

# APPENDIX ELEVEN

## Building Implications of Using Satellite and WANs to Support Administration and Learning in Schools<sup>1</sup>

### INTRODUCTION

The South African Institute for Distance Education (SAIDE) has been working on the development of a communications systems to support administration and learning in schools. This proposal is directly in line with the CSIR's Boutek *Education for All* project's aims. It was therefore decided that an effective way of developing the project, particularly the media access model, was to work collaboratively with SAIDE in developing this proposal. In particular, the project would explore the building implications of the proposal. This appendix, developed by Boutek for SAIDE, is divided into two parts. First, the building implications of the model are explored and costed for a range of scenarios. Second, 'ownership' and the implications for management and maintenance of the system is explored, for three different scenarios. While this appendix focuses on schools, the basic options are applicable to any educational sector.

### THE BUILDING IMPLICATIONS

There are three main aspects of the proposal that have implications for buildings. These are: the location and design of the 'server' buildings, the location and design of the spaces that house computers within schools and the design of a 'building and resource package' as part of the system, and how this might be used in assisting in the management and maintenance of school buildings.

### THE SERVER BUILDING

The server building will house the web-based network server that will be connected to local schools via leased lines or wireless radio networks. The server building could be purpose built or the adaptation of an existing building. There are a number of considerations that would have to be addressed in establishing the server buildings. These are as follows:

#### Location

- The location of the server building should be fairly central to the schools and organizations it is serving.
- The location should be acceptable to the local community, business, and government.

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<sup>1</sup> This appendix was prepared for SAIDE by Jeremy Gibberd, of Boutek at the CSIR.

- The server should be close to existing telephone networks, or in a position which suits wireless networks.
- Any agreement to accommodate the server building should be reasonably long term (i.e. 20 years).

### Design

- The building needs to be highly secure. This would entail a minimum of: robust masonry construction, secure windows and doors with burgler proofing, a secure roof (concrete or reinforced metal grill ceiling), and an alarm system.
- The internal environment of the building would have to be controlled in terms of dust, temperature, and moisture. This would probably entail masonry construction and simple mechanical ventilation. Extremely hot climates may need air-conditioning.
- The building would need to house, or to be close to, a mast that housed a satellite dish.
- The building needs to be affordable.
- The construction of the building, where possible, should use local labour and material in order to minimize cost and to benefit the local economy.

### Management and Maintenance

- The building and its equipment will need to be maintained in a cost effective way.
- Maintenance of the building and the equipment should be regular and thorough.

### Cost

- The capital and ongoing costs for the server building need to be affordable.
- Costs would depend on the existing situation. For instance, if there was an existing building, the costs would be low. If, on the other hand there was no existing suitable existing building, a new building would have to be constructed. Approximate costs, based on the above considerations, are given for representative scenarios below. These costs are the building costs of a secure serviced space capable of housing a server and enabling access for maintenance. Costs do not include air conditioning, special security measures, equipment or land and legal fees. Where existing buildings are used annual maintenance and replacement costs are only for the internal spaces.

	<b>Scenario</b>	<b>Capital cost</b>	<b>Annual maintenance costs and replacement provision</b>
1	Highly suitable building locally, no modifications	N/A	R1,100
2	Suitable building locally, minor modifications	R4,500	R1,100
3	Non-suitable building, major modifications	R10,700	R1,100
4	No suitable building locally, new building required	R25,000	R2,500

## THE IMPLICATIONS FOR SCHOOL BUILDINGS

Most schools buildings in South Africa follow a variation of a standard plan, consisting of classroom blocks, an administration block, and toilet block. This however varies, with poorly

resourced schools having severely limited classroom space and no or little space for teachers or administration, while others, particularly ex-model C schools, have relatively lavish provision. In all schools, the accommodation and implementation of the system will need to be planned. There are particular considerations, in terms of school buildings, which need to be considered. These are described below:

### Location

- The location of web browser(s) (low-end PCs or thin clients) should be easily accessible to teaching and administrative staff. Of particular importance, is enabling easy access by the principal.
- The web browser(s) should be secure.
- The logical upgrade path of the systems, for instance enabling access for students, needs to be considered and planned.
- The space will need to be serviced with electricity and telecommunications facilities.

### Design

- The space in which the web browser(s) are housed should be secure. This would include secure doors and windows (with burglarproofing) and an alarm system.
- The environment in which the web browsers are located should be controlled in terms of temperature and dirt. This would probably include provision for ventilation, possibly a simple mechanical extract system.
- The space should allow comfortable use of the web browsers.
- The logical upgrade path of the systems, for instance enabling access for students, needs to be considered and planned.

### Management and Maintenance

- Clear policies need to be developed and implemented, including the allocation of responsibility, in order to ensure the systems is cared for and used effectively.

### Cost

- The cost of adapting existing school buildings, or building new buildings needs to be affordable.
- The cost implications for schools are likely to vary widely. Some schools may need a new building to house the webserver, others will already have suitable spaces already. The approximate cost of housing a web-server in schools based on the above considerations are given below for 4 representative scenarios. These costs are the building costs of a secure serviced space capable of housing a web-server with easy access by appropriate staff. Costs do not include air conditioning, special security measures or equipment. Where existing buildings are used annual maintenance and replacement costs are only for the internal spaces.

	<b>Scenario</b>	<b>Capital Cost</b>	<b>Annual maintenance cost and provision for replacement</b>
1	Suitable space in school, no modification	R0	R600
2	Suitable space in school, some modification	R3,000	R600

	<b>Scenario</b>	<b>Capital Cost</b>	<b>Annual maintenance cost and provision for replacement</b>
3	Unsuitable space in school, major modification	R5,700	R600
4	No suitable space in school, new building	R18,000	R1,800

- Once the administration aspect of the web-server is working smoothly, schools can look at using the facility for educational use. This initially may involve enabling teachers to access learning material and printing these off, for use in the classroom. However, where this can be afforded, this may also lead to the provision of a local server and computers to enable students to access this material themselves. The cost of this upgrading of the system will also vary depending on the local situation. Indicative cost are given for a 4 representative scenarios in the table below. These costs are the building costs of a secure serviced classroom sized space (57m<sup>2</sup>), which can be easily accessed by students. Costs do not include air conditioning or equipment. Security measures included in the cost estimates include: secure doors and windows (with burglarproofing), secure ceiling (concrete or grill), and an alarm system. Where existing buildings are used annual maintenance and replacement costs are only for the internal spaces.

	<b>Scenario</b>	<b>Capital Costs</b>	<b>Maintenance cost and replacement provision</b>
1	Suitable existing space in school	R0	R3,500
2	Suitable space, some modification	R11,000	R3,500
3	Unsuitable space, major modification	R35,000	R3,500
4	No suitable space, new building	R70,000	R3,500

## A BUILDING AND RESOURCE SOFTWARE PACKAGE

A building and resource package included as part of the administrative system can have a number of applications. It can help provide information for decisions and planning by the school governors, teachers, parents, and students. It can help provide up-to-date, accurate information to enable effective planning at provisional and national levels. Currently, planning is often done using information that is out of date. For instance the School Register of Needs (SRN) database is used extensively: this, at the moment is only updated every two to three years. The cost of these large national surveys (such as the SRN) would also be avoided. Also, by ensuring buildings and equipment issues are addressed regularly, this could help reduce costs and ensure effective use, as these are consciously managed and maintained. In designing and implementing this package there is a number of considerations. These are:

### Design

- The package must be extremely intuitive and easy to use.
- The package must be supported by 'help' material, either electronically, as part of the package, or as a paper-based manual.
- Users of the system must be able to quickly and easily see how they can make use of the system for their own needs.

## Use

- There should be some training in the use of the package.
- The responsibility for using the package needs to be clearly allocated, and it's correct and regular use checked.

## OWNERSHIP OPTIONS

The implications of three possible options for the 'ownership' of the system are explored below. Options explored are: A School Based System where the ownership resides with the Department of Education and with schools, a Local Entrepreneur System where ownership resides privately, and finally, a Service Provider System where the ownership resides with an organization like Telkom, Vodacom or MTN.

### SCHOOL BASED SYSTEM

#### Description

The system would be run by the Department of Education, possibly with the Department of Communications. As far as possible existing infrastructure and systems would be used.

#### Location

Servers would be located in school buildings or in a new buildings on school grounds.

#### Management and Maintenance

A member of the school staff, in addition to their existing duties, would be appointed to manage and maintain the server. They would be given training, adequate resources, and be paid to do this.

#### Funding

Funding would be by the Department for Education. Other departments would be encouraged to use this system (i.e. health) and would contribute to the cost, depending on extent of use.

#### Advantages

- Large number of schools (30,000) exist, mostly in suitable strategic positions (i.e. central to other services and to other service providers).
- System is designed mainly to benefit education: it therefore would make sense that they develop the system to ensure that it suits themselves before providing for other users.

#### Disadvantages

- Requires large amount of funding by government.
- System may be perceived to be 'owned and controlled' by the Department of Education by other users, who may want more say in the design and operation of the system.
- Limited capacity currently exists within the DoE to develop, manage and maintain the system

## LOCAL ENTREPRENEUR-BASED SYSTEM

### Description

The system will be divided into different packages which would go out to tender. There could be a 'province tender' for each province. This would be to provide the server equipment and technical back-up for this. There could also be a 'site tender'. This would be a tender for each site to accommodate and carry out day-to-day maintenance on the server. For this service, successful tenderers would receive a monthly fee. This could be tied to performance and number of users.

### Location

The server could be located in a range of different places as this would be at the discretion of the entrepreneur. For instance it could be located in a school, where the entrepreneur has an agreement with the school (as currently happens with MTN/Vodacom masts).

### Management and Maintenance

This would be the responsibility of the successful tenderer. Updating and attending to repairs of the server equipment would be the responsibility of the provincial tenderer. Day-to-day maintenance of the server and the space in which it is accommodated would be the responsibility of the site tenderer.

### Funding

Capital and servicing costs for the server equipment would be covered by the provincial tenderer. Capital and maintenance costs for the server building and the day-to-day maintenance of the server would be borne by the site tenderer. Users, such as the Department of Education and Health would pay a monthly use for use of the system.

### Advantages

- Capital costs for server buildings and server accommodation would not be borne by government.
- To some extent the quality of service could be assured by relating these to performance specifications in contracts and financial incentives.
- Would contribute to the local economy and encourage local participation with the system.

### Disadvantages

- Overall costs may be slightly higher than if the system was run by government as there would not be the economies of scale and would need to include profit.
- There would need to be considerable input in the early stages in terms of the design and management of the service contracts and in terms of training.

## SERVICE PROVIDER-BASED SYSTEM

### Description

A service provider such as Telkom, MTN, or Vodacom would be responsible for developing and running the system. They would liaise with users such as the Department of Education and Health in ensuring that the system developed was appropriate for them.

### Location

Servers, as far as possible, would be located within the existing service provider infrastructure. If required, new infrastructure would be developed.

### Management and Maintenance

Management and maintenance of the system would be the responsibility of the service provider.

### Funding

Funding for capital and ongoing costs would be borne by the service provider. Users, such as the Department of Education, would then pay for use of the system, in much the same way as they would a telephone service.

### Advantages

- The responsibility for the whole system (design, operation etc) would reside with one organization.
- Savings could be made as existing capacity could be used. This would include personnel, equipment etc.

### Disadvantages

- May overstretch service provider to the detriment of their core service.