Local Area Networks

with particular reference to office automation

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CHAPTER 14

METHODOLOGY

Ross Halgren

SUMMARY

14.1 INTRODUCTION

The aim of the Case Studies Group was to take the LAN dream of a totally integrated 'information pipe' passing by all offices and desks and see how it could be applied to real—life situations. The ideal LAN would support all Local Communication Traffic (data, voice, video, building services, etc.) and would be accessible via a simple wall socket. In practice, such a network is not simple to achieve. The dream of distributed access and control is offered by many LANs. In practice, the possibilities of common or distributed protocols are to be found only at the lower levels of the layered OSI description of communication protocols.

The approach taken by the Group in evaluating the practical aspects of Local Area Networking was as shown in Fig. 14.1 and outlined below:

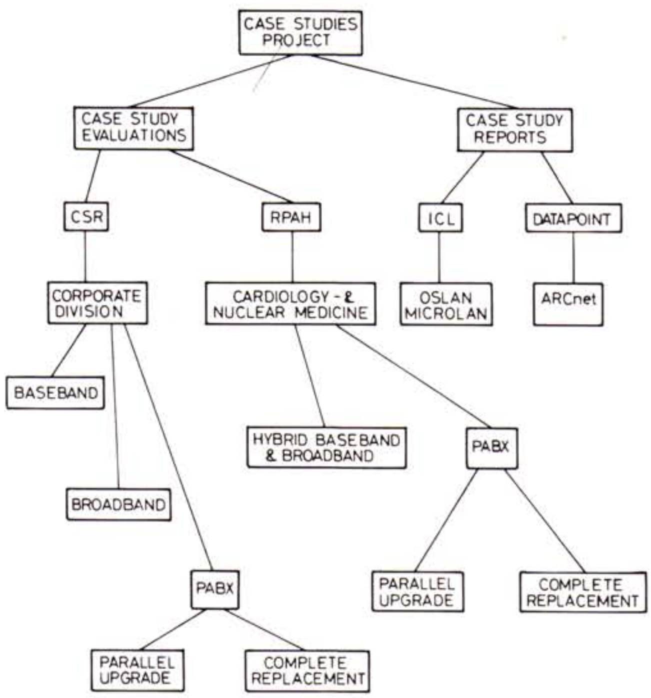

FIGURE 14.1 The basic structure of the Case Study Project.

(1) study the current office automation and networking activities of one or more organisations and evaluate

CHAPTER 15

LAN CASE STUDY — CSR

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(Co—ordinator, Background Material)

Ross Halgren

(LAN Solutions, Cost Analysis, Summary, Conclusion)

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(Cost Research)

SUMMARY

15.1 CSR OVERVIEW

CSR is one of Australia's largest companies. Founded as a sugar refiner in 1855, it now has a diverse range of activities in the area of natural resources, industrial products and services.

The company produces cane sugar, rural products, coal, oil and gas, bauxite, alumina, iron ore, other minerals, chemicals and a range of building and construction materials. It is an employer of 14,700 people throughout Australia.

15.1.1 Location

The head office occupies a site at the corners of O'Connell, Bent and Spring streets in Sydney. The complex, housing about 700 people, comprises 5 main buildings; Knox House (K), Chatsworth House (C), Harwood House (H), Macknade House (M) and the Elders Building (E).

Staff from some areas also occupy floors in 4 other buildings in the vicinity, being; Swire House, General Accident Building, Pastoral Exchange and 60 Pitt Street. The Sugar division head office is located in Clarence Street, Sydney.

CHAPTER 17

NEW BUILDING EVALUATION

Ross Halgren

SUMMARY

17.1 INTRODUCTION

There is a need to evaluate several networking implementations for a new building in contrast to the older buildings covered in the CSR and RPAH Case Study Evaluations. Architects and Building Management Organisations are especially interested in the choice of networks and the installation problems that will be encountered. The aim of this evaluation is not to solve all these problems, but rather to contribute to the knowledge associated with LANs and Office Automation in new buildings.

Some of the differences between LANs in new buildings compared with older buildings are as follows:

(1) The building can be designed to simplify cable installation. False ceilings and/or floors, special wall panels and skirting boards can be incorporated.

(2) LAN cabling costs can be reduced by running the cable during the installation of other power and telephone cables. Wall panels can be added after cable installation.

(3) Any special LAN cable requirements or restrictions can be catered for. For example, the 25cm minimum bending radius of ETHERNET and similar sized cables can be allowed for when designing cable ducts and ceiling cavities.

(4) Any additional power and air conditioning requirements associated with a LAN installation can be considered in the building design. This of course is also true for the computers and large number of extra terminals that will be required as Office Automation takes a stronger hold on business operations.

(5) Integration of data and voice communications can be incorporated into the building design. This is especially applicable where a LAN cable is to interface to the PABX for both internal and external communications. Cost of providing extra Telecom wiring for integrated data/voice extensions is greatly reduced if the extra wiring can be incorporated during the initial installation.

(6) Special office furniture can be designed to integrate all cabling requirements; for example, ICL's new building at French's Forest has office furniture with data posts through which power, telephone and LAN data cable can be distributed to the user. The office furniture can also be ergonomically designed to provide better working conditions for staff that use display terminals. For further information on the ICL building and ICL's LAN implementation, see the ICL Case Study Report (See Chapter 18).

In studying a hypothetical new building, several assumptions must be made about the existence of a PABX, telephones, computers and data terminals. When considering a PABX data network solution for example, it is difficult to separate the costs of the voice network from the data network. This is because the two networks are integrated into the building design from conception. This is in contrast to the parallel PABX upgrade offered in the CSR and RPAH

CHAPTER 19

CASE STUDIES

SUMMARY AND CONCLUSION

Ross Halgren

SUMMARY

The results of the Case Studies project can be best conveyed through the following hypothetical situation:

A small business starting up today may or may not need Office Automation tools. If the business is information—intensive, then these tools will be required for efficient operation of day to day affairs. Such a business has essentially two paths to follow:

(1) Distributed computing from the outset, using a LAN to tie the various terminals, processors, disk drives and printers together. Generally, the processors would be microcomputers and the LAN interface would be built into the terminal;

(2) Centralised computing with a conventional star network for connecting terminals and other peripherals to the computer. In this case, the computer would have much greater processing power than the individual microcomputers used in the distributed approach.

Large businesses on the other hand will already be well and truly down the second path, since the first path was not available to them when they were smaller businesses. The majority of the information uncovered during the project is only applicable to the second path, consequently a detailed comparison of the two paths is beyond the scope of this report. This is an area where further research is required. This description will therefore continue down the second path.

For a small business with a preference for a central computer (mini or super—mini), associated centralised storage, control and maintenance, and a number of low—cost terminals scattered around the office, the most cost—effective means of terminal connection is a star network with the computer being the central node. The connection cost of such a network could vary between $400 and $600 per terminal, depending on the size and distribution of the business premises. This is at least half the cost of a typical modern LAN connection. For a small business, a modern LAN topology is not essential to Office Automation. Terminal additions and relocations are easily accommodated by a small network.

As the business grows, so the level of Office Automation grows and matures. The business is frequently split into a number of departments or divisions and with this split, more computers and terminals are added to the network. The star network is still the most cost—effective means of connecting terminals. However, the cost of each connection is increasing rapidly. Terminal additions and relocations are more frequent. The number of wall sockets (many vacant) far exceeds the number of terminals. Patch panels are set up at each computer to accommodate the continual movement of terminals. Patch panels are also used to allow terminals to connect to different computers from time to time. Sometimes a data switch is used for this purpose instead of a patch panel. This can be an expensive alternative to manual switching.

For each terminal connected, there is a dedicated port on the computer (whether the terminal is in use or not). As terminals are added to the network, more computer interface boards are installed. Eventually, the interface capacity of the computer is reached. In parallel, and as a result of these events, computer—computer links are set up to permit file transfers between computers and logical terminal connections for resource sharing. Logical terminal connections are easier than using patch panels but are more demanding on computer software load. A result of file transfers through intermediate computers and logical terminal connections is increased system response time and associated decrease in user efficiency. As user efficiency drops and computer interface capacity is reached, demands are placed on management to purchase a new computer.

Fig. 19.1 illustrates the network so far. Shown are three existing computers with associated terminal ports, patch panels and wall sockets. The business requires a new computer to allow connection of more terminals and to reduce the computer response times to an acceptable level. At this point, it may be appropriate for the business to discontinue its advance down the second network path and jump across to the first path (distributed network topology with super—minis rather than microcomputers as processors). If this were done, the network would appear as shown in Fig. 19.2. Terminal servers would be located in strategic locations to connect up to 32 terminals to the network. The type of network topology used (tree, bus, ring) is essentially irrelevant, since all of these network topologies provide similar connectivity advantages compared with a star network. For a large business located in a multi—storey