating and managing the content of the WWW servers, and VisualAge for Java for developing java apps should GNR wish to use Java.

A 3U server engineered for business-critical reliability and scalability

IBM

IBM Netfinity 4500R

Highlights

_____

Rack optimised

Slim and easy-to-use two-way capable server with scalability and manageability

Extra reliability

Packed with high-availability features for critical, around-the-clock operations

Versatile

Excellent choice for general business serving, Application Service Providers (ASPs) or constrained data centres

Thin and feature-rich

The Netfinity ® 4500R incorporates a wealth of high-reliability and

scalability features into a compact 3U 1 box. You'll find excellent cable management for the back, and direct access to critical components from the front—a real advantage in a densely packed data center environment. The 4500R is part of a comprehensive portfolio of rack-optimised Netfinity servers, racks and rack-mountable accessories. Integrated 10/100 Ethernet and Advanced System Management Processor leaves room for up to six hot-plug hard disk drives, five PCI adapters and 4GB of memory. Plus, optional DLT tape backup is supported.

High availability

With the Netfinity 4500R, you get industry-leading systems management

software and hardware for problem detection and avoidance, plus remote systems management. Innovative Light Path Diagnostics™, redundant and hot-replace components make maintenance painless.

Multipurpose server

Compact. Highly reliable. Easy to use. Just what you need for general business serving such as file and print, workgroup applications, Web serving or e-commerce. ASPs will find the 4500R an excellent solution for Web hosting and Internet application hosting. And constrained data centres will welcome the practical packaging.

Netfinity

Rack and monitor available separately

e-business tools

IBM Netfinity 4500R at a glance	
Models	8656-1RY 8656-2RY 8656-3RY 8656-4RY 8656-5RY
Form factor/height	Rack/3U
Intel ® Pentium ® III processor	733/133MHz 2 667/133MHz 800/133MHz 866/133MHz 933/133MHz
Number of processors	(std/max) 1/2
Level 2 cache	(per processor) 256KB
ECC SDRAM memory	(std/max) 128MB/4GB
I/O slots	5 PCI (3x64-bit, 2x32-bit)
PCI disk controller	Integrated dual-channel Ultra160 SCSI
Advanced System Management Processor	Integrated
Bays	7 bays (3 slim-high hot-plug, 2 removable media, 24X-10X 3 IDE CD-ROM drive, 1.44MB diskette drive)
Internal storage	(max) 109.2GB 4 (218GB with optional 3-Pack Ultra160 hot-plug expansion kit)
RAID support	Optional ServeRAID ™ -4H, -4M and -4L Ultra160 SCSI Adapters
Network	10/100 Ethernet integrated
I/O ports	2 serial, parallel, keyboard, mouse, video, Ethernet, 2 USB
Power supply	270W hot-plug and front access (optional second power supply for redundancy)
Cooling fans	7 hot-plug and redundant
Light Path Diagnostics	Yes
Predictive Failure Analysis ® support	Hard disk drives, processors, VRMs, fans and memory
Operating systems supported	Microsoft ® Windows NT ® , Microsoft Windows ® 2000 Server/Advanced Server, Novell ® NetWare ® , SCO UnixWare, Citrix WinFrame and Linux ®
Software	5 IBM Netfinity Director ™ , IBM Netfinity Manager ™ , IBM ServerGuide ™ , Norton AntiVirus (OEM version), Lotus ® Domino ™ Application Server 6 , five Lotus Notes ® client licenses and five Lotus iNotes ® client licenses
Service, support and offerings	3-year limited onsite warranty 7 , IBM Server Start Up Support, TechConnect ® , Update Connector

1 A single "U," or rack unit, is 1.75" or 44.45mm.
2 MHz only measures microprocessor internal clock speed, not application performance. Many factors affect application performance.
3 Variable read rate. Actual playback speeds may vary and are often less than the maximum possible.
4 When referring to memory or hard disk drive capacity, GB means one billion bytes. Total user accessible capacity may vary depending on operating environments.
5 Some software may differ from its retail version (if any) and may not include user manuals or all program functionality. Warranty, service and support for non-IBM products are provided directly to you by third parties, not IBM. IBM makes no representations or warranties regarding non-IBM products. For non-IBM software, applicable third-party software licenses may apply.
6 Domino Server offer valid until December 31, 2000. Refer to Netfinity Web site for details.

7 For terms and conditions or copies of IBM's Statement of Limited Warranty, call 1 800 772-2227 in the U.S. and in Canada, call 1 800 426-2255. Limited warranty includes International Warranty Service in those countries where this product is offered. Telephone support may be subject to additional charges.

IBM reserves the right to change specifications or other product information without notice. This publication could include technical inaccuracies or typographical errors. References herein to IBM products and services do not imply that IBM intends to make them available in other countries. IBM PROVIDES THIS PUBLICATION "AS IS" WITHOUT WARRANTY OF ANY KIND, EITHER EXPRESS OR IMPLIED, INCLUDING THE IMPLIED WARRANTIES OF MERCHANT-ABILITY OR FITNESS FOR A PARTICULAR PURPOSE. Some jurisdictions do not allow disclaimer of express or implied warranties in certain transactions,

therefore this disclaimer may not apply to you.

IBM Netfinity systems are assembled in the U.S., Great Britain, Japan, Australia and Brazil and are comprised of U.S. and non-U.S. components. IBM, the e-business logo, Light Path Diagnostics, Netfinity, Netfinity Director, Netfinity Manager, Predictive Failure Analysis, ServeRAID, ServerGuide and TechConnect are trademarks of IBM Corporation in the United States and/or other countries.

Intel and Pentium are trademarks of Intel Corporation. Linux is a trademark of Linus Torvalds. Lotus, Domino, Lotus Notes and Lotus iNotes are trademarks of Lotus Development Corporation. Microsoft, Windows, Windows NT and the Windows logo are trademarks of Microsoft Corporation. Other company, product and service names may be trademarks or service marks of others.

.

IBM

IBM Netfinity 7600

Highlights

————————————

Enterprise solution platform

Undaunted by your most challenging application serving, clustering and Internet/intranet requirements

Extreme availability

X-architecture delivers multilayered protection against downtime

Peak performance

Well-matched subsystems alleviate potential bottlenecks or stress points

Attractive life-cycle cost

Enhanced uptime can reduce costs, increase revenues; easy system scale-up means long-term asset protection

To the limits

Business today can be like an extreme sport —you push your organisation to the limits in a harsh environment surrounded by fierce competition. To be worthy of your endeavours, your equipment must be exceptional. The Netfinity ® 7600 meets that challenge with extreme reliability, excellent scalability and ease of use—making it a powerful extension of your organisation's skills and talents.

Maximum scalability

The 7600 grows easily with up to 16GB of Chipkill ™ Memory and integrated dual-channel Ultra2 LVD SCSI controller to expand internal and external storage.
Active ™ PCI slots let you extend your system without downtime.

Extreme availability rooted in X-architecture

Netfinity X-architecture incorporates innovative technologies tempered in IBM's large enterprise servers. Chipkill Memory is more reliable than ordinary ECC memory. IBM's hot-plug Active PCI technology is quickly becoming the in-dustry-standard. And Light Path Diagnostics ™ now monitor power supplies and redundancy too.

Easy to use

ServerGuide and IBM Server Start Up Support help get you running quickly. Netfinity Director ™ systems management software, technology-enabled services and support, and a three-year limited warranty 1 make operation and maintenance easy. And Lotus ® Domino ™ Application Server helps you step right into e-business.

Netfinity

e business tools

Need more information?
ibm.com/netfinity

Options for your Netfinity 7600 server
ibm.com/pc/us/accessories/netfinity

Reminders for Year 2000 Readiness ibm.com/pc/year 2000 (worldwide)

IBM Netfinity 7600 at a glance	
Models	8665-1RY 8665-2RY 8665-3RY TBD
Form factor/height	Rack/8U 2
Intel ® Pentium ® III Xeon ™ processor	550/100MHz 3 550/100MHz 700/100MHz 800/100MHz
Number of processors	(std/max) 1/4
Level 2 cache	(per processor) 1MB 2MB 2MB 2MB
Chipkill Memory	(std/max) 512MB/16GB
I/O slots	6 PCI (4x64-bit 33MHz Active PCI, 2x64-bit 66MHz)
PCI disk controller	Integrated dual-channel Ultra2 LVD SCSI (80MBps per channel)
Advanced System Management Processor	Integrated
Bays	Up to 14 bays (Including 10 slim-high, hot-plug or 7 half-high, hot-plug; 2 half-high; 40X-17X 4 IDE CD-ROM; 1.44MB diskette drive)
Internal storage	(max) 254.8GB 5
RAID	ServeRAID ™ -3HB (included); support for -4H, -4M and -4L Ultra160 SCSI Adapters 6
Network	10/100 Ethernet integrated
I/O ports	2 serial, parallel, mouse, keyboard, video, management, SCSI, Ethernet, 2 USB
Power supply	750W (3x250W hot-plug, redundant); optional 250W
Cooling fans	10 hot-plug and redundant
Light Path Diagnostics	Yes
Predictive Failure Analysis ® support	Hard disk drives, processors, VRMs, fans and memory
Operating systems supported	Microsoft ® Windows NT ® , Microsoft Windows ® 2000 Server/Advanced Server, Novell ® NetWare ® , OS/2 ® , SCO UnixWare, Citrix WinFrame and Linux ®
Software 7	IBM Netfinity Director, IBM Netfinity Manager ™ , IBM ServerGuide, Norton AntiVirus ™ (OEM version), Lotus Domino Application Server 8 with five Lotus Notes ® collaboration client licenses and five client access licenses
Service, support and offerings	3-year limited onsite warranty, IBM Server Start Up Support, Netfinity 99.9% Availability Guarantee Program 9 (optional), TechConnect ® , Remote Connect, Update Connector

Value-packed midrange enterprise server

IBM

RS/6000 Enterprise Server Model M80

Highlights
_____

Exceptional midrange RS/6000® enterprise server with world-class performance and expandability

Two- to eight-way 6 -bit SMP rack-drawer server with copper chip technology

Rack-mount packaging for Configuration flexibility, ease of growth and reduced floor space

Outstanding value for e -business, ERP, BI and other business-critical applications

Significant availability and reliability features

Powered by AIX®, the leading commercial UNIX® OS

Midrange performance powerhouse
The Model M80 is an advanced rack-mounted system positioned at the top of IBM's midrange RS 6000 enterprise server family. The M80 is a new design that combines the technology of the popular Model S80 with versatile 19 inch rack packaging to bring extraordinary levels of configuration flexibility, performance, reliability and value to demanding e-business environments.

The M80 is targeted to meet the critical requirements of e-business, enterprise resource planning (ERP), supply chain management (SCM), and business intelligence (BI) solutions. In ERP environments, it is n excellent application server with powerful processors and outstanding memory c p city. For e-business, the M80 excels as highly reliable and fast business-t o-business Web server. Also designed for NEBS (Network Equipment Building Standards) Level 3 compliance, the M80 offers special features (including redundant -48vDC power) for telecommunication centre l office operations.

e-business

RS/6000 Model T00: One of the available racks for M80 processor and I/O drawers

Feature	Benefits
Copper-based RS6 III SMP processors	Provide significant performance increases over earlier processors
64-bit systems architecture	Improves memory use for applications requiring faster access to large amounts of data
4MB ECC L2 cache per processor	Provides increased performance and greater reliability
Up to 32GB ECC SDRAM memory	Allows exploitation of 64-bit addressing for large database applications Provides growth options for much greater throughput
Rack-drawer configuration	Allows for efficient utilisation of floor space Provides flexible growth in processor and I/O capacity
56 hot-plug PCI slots	Dramatically improve availability and provide uninterrupted growth for new adapters Provide increased connectivity for e-business applications
Built-in service processor	Designed to automatically monitor system operations and take preventive or corrective action. Allows diagnostics and maintenance to be performed remotely
Hot-plug redundant power supplies and cooling fans	Allow uninterrupted operations if power supply or f n becomes disabled
Dynamic CPU Deallocation	Automatically deallocates resources when impending CPU failures re detected so applications keep running
AIX operating system	Supports concurrent execution of 32- and 64-bit applications on 64-bit RS 6000 systems in their full range of scalability Maintains branded conformance to The Open Group's XPG4, UNIX95, and UNIX98 specifications Provides n AIX binary compatible environment that helps assure continuing application availability cross AIX Version 4 releases

Unparalleled technology in a midrange server

The Model M80 symmetric multiprocessor (SMP) server offers the same advanced technology as the award-winning 1 S80 in an affordable midrange rack-mountable package. The minimum configuration of two 64-bit 500 MHz RS64 III copper chip microprocessors can be expanded to eight processors in increments of two.

IBM's unique copper chip technology produces faster and more reliable processors, which improve speed and reduce the heat generated.

The M80 has an integrated system switch connecting the processors, memory and I/O. The switch has an outstanding total aggregate bandwidth of 18GB sec. The M80 also comes standard with 1GB memory, which can be increased to 32GB. These features provide enough performance and memory capacity to meet the needs of many demanding e-business applications.
The M80 comes standard with 14 hot-plug PCI I/O slots (with combined bandwidth of 1GB sec) packaged in an I/O drawer for easy rack mounting.
Up to four I/O drawers may be installed

For a total of 56 slots. Option l boot bays are provided in the first I O drawer (space for 2 I/O slots must be used, leaving 12). Integrated fast Ethernet, Ultra SCSI and Ultra 2 SCSI controllers are standard in each I/O drawer, leaving all slots available for your use.

Big power, s all footprint

The M80's rack packaging offers extraordinary configuration flexibility to meet unexpected growth needs. It consists of rack-mountable processor drawer containing the processors and memory. This drawer is connected to the I/O drawers containing the PCI slots.

For additional availability, the processor and I/O drawers come standard with hot -plug redundant power supplies and cooling fans. The M80 offers flexibility in the number of processor and I/O drawers that can be mounted in the rack, providing more compute and I/O power per square foot of floor space. In its maximum configuration, an M80 system consists of one processor drawer with eight

RS/6000 Model M80 at a glance

Minimum configuration	**Processor 8U rack drawer**	
	Microprocessor:	2-way 500 MHz Rs64 III SMP
	Level 1 (L1) cache:	128KB data/128KB instruction
	Level 2 (L2) cache:	4MB/processor
	RAM (memory):	1GB
	System bus width:	128-bit
	I/O 5U rack drawer	
	I/O slots:	14 hot-plug PCI
	I/O bus width:	10 64-bit, 4 32-bit
	I/O bus speed:	10@66 MHz(3.3v)/4@33 MHz(5v)
	Storage options:	Boot capability from externally attached disk Drawers, or optionally, two internal boot Disks which require two I/o slots
Standard features	Integrated ports:	Keyboard, mouse, four serial, one parallel
	Integrated bays:	Diskette drive, CD-ROM, one bay available
	Integrated controllers:	Ultra SCSI (internal, supports SCSI -2 F/W Speeds) Ultra2 SCSI (external), 10/100 Mbps Ethernet
System expansion	Processor:	4- 6- or 8 way 500 MHz
	Ram:	Up to 32GB
	I/O:	Up to four total 5U rack drawers (56 total hot-plug PCI slots and 8 total bays)
	Storage:	IBM 2104 Expandable storage Plus (Ultra2 SCSI), IBM 7133 Serial Disk System (SSA), IBM 2105 Enterprise Storage Server
Operating system	AIX 4.3.3 (unlimited user licence)	
Power requirements	220v AC/-48v DC	
Warranty	Onsite for one year (limited) at no additional cost	

500 MHz processors and four I/O drawers for tot l of 28 EIA units (U) of rack space (8U for the processor drawer, 5U for each I O drawer).

Depending on the number of attached I/O drawers, two or three M80 processor drawers can be installed in the S00 (32U), T00 (36U), or T42 (42U) racks. Disk and tape storage can also be mounted in the racks. Storage products such as the IBM 7133 Serial Disk System (SSA), the IBM 2104 Expandable Storage Plus (Ultra2 SCSI), and the IBM 2105 Enterprise Storage Server provide terabytes of highly reliable, hot-swappable disk storage.

Availability when you need it

At the heart of the Model M80 is service processor that is designed to constantly monitor the system's vital signs. It can determine and recommend actions often before problem rises. If desired, service call may be automatically placed.

The M80 has an IBM-unique feature, Dynamic CPU Deallocation, that monitors the processors. In the event processor displays indications of an impending failure, this feature working with AIX 4.3.3 gracefully takes the faulty processor offline. Work from the failing processor is automatically reassigned to other processors and replacement of the failing processor can be scheduled for convenient time.

The hot-plug PCI slots make it possible to keep e-business applications running while I/O adapters are added or replaced. Individual adapters can be enabled or disabled s needed, while operations not dependent on that adapter continue to run. There is usually no need to power-down and restart the system.

For near continuous operations, two M80's can be clustered in a single rack with IBM's industry-leading High Availability Cluster Multiprocessing (HACMP) disaster recovery solution 2. This cluster solution, HA-M80, when combined with applications that meet IBM's ClusterProven TM standards, provides superior base for high availability, an essential ingredient for e-commerce.

Easy upgrade from the H80

Moving up t o Model M80 from the next smaller system, the H80, is simple and cost effective since both systems share the same flexible packaging design. Upgrades are performed via a serial number protected model conversion by exchanging the processor drawer for a new one. The memory, I/O drawers, adapters, disk drives and rack enclosure can be reused, thus protecting investments and increasing overall scalability.

Value for e-business

The performance of the Model M80 places it above the H80 but below the S80, providing a nice bridge for midrange server requirements. The low entry price makes it possible to meet application requirements that do not warrant full-scale S80 installation.

The AIX advantage

An unlimited user license of IBM's industry-leading version of UNI X, 3 AIX 4.3.3, is included. Providing real value in reliability, availability and security, AIX is tuned for e-business performance and is widely recognised as state-of-the-art in systems and network management.

AIX 4.3.3 delivers Java TM technology, Web performance and scalability enhancements, and is an excellent choice for managing large, complex installations. It offers Web-based remote management tools to control the system and monitor key resources such as adapter and network availability, file system status and processor workload.

For more information

To learn more about the RS 6000 Model M80, contact your IBM marketing representative, IBM Business Partner, or visit the following IBM Web sites:

1 1999 Network Hardware Product of the Year,
InfoWorld Magazine, January 17, 2000
2 *Competitive Analysis of UNIX luster HA Functionality* D.H. Brown Associates, Inc., March 2000
3 *1999-2000 Operating System Function Review*, D.H. Brown Associates, Inc., March 2000

RS/6000 S80 Investment Advantage

The RS/6000 S80 Enterprise Server is a 64-bit, 450 MHz processor SMP server that will enable you to:

- Scale existing and future applications from 6-way to 24-way symmetric multiprocessing
- Maximize memory capacity up to 64GB
- Store up to 873 GB of data internally
- Move data through the system at a bus speed of 43.2GB/sec

Discover the *magic* of the RS/6000 S80 which is:

- An investment protection you can depend on as you grow your IT infrastructure
- The first copper processor that decreases your overall computing power expense and gives you amazing power that will speed you into this new millennium
- The highest performing UNIX server versus our competition (as measured by industry standard benchmarks) in:
    - Web serving (SPECWeb96 - 40,161 http ops per sec)
    - ERP: SAP R/3 (Three-tier - 16,640 SD Users) and Baan (17,441 BRUs)
    - OLTP (TPM C - 135,815 tpm at $52.70 per tpm)
    - Java execution (VolanoMark - 33,906 messages per sec)
    - NFS file serving (SPECsfs97.V2 - 40,218 ops per sec)
- A highly available server solution, HA-S80 Cluster Server, that comes packaged with our industry-leading high availability solution, HACMP (ranked #1 by D.H. Brown Consultants)
- The IBM server at the leading-edge of our technology roadmap as we move to 1 GHz processors
- The performance boost your applications need that will give you the power to compute and the power to compete

The market excitement and enthusiasm for the RS/6000 S80 is enormous and is growing each day!!!

"Technology Drivers:
1999 Product of the Year
- RS/6000 Enterprise
Server S80"

InfoWorld.com

"Powerful new IBM
computer steps up
pressure on rivals"

Detroit Free Press

"Peoplesoft believes IBM's new RS/6000 Model S80 will deliver the type of exceptional performance required by Enterprise Resource Planning customers."
- Mark Stillman, VP, Peoplesoft Alliance Solution Center

"With the new S80 Baan benchmark of 17,442 BRUs, IBM has retaken the lead over Sun's 10,721 which was published July 8, 1999. The S80 running Baan beats Sun's number by better than 60%."
- Phillip Van Loon - Manager, IBM/Baan International Competency Center

IBM.

Server Performance Comparison and Perspective

Server Performance Comparisons

ROLTP

| 600 |
| 400 |
| 200 |
| 0 |

S7A   S80

RS/6000 Server Model
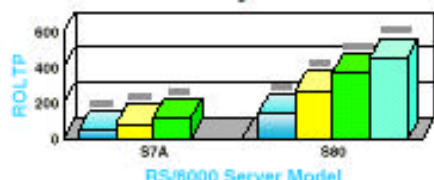
The S80 provides *twice* the memory, *twice* the number of processors and a 12-way S80 offers *twice* the performance of a 12-way S7A server.

Server Migration Options

7017 S7A		7017 S80
262 MHz	Processor Speed	450 MHz
RS64 II	Architecture	RS64 III
4, 8, or 12	# of Processors	6, 12, 18, or 24
32 GB	Max Memory	64 GB
873.6 GB	Max Internal Disk	873.6 GB
56/48	Slots/Bay	56/48
34139	Max Transactions/Minute	135815

Upgrade Options Made Easy

Upgrading your RS/6000 S70 or S7A to the RS/6000 S80 is as easy as plug and go......

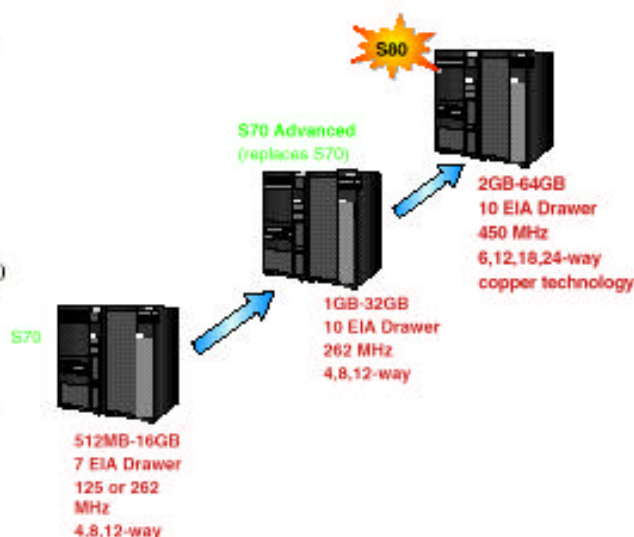- There is no need to make any changes to the application
- Upgrade to the AIX 4.3.3 operating system
- Simply replace the S70/S7A Central Electronics Complex (CEC) with the S80 CEC
- You will use the same I/O Drawer on the S7A for the S80 (S70 customers need to install the S70 Advanced I/O Drawer prior to the S80 upgrade)

Experience the four times performance of the S80 over the S7A today; and utilize the well-balanced design of the S80 that will provide you the throughput needed for your mission-critical applications.

S80

S70 Advanced
(replaces S70)

2GB-64GB
10 EIA Drawer
450 MHz
6,12,18,24-way
copper technology

1GB-32GB
10 EIA Drawer
262 MHz
4,8,12-way

S70

512MB-16GB
7 EIA Drawer
125 or 262 MHz
4,8,12-way

Upgrade Promotional Offering

For a limited time only, if you acquire an upgrade from an RS/6000 (R) 7017 Model S7A to an RS/6000 7017 Model S80 with at least one additional 6-way processor book (FC 5319), you can receive a 40% discount on the upgrade charge and any features acquired with the same MES order. S70 customers may take advantage of this promotion by first replacing the standard I/O drawer with the S70 Advanced I/O Drawer.

Your order must be placed on or before June 30, 2000. The Date of Installation, as defined in the IBM Customer Agreement or any equivalent IBM agreement, must occur on or after February 7, 2000, but no later than July 31, 2000.

Getting More Information

Visit our Web site at http://www.rs6000.ibm.com/hardware/enterprise/s80.html to get additional information on the RS/6000 S80 server, and contact your IBM Sales Representative or IBM Certified Business Partner today to discover the new *magic* of the RS/6000 S80 Enterprise Server, and get the *magic* out of the box!

IBM.

Cisco Secure PIX Firewall Series

Product Overview

The Cisco Secure PIX Firewall series delivers strong security in an easy-to-install, integrated hardware/software appliance that offers outstanding performance. The series allows you to rigorously protect your internal network from the outside world—providing full firewall security protection. Unlike typical CPU-intensive full-time proxy servers that perform extensive processing on each data packet at the application level, Cisco Secure PIX Firewalls use a non-UNIX, secure, real-time, embedded system. The Cisco Secure PIX Firewalls deliver superior performance of up to 250,000 simultaneous connections, over 6,500 connections per second, and nearly 170 megabits per second (Mbps) throughput. This level of performance is dramatically greater than that delivered by other appliance-like firewalls or those based on general-purpose operating systems.
H10924 H7501

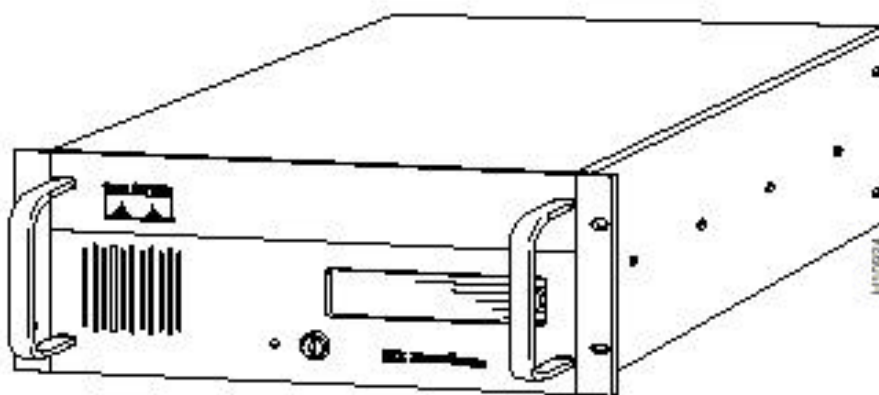Figure 18-3: Cisco Secure PIX Firewall 520 Front View

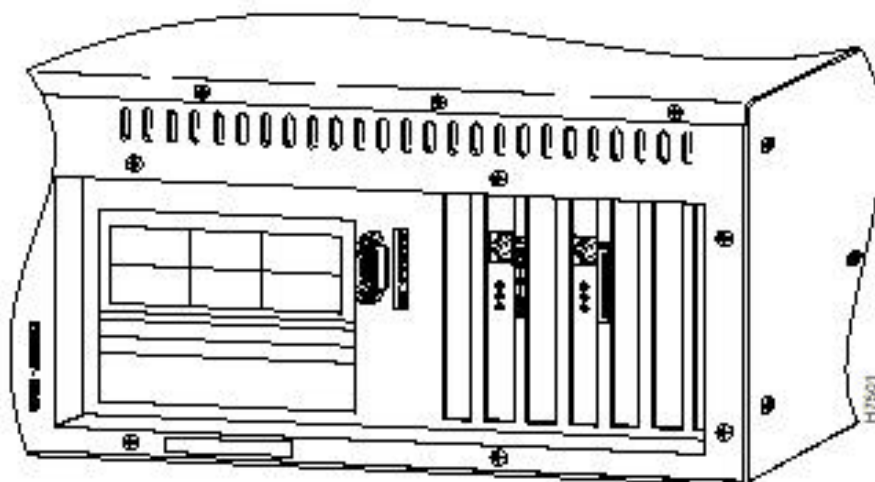Figure 18-4: Cisco Secure PIX Firewall 520 Rear View

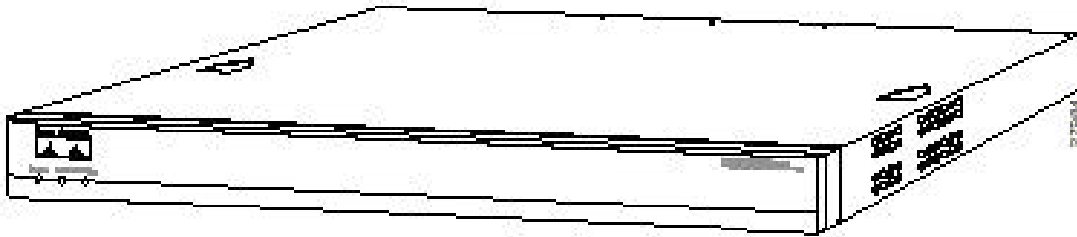Figure 18-5: Cisco Secure PIX Firewall 515 Front View

Figure 18-6: Cisco Secure PIX Firewall 515 rear View

Key Features and Benefits
Non-UNIX, secure, real-time, embedded system

This design eliminates the risks associated with a general purpose operating system and allows the Cisco Secure PIX Firewall series to deliver outstanding performance—up to 250,000 simultaneous connections—dramatically greater than any UNIX-based firewall and without affecting end-user performance.

Less complex and more robust than packet-filtering; higher performance and more scalable than application proxy firewalls.

The heart of the PIX Firewall series is the adaptive security algorithm (ASA), which maintains the secure perimeters between the networks controlled by the firewall. The stateful, connection-oriented ASA design creates session flows based on source and destination addresses, TCP sequence numbers (which are non-predictable), port numbers, and additional TCP flags. All inbound and outbound traffic is controlled by applying security policy to connection table
entries.

User authentication and authorisation with cut-through proxy

Cisco Secure PIX Firewall series gains further dramatic performance advantage through its patented method of transparently verifying the identity of users at the firewall and permitting or denying access to any TCP- or UDP-based application. This method eliminates the price/performance impact UNIX-based firewalls impose in similar configurations, and leverages the authentication and

authorisation services of CiscoSecure Access Control Server. For more information on CiscoSecure Access Control Server, available for both Windows NT and UNIX (Solaris), see the chapter "CiscoSecure Access Control Server Software."

Centralised configuration and management with the PIX Firewall Manager

This Java-based graphical user interface (GUI) configuration tool lets the administrator use a Web browser to retrieve, edit, and centrally manage security policies. Separate tabs provide access to configuration information common to all PIX Firewalls being managed and to built-in reports for user-based accounting for web sites visited and volume of files transferred. The PIX Firewall Manager can automatically provide real-time alerts of any attempted firewall breaches through e-mail or pager notification.

Platform extensibility

To provide platform extensibility without sacrificing the benefits of an embedded system, the PIX Firewall series includes two hardware platforms, the PIX Firewall 515 and 520, which support a broad range of network interface cards (NICs). Standard NICs include single- or four-port 10/100 Ethernet cards, 4/16 Token Ring cards, and dual-attached multimode FDDI cards. FDDI cards and four-port Ethernet cards are supported in PIX beginning with version 4.4.

Failover/hot standby upgrade option
27985
The PIX Firewall failover option ensures high availability and eliminates a single point of failure. With two PIX Firewalls running in parallel, if one malfunctions, the second PIX Firewall transparently maintains security operations.

Synchronised configurations for effective recovery from hardware failure

Simplified TFTP boot function allows consistent synchronization of multiple device configurations.

Specifications

Hardware

Table 18-23: Technical Specifications for Cisco Secure PIX Firewall

Description	PIX Firewall 515-R	PIX Firewall 515-UR	PIX Firewall 520	PIX Firewall 520-DC
Hardware Case	19-in. rack-mountable (comes with rack-mount hardware)	19-in. rack-mountable (comes with rack-mount hardware)	19-in. rack-mountable (comes with rack-mount hardware)	19-in. rack-mountable (comes with rack-mount hardware)
Random Access Memory	32MB	64MB	128MB	128MB
Console Report	RJ-45	RJ-45	DB-9 EIA/TIA-232	DB-9 EIA/TIA-232
Boot/Update Device	TFTP only	TFTP only	3.5-in. floppy disk drive	3.5-in. floppy disk drive
Failover Port 1	DB-25 EIA/TIA-232	DB-25 EIA/TIA-232	DB-25 EIA/TIA-232	DB-25 EIA/TIA-232

1.   Failover requires special, Cisco cable

Table 18-24: Power Requirements for Cisco Secure PIX Firewall

Description	PIX Firewall 515-R	PIX Firewall 515-UR	PIX Firewall 520	PIX Firewall 520-DC
Autoswitching	100-240 VAC	100-240 VAC	100-240 VAC	.-48 VDC
Frequency	50-60 Hz	50-60 Hz	50-60 Hz	-----------
Current	1.5-0.75 Amps	1.5-0.75 Amps	4-2 Amps	4 Amps

Table 18-25: Physical and Environmental Specifications for Cisco Secure PIX Firewall

Description	PIX Firewall 515-R	PIX Firewall 515-UR	PIX Firewall 520	PIX Firewall 520-DC
Dimensions (HxWxD)	1.72 x 16.82 x 11.8 in (4.4 x 42.7 x 29.9 cm)	1.73 x 16.82 x 11.8 in (4.4 x 42.7 x 29.9 cm)	5.21 x 16.82 x 17.5 in. (13.2 x 42.7 x 44.5 cm)	5.21 x 16.82 x 17.5 in. (13.2 x 42.7 x 44.5 cm)
Weight	11 lb. (4.9 kg)	11 lb. (4.9 kg)	21 lb. (9.5 kg)	21 lb. (9.5 kg)
Operating Temperature	-25 to 113°F (5 to +45°C)	25 to 113°F (5 to +45°C)	25 to 113°F (-5 to +45°C)	25 to 113°F (5 to +45°C)
Storage temperature	-77 to 158°F (25 to +70°C)	-77 to 158°F (-25 to +70°C)	-77 to 158°F (25 to +70°C)	-77 to 158°F (25 to +70°C)
Operational Humidity	95% relative humidity (RH)	95% relative humidity (RH)	95% relative humidity (RH)	95% relative humidity (RH)
Operational altitude	9843 ft (3000m), 77°F (25°C)	9843 ft (3000m), 77°F (25°C)	9843 ft (3000m), 77°F (25°C)	9843 ft (3000m), 77°F (25°C)
Heat Dissipation (Worst Case with Full Power Usage)	160.37 BTU/hr	160.37 BTU/hr	863.27 BTU/hr	863.27 BTU/hr

Cisco Secure PIX Firewall Software

PIX 520 - Connection licenses available for 128, 1024, and Unrestricted (more than 250,000) simultaneous connections

PIX 515 - Only unrestricted licenses available

PIX 520 - Ethernet, FDDI and Token Ring available

PIX 515 - Restricted (no failover, 32 MB RAM, no option cards, 2 ethernet interfaces only)

PIX 515 - Unrestricted (64 MB RAM, failover, up to 6 ethernet interfaces)

PIX 515 - Ethernet only
Adaptive security algorithm (ASA)

Cut-through proxy authenticates, authorizes, and enhances performance

Multiple interface support (10/100 Mbps ethernet, Token Ring, FDDI)

Up to 6 ethernet interfaces

Failover/hot standby; synchronised configurations

True Network Address Translation (NAT) as specified in RFC 1631

Port Address Translation (PAT) further expands a company's address pool-one IP address supports more than 64,000 hosts

Mail Guard removes need for external mail relay server in perimeter network

TACACS+, Radius authentication

DNS Guard transparently protects outbound name and address lookups

Flood Guard and Fragmentation Guard protect against denial of service attacks

Java blocking eliminates potentially dangerous Java applets (not compressed or archived)

Extremely high-performance URL filtering that surpasses the competition in any enterprise-scale network

Cisco IOS-style command-line interface

Extended authentication, authorisation, and accounting capabilities

Net Aliasing transparently merges overlapping networks with the same IP address space

Enhanced granularity of inbound access (conduits)

Allows use of existing registered IP addresses

Extended access lists

Ability to customise protocol ports

Support for private networking of virtual sites at greater than 45 MB using Cisco proprietary Private Link 2.

Enhanced customisation of syslog messages

Simple Network Management Protocol (SNMP) and syslog for remote management

Reliable syslogging using either TCP or UDP

Extended transparent application support (both with and without NAT enabled) includes:
—Sun remote procedure call (RPC)

—Microsoft Networking client and server communication (NetBIOS over IP) using NAT

—Multimedia, including Progressive Networks' RealAudio, Xing Technologies' Streamworks, White Pines' CuSeeMe, Vocal Tec's Internet Phone, VDOnet's VDOLive, Microsoft's NetShow, VXtreme Web Theatre 2; and Intel's Internet Video Phone and Microsoft's NetMeeting (based on H.323 standards)

—Oracle SQL*Net client and server communication

PIX Firewall Manager Specifications

Hosted on a Windows NT 4.0 platform (required) Service Pack 4 compliant

Each PIX Firewall Manager supports up to 10 PIX Firewalls for full logging, and configuration for up to 10 PIX Firewalls

E-mail and pager alarms can be set based on single events or after a threshold is reached

Built-in reports to display FTP and URL activity per user on a daily basis

Visit Cisco Connection Online at www.cisco.com
All configuration information sent between PIX Firewalls and PIX Firewall Manager are protected by a shared secret/
secure hash algorithm (MD5)

Strong authentication (one-time password) support for PIX Firewall management sessions can be provided by
CiscoSecure or other TACACS+ or RADIUS server

Software

For additional specifications, see the Cisco Secure PIX Firewall datasheet on the Cisco Web at www.cisco.com. For software
options for the Cisco Secure PIX Firewall Series, see PIX Firewall Software in the following table.

Ordering Information

Product and Part Numbers

Part Numbers for the Cisco Secure PIX Firewall

Part Description	Part Number
PIX Firewall Solutions	
PIX Private Link 2 card	PIX-PL2
PIX Private Link 2 card, spare	PIX-PL2=
ONE 10/100 Mbps ETHERNET INTERFACES, RJ45	PIX-1FE

Part Description	Part Number
PIX Firewall Software	
PIX Software Upgrade for Non-Support Customers	PIX-CONN-VER=
PIX Software version 4.4	SF-PIX-4.4
PIX version 4.4 software for 515 chassis. TFTP only.	SF-PIX515-4.4
PIX v5.0 software for the PIX chassis	SF-PIX-5.0
PIX 515 Restricted Function software license	PIX-515R-SW
PIX Firewall Bundles	
PIX 515 Failover (Chassis, software, two 10/100 ports)	PIX-515-FO-BUN
PIX 515R Bundle (Chassis, restricted SW, 2 FE ports)	PIX-515-R-BUN
PIX 515R Bundle (Chassis, unrestricted SW, 2 FE ports)	PIX-515-UR-BUN
PIX 515-R DC Bundle (Chassis, R software, two 10/100 ports)	PIX-515-DC-R-BUN
PIX 515-UR DC Bundle(Chassis, UR software, two 10/100 ports)	PIX-515-DC-UR-BUN
Entry level PIX Firewall 520, two 10/100 Enet NICs	PIX-520-128-CH
Midrange PIX Firewall 520, two 10/100 Enet NICs	PIX-520-1K-CH
PIX 520 Failover (Chassis, software, two 10/100 ports)	PIX-520-FO-BUN
Unrestricted PIX Firewall 520, two 10/100 Enet NICs	PIX-520-UR-CH
PIX Firewall Crypto	
PIX 3DES Software License Without Client Software	PIX-VPN-3DES=
PIX Firewall Accessories	
Manufacturing Accessory Kit for PIX version 5.0	ACC-5.0-PIX
PIX 520 Accessory Kit for 5.0 Software Version	ACC-PIX500-5.0

Services and Support

Table 18-26: Available Support Contracts for the Cisco Secure PIX Firewall Series

Description	Part Number
PIX SMARTnet maintenance—all versions	CON-SNT-PIX
PIX SMARTnet maintenance—all versions (two-tier products)	CON-SNT-PKG12

LocalDirector User Interface Overview 1-1

LocalDirector User Interface Overview

The LocalDirector User Interface is a graphical user interface-based application that administrators use to control one or more LocalDirectors, LocalDirector configurations, and custom server farms for which LocalDirector provides traffic management. With the LocalDirector User Interface, you can build, deploy, and monitor server farm configurations through a graphical interface.

To use this guide, you should be familiar with the concepts of LocalDirector; for example, virtual servers and real servers. This guide does not describe these concepts. Refer to the *Cisco LocalDirector Installation and Configuration Guide* for these details.

This guide describes:

• System requirements and installation procedures for the LocalDirector User Interface
• Startup and general layout of the main LocalDirector User Interface window
• Primary configuration instructions for LocalDirector
• Server farm configuration
• Monitoring setup and usage for LocalDirectors and server farms

The screenshots for this manual were generated on a Windows NT system. If you use the LocalDirector User Interface on a different platform, your interface may look different. Despite any visual differences, all platforms share the same functionality.

LocalDirector User Interface Architecture

A LocalDirector User Interface configuration consists of:

• One or more LocalDirectors.
• Zero or more server farms (virtual servers and real servers, grouped by type).
• LocalDirector User Interface server, which is the host system where the LocalDirector User Interface software resides. This host may be connected to LocalDirector via a serial or Telnet connection.
• LocalDirector User Interface client, which runs the browser-based LocalDirector User Interface. This client may be located on the same host as the LocalDirector User Interface server, or on a remote system.

Figure 1-1 illustrates the LocalDirector User Interface architecture.

Figure 1-1 LocalDirector User Interface Architecture

Figure 1-1   LocalDirector User Interface Architecture
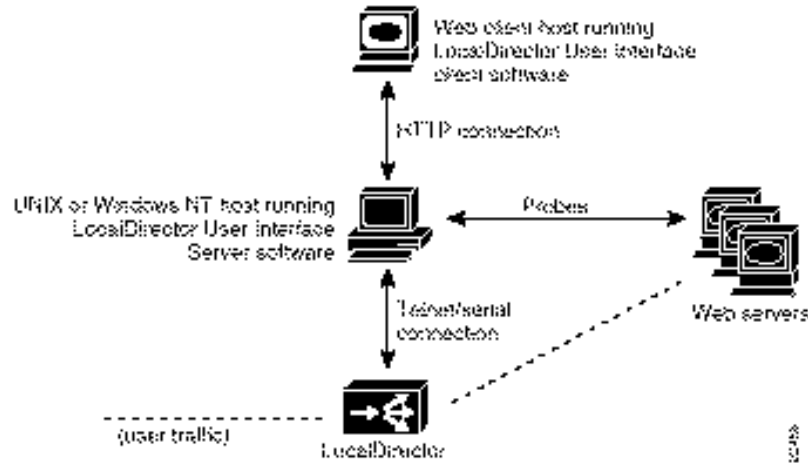
From a client, you access the LocalDirector User Interface server through a Web browser such as Netscape Communicator. The server and client may or may not be on the same host. The browser downloads and runs the LocalDirector User Interface as a Java applet on the client. The LocalDirector User Interface runs inside the browser using a Java plug-in. If the Java plug-in is not already installed in the browser, it will be when you first access the LocalDirector User Interface. Administrators submit configuration commands through the LocalDirector User Interface client.

The LocalDirector User Interface server connects to LocalDirectors via either a serial or a Telnet connection. A serial cable connection is necessary when you first configure LocalDirector to work with the LocalDirector User Interface server. You can configure LocalDirector for a Telnet connection once the initial serial connections have been established and LocalDirector has been configured to accept Telnet connections. Refer to the *Cisco LocalDirector Installation and Configuration Guide* for details about Telnet connections.

User-configured probes monitor the health of a Web server managed by LocalDirector. Probe status information is reported to the LocalDirector User Interface client, where it is displayed in several ways. The LocalDirector User Interface also sends probe status information to LocalDirector, to enable traffic to be routed around failures automatically.

Main LocalDirector User Interface Window

The main LocalDirector User Interface window has five areas that display the configuration and status of LocalDirectors and their server farms. Figure 1-2 illustrates the display areas of the main LocalDirector User Interface window.

The main display areas in the main LocalDirector User Interface window are:

• Tree view—Shows a graphical representation of the relationship between real

Figure 1-2   Main LocalDirector User Interface Window
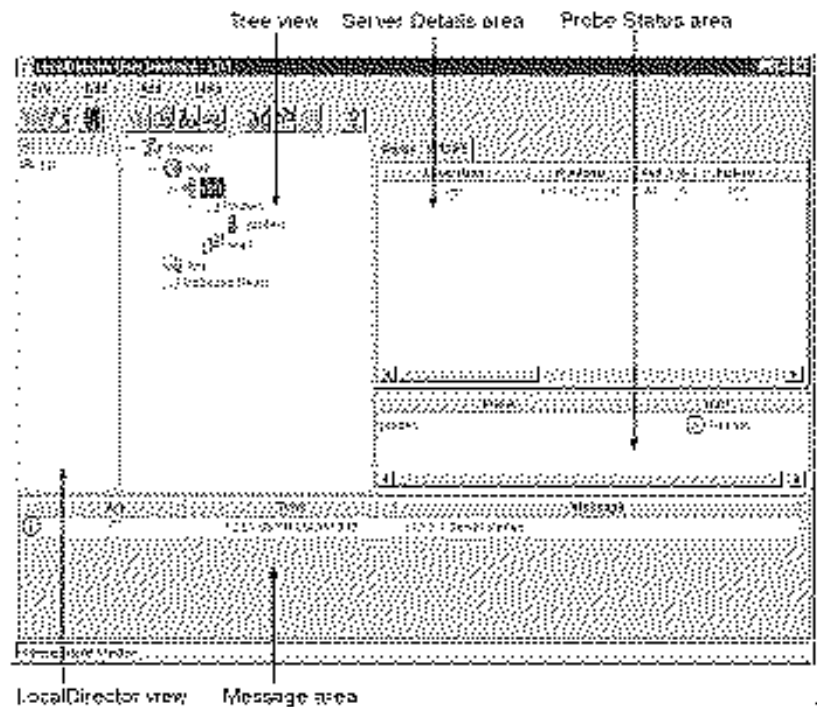
servers and virtual servers. It also displays any probes established for the real servers.

• Server Details area—Shows real server and virtual server properties. If a real server is selected, the Reals panel displays the real server properties, and the Virtuals panel displays the properties for all the virtual servers to which that real server is bound. If a virtual server is selected, the Reals panel shows the properties of all the real servers under that virtual server and the Virtuals panel displays the properties of the virtual server. If a service group (Web or Any) is selected, the properties for all the real servers and virtual servers under that service group are displayed.

• Probe Status area—Area that shows the probe status. If a virtual server is selected, the real servers display across the top of the table and the probes are listed down the left side. Each cell shows the status of a probe for the corresponding real server. If a real server is selected, the table shows the status of each probe on that real server.

• LocalDirector view—Shows all LocalDirectors currently connected to the LocalDirector User Interface server. As LocalDirectors are connected to the system,

they are added to this area. Unattached LocalDirectors appear in the view with question marks superimposed over their icon.

• Message area—Displays alerts or problems that occur in the system. Users can use this area to acknowledge these problems, or generate a new message.

Appendix 2

Sagitta Proposal

Proposal for nameplanet

Date: 21st Septemeber 2000

Contact Information

Quotation Reference :	UCNP2109
Version No:	1.0
Date:	21st September 2000

Customer: The Global Name Registry Ltd

Submitted By: Ursula Connolly

Contact Details: 023 9244 5055 Direct Line Office

                                 0802 916348 Mobile

                                 ursula_connolly@sagitta-ps.com

                                 023 9249 8853 Office Fax

Technically Validated By: Not yet completed

Contents

Executive Summary

With over 60% of IT hardware budgets now dedicated to storage purchases, and management costs of typically seven times the cost of acquisition, it is imperative to take a strategic approach to these buying decisions. Short-term perspectives and quick fixes inevitably leads to problems as common as escalating costs and uncontrolled inflexible environments, through to an IT department that can effectively put the entire company out of business through its inability to recover from a disaster.

In general a well implemented storage consolidation exercise saves at least 25% of storage acquisition costs annually, although we have seen actual savings of between 30 and 40% in other similar types of environments.

Information is the most valuable corporate asset. IT Management now demands a strategic approach that is business-centric, customer-orientated and value-based. Since business relies on information, protecting it should be the highest priority. Traditional backup and restore systems are not enough – a comprehensive data management system is required. A well implemented enterprise storage management strategy can save an estimated 20 to 30 percent or more in storage management costs per year. Storage management costs are estimated to be at least 7 times the cost of the hardware acquisition.

This proposal also provides substantial scope for future requirements of the UNIX and NT environments. Planning for the unforeseen, the unpredictable and the unexpected is essential in today's enterprise environment. The solution we propose also provides the flexibility to build a step-by-step disaster recovery plan in line with business objectives and test 'off-line' before live implementation of business continuance strategies. This includes a new class of storage server (IBMs Enterprise Storage Server) designed to address the real business issues of management, scaleability, flexibility, availability and total cost of ownership.

This proposal is based on IBM products. With more than 40 years of experience in data storage technology and products, no other company is better equipped than IBM to help you safeguard your most vital business resource; your enterprise information. As a standalone storage company IBM represents a $10 billion corporation and has

$6 billion additional investment currently committed to this area. In addition, IBM own and manufacture the base technology which is recognised as best in class – a number of competitors integrate IBM technologies which is testament to this.

Sagitta is an independent organisation whose business is based purely on implementation of specialist data storage subsystems. With a wealth of experience in all aspects of data storage information asset management with business continuance and an unlimited choice of potential technology partners, Sagitta's independence ensures that best-in-class solutions are delivered to our customers regardless of specific manufacturer bias.

In summary this proposal offers:

- A combination of storage management, products and services to address the initial needs of a 420GB implementation
- The most open and flexible choices in the marketplace
- The most comprehensive suite of storage management tools
- Incredible scalability and modularity that allows for easy management of unplanned growth
- Lower administration costs over the longer term
- Provides the most sophisticated basis for longer term business continuance needs
- A committed roadmap to the future for all of the technologies involved
- Ownership of the base technology offering secure investment protection

2.0   Customer Requirements/Proposed Solution

This document is a specific response to the storage requirements for the The Global Name Registry Ltd proposal.

Our summary of the basic data storage environment/requirements are as follows:

- 420GB of usable disk capacity in a high availability configuration
- Connection to 6 RS/6000 servers with unknown number of clients (for the purposes of planning we have assumed 50)
- Automated backup procedures, including disaster recovery planning
- Massive flexibility for both capacity expansion and future functionality needs (eg. Resilience, 24 x 7 availability, full business continuance, disaster recover)

All of the requirements as listed above would be met by the following proposal, the key components of which are discussed below. More detailed information may be found in the Appendices.

Seascape, IBM's innovative storage enterprise architecture solutions, embraces a new direction in data storage and management. This advanced architecture for integrated storage solutions offers an unprecedented combination of enhanced multi-platform connectivity, superior reliability and performance and greatly simplified storage management for major distributed platforms. As an enterprise changes and evolves, Seascape's highly interchangeable components can be easily matched to meet current and future needs. Seascape enables data-driven business innovation and provides highly reliable, scalable and versatile application-based storage solutions that affordably span the range of servers from PCs to supercomputers. All of the products discussed belong to the Seascape family.

Based on IBMs Seascape architecture, the **Entreprise Storage Server** is a second generation disk storage system that provides industry-leading availability, performance, manageability and scalability.   Virtually all types of servers can concurrently attach to the ESS – including NT, RS/6000, AS/400 and many types of UNIX servers. With more business critical information processing being performed on distributed systems (running several different operating systems), the IBM ESS addresses the need to protect and manage distributed data with the same level of performance previously reserved for the mainframe environment. Industry analysts have rated the ESS as a

storage server in a class of its own and it is estimated that the costs of administration can be reduced to one administrator per 8TB !

The ESS heralds a new era in storage servers. Since its introduction in September 1999 over 3500 systems have already been sold. Almost 50% of the Fortune 100 companies already have an ESS on site providing massive increases in productivity, performance, availability and ease of management. Customer testimonials and references are available in abundance and a selection of these can be found in the attached file.

Beyond providing storage management hardware solutions for systems of nearly every size and operating environment, IBM offers one of the most robust and flexible software based automated storage management solutions available today; the **Tivoli Storage Manager (TSM)**. TSM is part of IBM's Seascape architecture, a blueprint for comprehensive storage solutions optimised for the networked world. This award winning software suite not only automates enterprise data backup and archive, but also provides a full complement of storage management functions. TSM has been installed on more than 1,000,000 systems world-wide.

Finally we are proposing the (Linear Tape Open) LTO tape library with dual drives which allow for an automated backup environment when combined with TSM. LTO combines the best implementations of several technologies. Jointly developed by IBM, HP and Seagate, LTO delivers new levels of scalability, reliability and automation to the tape backup market.

4.0   Budgetary Pricing

Obviously further detailed discussion will define the precise nature of the final configuration
but the table below provides realistic costs for the assumptions listed.

Basic Description	*Budgetary Price*
Enterprise Storage Server with 420GB usable storage capacity (indudes 4 Fibre Channel port adapters) Services – Pre planning, surveys, configuration, implementation etc	£ 240,000
PPRC (peer to peer remote copy) with implementation services for 420GB	£ 40,000
Tivoli Storage Manager licenses for 1 RS/6000 backup server and 50 client systems. (Includes Diaster Recovery Module and Extended Device Support Licenses). Also includes pre planning, design and implementation services	£ 55,000
2 Drive 3583 LTO Ultrium Tape Library (including appropriate media)	£ 30,000
TOTALS	**£ 365,000**

Assumptions:

- RS/6000 systems have appropriate Fibre Channel/PCI cards installed in the host
- 6 RS/6000 servers to be connected to the disk storage
- 1 RS/6000 server to be utilised as the backup server
- Environment is a LAN (as opposed to a SAN) environment – no SAN infrastructure costs have been included although this may be an option at the detailed design phase
- From a planning perspective 50 clients have been planned for in the licensing costs

4.0 Sagitta Performance Systems

Sagitta Performance Systems was established as an independent company in 1997 as the result of a management buy out from Xyratex. Sagitta focuses on providing high performance storage and storage area networking solutions.

As the leading independent provider of storage area networks in Europe Sagitta provides commercially viable implementations for our customers in conjunction with outstanding service levels. Sagitta bridges the gap between high technology expertise and understandable business propositions. Sagitta can discuss which technologies are suitable for your environment and deal with the range of practical issues from integration with existing equipment through to performance and resilience expectations. With multiple high profile reference sites Sagitta can also provide reassurance from existing accounts.

Sagitta Performance Systems is a founding member of the Storage Networking Industry Association and a member of the Fibre Channel Association Europe. Sagitta also has formal partnerships with Tivoli, IBM, Novell, Gadzoox, Sony, Fuji Film, Mountain Gate (exclusive), and Media 100.

As an IBM Business Partner, Sagitta offers a comprehensive range of solutions including the IBM advanced storage management products. The partnership combines the industry's most advanced storage management products from IBM with Sagitta's expertise in implementation.

Appendices

Appendix A: **TIVOLI STORAGE MANAGER**

Tivoli Storage Manager Base Product

Tivoli Storage Manager Version 3.7 features include:

- **Progressive Backup Methodology:** Saves time and disk space by backing up just the new files and files that have changed since the last backup. This progressive backup methodology feature also uses its own relational database to track data wherever it is stored, for direct one-step file restore. This eliminates the need for "base plus incremental" tapes, commonly used for restore procedures in other storage management products.

- **Tape Resource Sharing:** Allows multiple Tivoli Storage Manager servers to use the same tape library and drives, improving backup, recovery performance, and tape hardware asset utilisation.

- **Network-Free Rapid Recovery:** Supports high-speed client data recovery directly from a tape or CD-ROM. This feature minimises recovery time by eliminating the use of network and central services resources.

- **LAN-Free Data Transfer:** Effectively exploits SAN environments by moving back-end office and IT data transfers from the communications network to a dedicated data network or SAN. IP communications bandwidth can then be used to enhance and improve service levels for end users and customers.

- **Dynamic Multi-Threaded Transfer:** Permits multiple clients to simultaneously transfer data to and from the same Tivoli Storage Manager server. This feature improves performance backups to more than three times faster than the rate of a single-threaded session. It does this by transparently optimising the number of Tivoli Storage Manager data transfer sessions, based on available systems resources.

- **Adaptive Differencing Technology:** Fundamentally changes the way data may be transferred throughout the enterprise. Adaptive Differencing Technology, newly patented, transfers data by byte, block, or file level based on data size and network characteristics. This technology supports a variety of connectivity strategies, including LANs, WANs, SANs, Internet and dial-up connections. The first application is designed for mobile computer users who experience frequent bandwidth constraints.

- **Enterprise Administration:** Simplifies centralised control across multiple Tivoli Storage Manager implementations, without sacrificing network performance. It also enables high-performance backups to locally attached storage devices using a minimum of network resources.

Appendix B: IBM Enterprise Storage Server (ESS)

E-business is driving a data explosion, generating exponential growth in the need for immediately accessible, always available and highly functional storage capacity. In the increasingly e-centric world, information demand is like electricity: you plug in, you get it. Appliance-like intelligent storage served by its own network is required to provide "information as a utility."

The IBM Enterprise Storage Server (ESS) is the ultimate Storage Area Network (SAN) utility, providing the information "fuel" that runs the e-business "engine". Extensive heterogeneous server connectivity makes the ESS a natural fit for server consolidation requirements. The ESS supports rapid universal access to vast quantities of data through many advanced functions and features, making it a workhorse for support of business intelligence and other business-critical applications. Because of its enterprise-wide support and management scope, the ESS is tailor made to help provide consistent, efficient and effective enterprise resource planning. Using the ESS to address any or all of your strategic and tactical business initiatives will give your organisation the business advantage needed to survive and thrive in the e -world.

The ESS is an IBM Seascape solution that provides the outboard intelligence required by SAN solutions, offloading key functions from host servers which frees up valuable

processing power for applications. As a comprehensive SAN-based storage solution, the ESS provides considerable management flexibility to meet the fast-paced requirements of the next century.

Universal Data Access and Future Enhancements

The ESS supports many diverse platforms including the RS/6000 running AIX and many leading UNIX variants, IBM NetFinity and other Intel-based PC servers running Windows NT and Novell Netware, and AS/400 running OS/400. In addition, the ESS supports System/390 servers running OS/390, VM/ESA, VSE/ESA and TPF. This rich support of server platforms is not limited in any way; any combination of these heterogeneous platforms may be used with the ESS. Storage capacity is partitioned among the attached servers using the flexible, web based StorWatch Enterprise Storage Specialist management tool. The ESSNet feature even provides a browser for the StorWatch interface.

Different platform types use different connection protocols, and the ESS is initially equipped to handle either SCSI (20MB or 40MB) connectivity for UNIX, Intel-based PC and AS/400 servers, or ESCON for S/390 servers. Fibre Channel is initially accommodated by the IBM SAN Data Gateway, which provides support for Fibre Channel attachment to the ESS SCSI ports. The ESS will also support native Fibre Channel, providing a basis for future development of full SAN exploitation in areas such as disk pooling, file pooling, and copy services. Up to 16 Fibre Channel ports are planned to be available on an ESS. Fibre Channel ports are planned to support FICON, the Fibre Channel interface for S/390 servers. Fibre Channel ports are planned as an upgrade option for installed ESSs.

IBM plans continuing growth and enhancements to the ESS and to make these enhancements available as upgrades to installed ESSs. Enhancements are planned, such as larger cache, implementation of a virtual architecture similar to the RAMAC Virtual Array (RVA), triple the current maximum storage capacity, and continued performance enhancements by utilising faster RISC microprocessor engines.

Business Value of the ESS

In today's information-dependent world of e-business, the ability to gather and store information from every imaginable source and deliver it to users across the extended enterprise is the key to business success. The ESS provides:

- **Extensive Connectivity** - The ESS provides simultaneous attachment to a wide variety of host servers with storage capacity partitioned among the attached servers using flexible web-based StorWatch management tools. Heterogeneous Support for NT, UNIX, AS/400 and S/390 Data Storage is provided through SCSI, Fibre Channel, ESCON and FICON options

- **Copy Services Functions** - The ESS supports several hardware copy functions for two purposes: Mirroring for disaster recovery solutions, and copy functions that provide an instant copy of data.

- **Comprehensive Availability** for Applications and e-Business 24x7x365 –Everything is designed for redundancy: power, cooling, adapters, buses and microprocessor complexes.

- **Breakthrough Performance** - The ESS hardware can be configured to provide the capacity and performance required for applications supporting over 30,000 I/Os per second. Automatic I/O load balancing is inherent particularly useful for open environments. New OS/390 options allow multiple simultaneous I/O operations to the same logical volume, which significantly reduces IOSQ time.

- **Low Total Cost of Ownership** - Use of snap-in-building blocks keeps IBM development costs low -- with the savings passed on to you. IBM Global Financing can develop a lease to fit every requirement. Three-year warranty is included. A one-year warranty is optional.

- **Investment Protection** - Existing 7133-020 or D40 drawers can be reused in the ESS, resulting in significant savings.

- **Extreme scalability** - The ESS adapts to growing storage requirements created by both planned and unexpected demands scaling from 420GB to over 11TB with non-disruptive upgrades. Also, storage consolidation from multiple platforms reduces costs.

- **Storage Area Networks (SAN)** - The ESS offers customers the leading storage subsystem, supporting the key servers in the industry, and enabling customers to realise the promise of non-proprietary SANs.

- **Remote Hardware Support** - The IBM hardware support centre call home connection results in virtually no user intervention required on hardware failures.

Appendix C: Linear Tape Open (LTO)

With the rise of e-commerce, data repositories and other data-intensive applications, more data must be backed up and restored ever more quickly. In terms of cost and capacity for data storage no other technology offers the low cost and high capacity advantages of tape.

Open formats benefit customers by offering multiple sources of product and media and by providing a means to enable compatibility between products from different vendors. The competitive environment fostered by multiple sources of product also leads to faster paced innovation and enhancements and provides for data compatibility and investment protection well into the future.

What is Linear Tape – Open (LTO)

Linear Tape Open is a new approach to tape format specifications designed to bring open standards, and new levels of scalability, reliability and automation to the tape backup market. The LTO specification was jointly developed by three of the world's leading storage producers—IBM, Hewlett-Packard, and Seagate.

LTO provides customers with powerful benefits:

- Seamless data interchange and unprecedented levels of scalability, reliability and performance.
- Faster paced innovation, lower prices , and true multi-vendor compatibility.

LTO incorporates the best implementations of several technologies to enable the highest possible performance. Essentially a linear serpentine technology, LTO is the best available implementation of this technology in many ways. First, it enables a higher number of concurrent channels. The first generation of LTO enables up to eight channels, with future versions delivering up to 16 channels. By comparison, most linear serpentine implementations offer a maximum of four channels.

LTO was also developed to take advantage of the best available servo and head technologies, which are essential to provide the high degree of accuracy critical for high track densities. The more tracks there are on a tape, the greater the risk of overwriting a neighbouring track. LTO's track following servo, monitors and controls the position of the head on the tape to ensure accuracy and avoid overwrites. In addition, LTO will offer a higher recording a real density (100 Mbits/sq. inch) than any linear tape technology available in the industry today. The high linear density is supported by a robust logical format including lock step recording across multiple data tracks of user data protected by a true cross-product Error

Correction Code (ECC) designed for robust multiple track operation even if random error rates become high.

Other aspects of the robust logical format include:

- Improved data compression algorithm.

- New RLL code, dynamic rewrite of data written onto defective areas of a tape or written by a bad write head.

- Dynamic discontinuation of writing on any region of tape with an unreliable servo region with subsequent rewrite down tape.

- Use of LTO Cartridge Memory (LTO-CM) to allow old data to be easily disregarded and new write operations to be precisely triggered.

- Recording units are indexed precisely via the longitudinal position encoded into the servo bands. This permits rapid searching for new blocks and dramatically simplifies error and data recovery.

Why choose linear technology?

- The linear format is a market tested and proven technology.
- The mechanical simplicity of linear technology means there are few moving parts, providing proven durability and lower maintenance costs.
- Enhancements in the areas of timing-based servo, hardware data compression, optimised track layouts and high efficiency error correction code (ECC) maximises capacity and performance.

LTO provides unparalleled tape backup scalability accommodates a wide range of system formats and easily integrates into current operating environments.

The *Ultrium* tape format is the implementation of LTO technology optimised for high capacity and performance with outstanding reliability, in either a stand-alone or an automated environment. The Ultrium tape format uses a single reel cartridge to maximise capacity. It is ideally suited for backup, restore, and archive applications. The Ultrium tape format will establish a new benchmark for large volume backup and archive.

The four generation roadmap (figure 1: Ultrium Migration Path) protects your investment today and in the future. Migration paths focused on increasing maximum transfer rates to reduce backup window. In addition, capacity will double in each successive generation.

Figure 1: Ultrium Migration Path

				Generation 4*
			Generation 3*	
		Generation 2*		
	Generation 1			
Native Capacity	100 GB	200 GB	400 GB	800 GB
Native Transfer Rate	10-20 MB/sec	20-40 MB/sec	40-80 MB/sec	80-160 MB/sec
Recording Method	RLL 1,7	PRML	PRML	PRML
Media	MP	MP	MP	Thin film

The LTO Ultrium format offers exceptional investment protection. As a truly open tape solution, the LTO Ultrium format has gained widespread industry acceptance from leading tape drive, media, and automation companies. More than 30 licensees have already demonstrated their endorsement of the technology. Simplified product planning means faster cycle time for new features Compliance testing ensures that LTO Ultrium drives and media cartridges conform to the specification to deliver data interchange among multiple vendors' products.

What are the key strengths of the IBM Ultrium-based tape family?

- IBM offers a complete family of solutions, comprising tape drives and small- medium- and large tape automation solutions that leverage the Ultrium ultra-high-capacity recording format. This family delivers exceptional performance, widespread availability, and a lower price data storage solution.
- High Capacity. Up to 200 GB of compressed data can fit on a single compact cartridge.
- High Data Transfer Rate. Sustained data transfer rates of up to 30 MB/second are supported in the first generation.
- The IBM LTO Ultrium solutions are designed to grow with your needs, across platforms and operating systems.

IBM 3580

Ultrium Tape Drive

- The foundation of a new family of scalable, flexible tape solutions
- Ideal for backup, save/restore and archival data storage needs of a wide range of small systems
- Capacity of up to 200GB with compression
- Sustained data transfer rate of up to 30 MB/second (compressed)
- Excellent alternative to DLT, 1/4-inch, 4mm or 8mm tape drives

IBM 3581

Ultrium Tape Autoloader

- First step toward automation, with a high capacity storage solution that minimises tape changes
- Maximum media capacity of 1.4 TB of compressed data Sustained data transfer rate of up to 30 MB/second (compressed)

IBM 3583/3584

UltraScalable Tape Library

- The LTO storage solution that protects your resource investment as your business continues to grow
- Data densities ranging from 1.8 TB to more than 3.4 TB per square foot
- Multipath architecture allows simultaneous attachment to a multitude of different server platforms
- Barcode scanner for optical cartridge recognition
- Sustained data transfer rate of up to 30 MB/second (compressed)

The IBM solution

- IBM has invented much of today's most advanced storage technology. IBM introduced the first tape drive in 1952 and the first disk drive in 1956. The IBM LTO-

based Ultrium format tape drives are simply the latest IBM storage developments to leverage this unparalleled track record of innovation and expertise.

- The IBM Ultrium format technology leverages earlier IBM innovations as building blocks for enhancement.

- The dramatic increases in linear and track density, and the use of multi-track, linear-serpentine recording are natural extensions of existing IBM tape technologies.

- The enhancements in tape track and magneto-resistive (MR) head technology leverage the high number of concurrent channels and track density characteristics of the LTO specifications.

- Highest Levels of Reliability. When you entrust your data to a storage medium, you want the very highest levels of reliability. For more than 40 years—longer than any other major storage vendor—IBM has been leading the way in tape storage technology.

- The error correction code (ECC) used in the IBM Ultrium tape products is powerful enough to ensure reliable recovery of data even with the loss of a track or head. The high efficiency ECC is based on the same architecture as existing IBM tape technologies.

- When you choose IBM, you have immediate access to an end-to-end solution whatever the requirement. From individual tape drives to ultrascalable libraries to disk, from printers to software, IBM has a solution.

- A worldwide network of superior sales and technical support services backs every IBM data storage product. In addition, there are more than 45,000 business partners worldwide to address your product solution requirements

Trademarks

All trademarks acknowledged.

All brand and product names are registered marks of their respective proprietors.

ISO9000 Registration

IBM UK has been registered to the requirements of ISO9001 and to the DTI-approved TickIT guidelines since August 1991.

The certificate has been issued by BVQI and our scope of registration ensures that the totality of our business processes are assessed.

Our Certificate number is 92029 and the Licence Scope covers all the activities of IBM in the UK culminating in the provision of business solutions.

Terms of Reference

All the information, statements and proposals in this document are correct and accurate to the best of our present knowledge but are not intended (and should not be taken) to be contractually binding unless and until they become the subject of separate, specific agreement between the parties.

The prices contained herein are subject to the IBM Customer Agreement. Prices are valid for a period of 30 days from the date of this proposal.

IBM is a registered trademark of International Business Machines Corporation. This proposal contains information which is confidential to IBM and is submitted to The Global Name Registry Ltd on the basis that it must not be used in any way nor disclosed to any other party, either whole or in part, except to employees or professional advisors of The Global Name Registry Ltd for the purpose of considering this proposal or otherwise with the prior written consent of IBM.

Year 2000

These Services do not address the capability of Your systems to handle date data within and between the 20th and 21st centuries. You acknowledge that it is your responsibility to assess your systems and take appropriate action to migrate to Year 2000 ready systems.

EMU

These Services do not address the capability of your systems to handle monetary data in the Euro denomination. You also acknowledge that it is your responsibility to assess your current systems and take appropriate action to migrate to Euro ready systems. You may refer to IBM Product Specifications or IBM's Internet venue at: **http://www.europe.ibm.com** to determine whether IBM products are Euro ready.

IBM.