LAN STRATEGY DOCUMENT

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1.0   SCOPE OF DOCUMENT

This document is intended to present a high-level strategy for the development of the LG LAN both in the medium and long term.   It does not address all of the operational systems currently in use and focuses singularly on the major components, both hardware and software, that comprise the LAN.   As with all strategy documents, the strategies are made with the information available at the time of writing and is therefore subject to change as technologies develop.

2.0   NETWORK INFRASTRUCTURE

2.1   CABLING

Presently, the cabling infrastructure is based on the Ethernet IEEE 802.3 standard.   There are two segments: one serving the majority of the Queensville building, factory and satellite locations and the other serving users on the CAD system.   A thick ethernet backbone provides the major artery in the Queensville building and out into the main factory, with fibre optic links serving the satellite locations.   All nodes are connected via thin Ethernet BNC connections except for nodes on the CAD system which are twisted pair RJ-45 connections. The 802.3 standard is based on a 10Mbs bandwidth and this has proved to be adequate for the present utilization levels.

It is anticipated that in the long-term, 100Mbs bandwidth on the LAN will be necessary to cope with increasingly sophisticated applications that distribute significantly higher file sizes through the Ethernet than presently experienced.   No 100Mbs technology is firmly established with ATM and Fast Ethernet appearing to be favourites to become adopted.   Hand-in-hand with the larger bandwidth is a necessity to introduce network adaptor cards that can handle the increased bandwidth as the present 16 bit ISA cards in most of the PCs on the site cannot presently cope with the bandwidth.

Tools for troubleshooting faults on the LAN should be implemented, with the use of SNMP protocol on all new communications devices installed on the LAN to enable centralised management of these devices.   Appropriate troubleshooting tools should be investigated.

In the short term, segmentation or switching of the LAN in a more appropriate manner than presently implemented could see a significant freeing up of bandwidth.   A study into suitable solutions is presently being conducted and is expected to be implemented during the next year.

2.2   PROTOCOLS

Presently, the only protocol in use on the LAN is TCP/IP.   Choosing any alternative protocol cannot be foreseen at the moment, indeed it looks increasingly likely that TCP/IP will become more firmly entrenched as the protocol of choice with the explosion of interest in Internet   / Intranet technologies.

2.3   CAPACITY / EXPANSION

There are presently 170 PCs and 20 portable PCs in use on the LG LAN.   As PC use as a communications tool becomes more widespread for using fax and mail services and the likelihood of core operational systems moving onto client server platforms it can be reasonably expected that every member of staff will require access to a PC.   The total number of staff who may potentially require a PC on the LAN is about 263 (218 LG, 30 DSD and 15 Foundry).   Additionally, as many as 30 more PCs may be needed for foremen, store workers, etc; this then results in a total figure of about 300 PCs.   The proportion of portable PCs out the total number of PCs is likely to increase significantly and the implications of that increase are considered in section 2.4.

2.4   REMOTE USERS / PORTABLES

The use of portable PCs in general is one of the major growth areas in PC computing, it can be expected that this trend will be similarly reflected in use on the LG LAN.   There are presently in   the region of 15 portable PCs, most of which have an ethernet network connection.   A project to provide portable users with dial-up connections over the PSTN, providing all the functionality of a direct LAN connection, has been proposed and this would be the norm for all new portable PCs.   A dedicated remote access server is to be used for this purpose that, in hand with a hunting group on the PABX, will manage up to 8 simultaneous dial-in connections.

2.5   WAN COMMUNICATIONS

The existing 2Mbit BT MegaStream WAN link to GEC CS, The Hollies, should be adequate for any application developments in the near future.   Any projects involving connection to the corporate ALCANET for data network or Intranet / Internet purposes should utilise the existing WAN link or possibly involve an upgrade to the existing WAN link.

2.6   PRINTING

The existing numbers of mono laser printers should not significantly change.   However, it is likely that higher capacity, faster mono laser printers will need to be implemented to replace the slow,   low duty cycle printer currently employed.   Additionally, a more widespread use of colour plotting is expected and a special purpose colour plotting device should be utilised to counter the creep of small colour devices into many areas.

All new network attached printers (including those attached via external print server devices)

must support TCP/IP.   All new LAN attached printers should use this protocol as it is faster and more manageable than the DLC protocol presently employed to communicate with printers.

3.0   SERVERS

3.1   SERVER OPERATING SYSTEM

Both NT servers presently run the Microsoft Windows NT Server v3.51 operating system.   It is not anticipated that the evaluation of any alternative server operating system will be necessary in the near future.

Software for performing replication between the two servers is to be implemented which will enable all data on the primary domain controller (PDC) to be immediately replicated to the backup domain controller (BDC) in real time and hence immediately available in the event of a failure of the PDC.

Software to manage the amount of space available to users / departments is an item that should be implemented in the near future, with the amount of space being consumed by users increasing at an alarming rate.

3.2   SERVER CONFIGURATION

The present dual server setup consists of a PDC, where all the data is sourced and a BDC which keeps a copy of the data from the previous Friday's PDC backup.   The BDC is utilised for print serving and log on authentication - reducing some of the load on the BDC.   Each server is configured in a similar manner with regard to hard disks and drives letter assignments and is backed up independently of the other with its own backup drive.

No more drive bays are available on either server for further expansion, so it will be necessary to install the Proliant Storage System to further increase capacity of the servers.   With the storage system, the capacity of each server increases to a potential 25GB on-line storage which should be enough storage to cope with normal increases in LAN use.   However, applications such as scanning in of documents to put into archive will put rapidly utilise storage space and this application's storage requirements will need to be considered as a special case.

The specifications of the servers, 486 DX2 /66 with 80 MB RAM, is becoming rather inadequate. The replacement of the existing servers with higher specification processors and faster disks / network cards should be planned.

The dual server operation has worked fairly well, with the amount of downtime hours experienced by PC LAN users being minimal.   It is not anticipated to change the general arrangement of the dual servers in the short term, except for taking the mail server processing off and onto a new machine specifically for the purpose of managing the proposed new mail

system and handling remote access services.   This machine will be have its own backup device but not a backup server, hence in the event of the server becoming unavailable there will be no mail services transferrable to another machine.

It would make sense to buy two new servers at the time of the mail project going ahead, and utilising one of the existing servers to perform mail server duties.   The spare server could be utilised for testing and development purposes and could also be available as a standby in the event of a fault to the mail server.

It has already been stated that TCP/IP will be the predominant protocol used in both LAN and WAN communications.   TCP/IP is fairly simple to implement, but keeping control of allocated IP addresses is a notoriously painful task, and as more of the users on the network use portable PCs that may be disconnected from this LAN and used on other GEC ALSTHOM LANs, use dial-up networking and may in the future be connected to the ALCANET, control of IP addressing will become increasingly difficult.   It is proposed that DHCP protocols are installed and utilised to enable dynamic allocation of IP addresses rather than rely on static allocations.   This can be implemented with the existing servers and operating system software.

3.3   SERVER MANAGEMENT

Server management tools are fairly weak with the vanilla version of Windows NT Server.   It is expected that as the LAN grows and becomes more complex it will be necessary to install tools that will enable the management of:

- Hardware and software inventory: so that it is possible to establish at a glance, for instance, which PCs need updated printer drivers, which have enough memory and free disk space to run a new application, and how many copies of Microsoft PowerPoint are actually installed throughout the organization;

- Software distribution and installation: making it easier to upgrade all of the PCs requiring the software;

- Network protocol analysis: so that it is possible to look at bottlenecks anywhere on the network and manage network traffic to help users be their most productive;

- Take remote control over the mouse, screen, and keyboard of any PC for more detailed troubleshooting or helping a user learn a new software program;

- Manage and control disk space utilisation.

Suitable tools for performing these tasks should be investigated and implemented.

3.4   SERVER SECURITY - VIRUSES, DISASTER RECOVERY

The present server resilience configuration only gives online protection against media failure in the server, any failure of a controller or power pack, etc. will result in the server becoming unavailable.   A second server can then be utilised to perform the services normally balanced between two servers.

In the event of the servers becoming totally unusable, e.g. fire or theft, there are no provisions for replacement servers / networking equipment.   This is clearly an area that needs to be addressed.   A contract with a hardware supplier should be implemented whereby in the event of a failure of this nature comparable servers can be installed with the appropriate operating system and data restored.   Hand in hand with this is the requirement for all potential critical components such as the CISCO router and other communications devices in the computer room to have a standby replacement available.

4.0 CLIENTS

4.1 CLIENT HARDWARE SPECIFICATION

The present PC client specification of 486 DX2 /66 with 16MB RAM is adequate for the type of 'office' applications that are being run on the LAN presently.   However, PCs on the LG LAN are now being utilised for more demanding applications such as X terminals onto the CAD system, engineering workstations and Project 2000; additionally applications such as CAM, CorelDraw and Visio Technical are being accessed via PCs and these applications require higher specification PCs than those required for simple word processing & spreadsheet work. In the short term, there should be a minimum specification PC established which all new PC purchases need to conform to, the suggested specification is included in Appendix 1.   New PCs should be rotated as appropriate to ensure that users with the most demanding applications receive the highest specification equipment.   Clearly the hardware specification depends to some extent upon the operating system and applications being used, so it needs to be specified in tandem with the operating system.

In the longer term, a policy of rolling improvement to the minimum specification should be adopted, to ensure that a situation does not arise where wholesale replacement / upgrading of equipment does not become an issue when a potentially significant change in operating system   or application is introduced.

A review of the PC standard specification should be carried out on at least an annual basis and the most appropriate manufacturer chosen at the same time.

4.2 CLIENT OPERATING SYSTEM

The client operating system installed on all clients on the LG LAN is a combination of Microsoft MS-DOS version 6.21 and Microsoft Windows for Workgroups version 3.11.   The operating system has now been in use for approximately 18 months on the LAN and has proved largely successful.   However, the operating system is not being developed any further by Microsoft and more significantly, applications are not being developed for it any more.   Hence, it has become apparent that an alternative operating system needs to be considered.

In the short term, a project is underway to evaluate the suitability of the Windows 95 operating system and the Windows NT v4 operating system.   One of the fundamental policies that was implemented on the LAN was for all PCs to have the same operating system and applications installed so that users could use any PC that was available.   Periodic re-issues of clients were considered necessary to ensure that any new applications that were purchased by LG and operating system configuration changes were available from all PCs.

This re-issue policy has proved difficult to implement, due to the following reasons:

- the number of PCs installed on the LAN is now significantly higher than originally anticipated;

- the method of remotely installing new applications has proved to be more difficult than was originally expected;

- new applications are always being introduced, making it difficult to establish a time when a new client is to be issued.

Any new client operating system must satisfy these basic requirements, as well as improve stability and other issues that will be considered in more depth in the evaluation.

The medium term strategy for client operating system will be Windows NT v4, whether that operating system is suitable for implementation in the short term will be considered in the operating system evaluation project.

4.3   MULTIMEDIA

The use of multimedia (sound cards & speakers, high performance graphics cards, speech input, etc.) is not expected to be relevant to the applications that are used on the LG LAN.

5.0 SOFTWARE

5.1 SUITE APPLICATIONS

The applications presently in use on the LG LAN are specified in Appendix 2. The core applications of WordPerfect and Lotus 1-2-3 are now well understood by the majority of users and there is a vast amount data that exists on the file servers. However, it is apparent that no more development of these applications on the Windows 3.x platform will be done by the software vendors and that at some time in the future a significant upgrade will be necessary.

The applications, although Windows based are not particularly well integrated and problems nearly alway occur when building compound documents. As well as this, nearly all of the other GEC ALSTHOM sites have now standardised on the Microsoft Office suite of applications and the IST steering group are now specifying Microsoft Office as the corporate standard.

The inevitable integration of GEC ALSTHOM units via WAN links and E-mail will make information sharing a real possibility, however, since the documents created at LG are not entirely compatible with other units, some of the benefits of the closer communications will be lost.

It is recommended that a study on the feasibility of implementing Microsoft Office is carried out to enable a fuller understanding of the issues involved in this change proposal.

5.2 APPLICATION LICENCING

One of the benefits of implementing a LAN, and centralised file servers was the ability to install all application software on the file servers, removing the requirement for software to be installed on the local PC's hard disk. Allied to this configuration benefit, running applications from a file server enables concurrent licencing to be employed which has reduced the amount of necessary application purchases significantly. However, more software vendors are changing their licencing policies to remove concurrent licencing options and this will need to be closely followed.

In the short term, the Express Meter licence metering tool should be continued to be employed as it is doing a valuable job. In the longer term, the benefits of installing software on the file servers may become negligible, especially with applications becoming so large, that it is more appropriate to install software on the local hard disk.

5.3 SOFTWARE DEVELOPMENT

Presently, very little application development on the LAN is performed by the FM unit with only

a handful of database applications being written.   However, engineers and designers write a significant number of applications using many different tools such as Visual Basic, Visual C++, Pascal, Fortan, etc.   All of this development is being conducted without the involvement of the FM unit which has led to some misunderstanding at times when faults have occurred in programs that have been developed.

It is proposed that the extent of involvement between the FM unit and the software developers is increased so that both parties have a better understanding of how things fit together and to aid troubleshooting problems that occur.

6.0   PUBLISHING

6.1   DOCUMENT MANAGEMENT

Presently, document management is not employed in the sense of version control and collaborative working.   All access rights and permissions are maintained by the FM department which can become difficult to manage.

Sophisticated document management tools that track versions, allow fully collaborative working and document indexing are more complex than required at Large Generators. Implementation of Windows NT Workstation allows users to manage access permissions and with the facility to use 'long filenames', some of the document indexing requirements disappear.   It is recommended that a document management solution not be implemented in the short term, but may be a requirement in the long term.

6.2   ARCHIVING

The rate of data growth on the servers is such that means of removing some of the load must be introduced.   HSM solutions are available on the market which involve migration of files from on-line (disk) to near-line (optical) to off-line(DAT); this solution is suitable for normal data growth   and migrating files that are on the LAN file servers.

Archiving onto electronic medium of backlogs of paper documentation is an area that needs to be addressed at LG, particularly in the commercial department.   This requirement, however, is quite different from the migration of files from the file server onto near and off-line storage.   The volume of documents is far greater than can be reasonably expected to be stored on a read-write medium and the amount of effort involved would necessitate a bureau service.   A specific project to implement this archiving facility (if justifiable) should be investigated.

6.3   SCANNING

A scanner device is installed that is capable of scanning in paper documents.   It is primarily used for graphic images to be included in presentations but does have the capability to scan in text documents which can be run through optical character recognition (OCR) software to retrieve the text.   Many users have made known their desire to scan in documents, however, scanning in of documents may have major implications on disk storage and network traffic as the images that are created tend to be very large in size.   A thorough investigation into a company wide solution should be investigated.

6.4   INTERNET / INTRANET

Although a project proposal has been submitted to give LG users Internet mail capability, there are no immediate plans to give users WEB access to the Internet.   Any WEB access should be via ALCANET UK as they provide appropriate domains and firewall protection.

7.0   TRAINING

7.1   SUPPORT TRAINING

There are presently three front-line support staff on the PC network and two second-line support staff.   As more and more PCs are introduced onto the network and the number of LAN based applications increases, the need for more support staff and better training for support staff is apparent.   This training should incorporate both training company led instruction to provide rapid and comprehensive training on PC network fundamentals and in-house training on specific adaptations and configurations that are used on the LG LAN.

7.2   USER TRAINING

User training for LG end users has been poor.   This has two major side effects: a significant amount of support work relates to poor use of applications and also users are not using the tools available to them in

SCHEDULE OF APPENDICES

APPENDIX 1   Minimum Client PC Specification

APPENDIX 2   Software Applications

Appendix 1   Minimum Client PC Specification

Manufacturer: DIGITAL

Processor: Pentium 166MHz

RAM Memory: 32MB

Cache: 256kb Synchronous Burst Cache

Bus Type: Peripheral Component Interconnect (PCI)

BIOS: Support for Password Disabling of Floppy Drive

DMI: DMI Compliant

Graphics: 2MB DRAM Accelerated Card

Network Interface Card: 3COM Etherlink III 3C509 Multi-Port (RJ-45 & BNC) on PCI Bus

Storage: 1000MB E-IDE Hard Disk

Mouse: Microsoft Compatible Bus Mouse

Keyboard: Windows 95 Key Compatible

Monitor: 15" 1024*768*256 Non-Interlaced MPRII

Appendix 2   Software Applications

WordPerfect v6.1

Lotus 123 v5

Microsoft PowerPoint v4

Microsoft Access v2

Microsoft Project v4

Microsoft AutoRoute+ v5

Microsoft Visual Basic Professional v3

AutoDesk AutoCad LT v2

Shapeware Visio Technical v4.1

Great Plains Dynamics Accounting Software v2.1

CorelDraw v5

Mathsoft MathCad v5

Stanford Graphics v2.1

Wollongong Pathway Access TN3270 v3

Hummingbird eXceed X Windows Server v5

Matlab Modeller v4.2