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Title: **Network Success with Hewlett-Packard and Microsoft  
A Case History: The Gulf Coast Waste Disposal Authority**

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*Foreword -*

This paper provides an overview of the progress made in revitalizing information systems for a small government organization serving industrial and municipal customers in the State of Texas. Gulf Coast Waste Disposal Authority (GCA) provides wastewater treatment services for a variety of customers, primarily in the Galveston Bay region. The Authority does not use any tax money in its operations, relying on its customers to pay as they go for services. With the need to support operations growth and enhance employee productivity, GCA's senior management revisited their information systems requirements and plans early in 1995.

The Authority's business processes have long been supported by applications running on a Hewlett-Packard mini-computer. With the HP-3000 as its platform of choice for application systems, GCA had both wide area network and local area network connectivity, using TCP/IP and other protocols, for several years. The emergence of distributed computing capabilities and client/server computing enabled the internal GCA users to develop new requirements for information systems. To satisfy those requirements, a new strategic concept and approach, a new vision, was needed, supported by emerging and enabling technologies.

GCA developed its strategic concept to support its stated mission and to provide for growth and increased employee productivity. The resultant systems planning process led to the formulation of an evolutionary approach for GCA systems. The approach was built on GCA's proven computing foundation, focused on the need to solve current problems, and also addressed long term needs via an information systems architecture.

GCA's MIS personnel decided to use HP hardware and to use the Microsoft family of software products for its information systems. Following the installation of Windows NT Server 3.51 early in 1995, MS-Exchange became the next Microsoft BackOffice product implemented by the Authority. For our users, MS-Exchange and Schedule+ were of great interest and benefit.

With the world's growing use of the Internet, GCA first started accessing the Internet late in 1995 and developed its first home page late in 1996. With the adoption of the Internet by Bill Gates and Microsoft as a unifying paradigm for future products, the Authority has chosen the Internet/Intranet concept to help develop its architecture for the future.

This paper provides information that should help other organizations in their quest for success, using current technology from industry leaders. (If you like what you hear in this session, let Interex know so that we can come back next year and you can follow our progress.)

## 1.0 Introduction

### 1.1 Background

The Gulf Coast Waste Disposal Authority (GCA) was established by the State of Texas in the late 1960's. It is a regional waste treatment authority based in Houston, with its central office located near NASA's Lyndon B. Johnson Space Center. Chartered to help protect Galveston Bay, GCA provides wastewater treatment for many industries and municipalities in a tri-county area. Its Board of Directors represents Chambers, Galveston and Harris Counties, as well as the Governor of the State of Texas. GCA currently consists of 12 facilities and approximately 200 staff members. GCA is unique in many ways, but especially in that it does not spend tax dollars. It operates on the money that it receives for its services to its customer industries and municipalities.

Through its long-term association with Hewlett-Packard (HP) and its user group, Interex, GCA has developed an effective approach for its use of information technology. At the Interex 95 conference held in Toronto, Canada, in August 1995, GCA's Management Information Systems (MIS) representatives were once again exposed to new concepts. Starting with the opening day addresses and continuing in subsequent sessions, they learned about the myriad of HP partners and Internet products, as well as about new enabling concepts and technologies. For example, HP speakers defined the company's concepts for the information utility and the information appliance, providing a new perspective on future information systems. HP partners and users described how they were applying technology in many new ways, adding structure and substance to the concepts. It was shortly after Interex 95 that GCA's MIS representatives developed the phased approach described in this paper.

The following summer, GCA sent the same representatives to attend HPWorld 96 in Anaheim, California. By that time, GCA's Network system, GCANet, had already proven its value in linking GCA management and other users together. HPWorld96 proved as valuable as Interex 95 to the MIS representatives, with additional products, concepts and technologies. For example, there was a new and greater emphasis on Microsoft (MS) NT 4.0 and an increased focus on the Internet. Sessions on HP and MS were found almost everywhere, providing details on how the two companies' products were inter-related and how they were moving together with a similar vision, if not a shared vision. Of special value to GCA was information on firewall technology and the virtual private network concept, as well as the Intranet concept. Once again, shortly after the conference, GCA's MIS representatives applied their new knowledge in their planning efforts.

This paper is offered by GCA to share its experiences with others interested in successful network system implementations. Our use of Hewlett-Packard and Microsoft products is part of an ongoing process of information systems evolution in a time of great change. It is no accident that we have been successful, and the careful integration of HP and MS products in our planning and implementation is one reason for our success.

### 1.2 The Business Situation in 1995

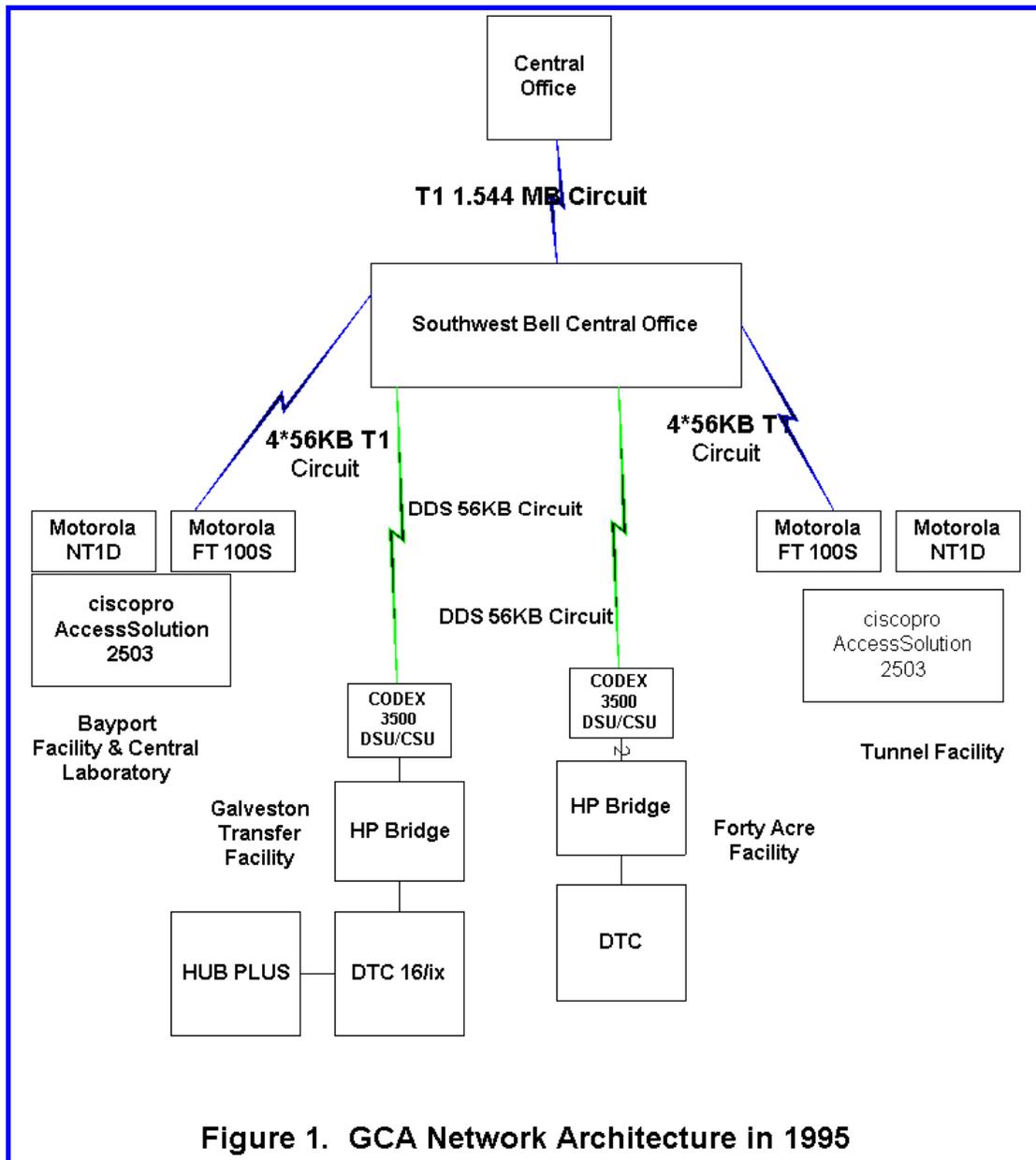
GCA business situation in 1995 was not unusual for a small organization. The Authority had 25 years of experience in using a central computer to meet its business needs. However, by 1995 Authority management had recognized that times had changed considerably over the years, certainly in terms of technology, and perhaps most importantly, in the needs of the organization. Since the Authority is managed centrally, its enterprise-wide reporting and processing needs were handled well by the central computer. However, the central computer was not well positioned to meet decentralized facility needs for operational data. Each GCA operating facility must meet its unique client requirements, as well as adapt reporting to meet changing Environmental Protection Agency (EPA) and Texas Natural Resource Conservation Commission (TNRCC) regulations. In addition, the Authority had been asked to develop a new operating facility. Changes in computing were required by GCA to meet the needs of existing clients as well as new clients.

### 1.3 Initial Systems Architecture

In 1995, GCA facilities and the users were linked via a TCP/IP network to the central HP-3000, as shown in Figure 1. There were no other servers in the Authority, especially at our facilities. The network comprised 10BaseT Ethernet LAN elements. GCA's facilities were interconnected via WAN connections, with both dedicated 56 KBPS lines and fractional T1 lines, and using bridges. Application software systems, written in languages such as Fortran and Speedware, ran as centralized applications on the HP-3000. These applications systems had effectively supported overall GCA operations in areas such as central finance (using IFAS, our Integrated Financial Accounting System) and facility maintenance (using Maintenance Manager). The standard desktop software suite consisted of Windows-For-Workgroups 3.11, WordPerfect and Lotus 1-2-3. There was a solid foundation for GCA's information systems architecture, but it had several limitations. Management thus decided to review the situation and consider what was needed to get GCA ready for the 21<sup>st</sup> Century.

### 1.4 Overview

This paper provides an overview of GCA's development of its network system, GCANet. It begins with the development of a GCA computing strategy, shedding light on significant factors affecting the strategy development process. It includes information about key decisions that were made in planning the project. The paper concludes with a report of the progress made between mid-1995 and the present time.



## 2.0 Computing Strategy

### 2.1 Computing Strategy Development

GCA began developing its computing strategy with an examination of its mission statement. Briefly stated, "It is the mission of Gulf Coast Waste Disposal Authority to protect the waters of the State of Texas through regional waste management practices which are environmentally sound and economically feasible." Because GCA already had operational processes that worked well, it looked to its business processes and computing support for ways to make improvements. Through the

subsequent discussions, GCA mission statement provided the basis for two goals of its computing strategy:

1. The first goal for the strategy was to provide for growth by increasing industrial and municipal customer participation in our operations. This was to be achieved by providing information systems capabilities that increased services to current customers and that enabled services to new customers. By providing information systems that expanded the services offered to existing customers and that attracted new customers, GCA could improve the total package of services offered to the area it serves.
2. The second goal for our strategy was to increase GCA's ability to stay competitive in much the same way as any other service provider. This was to be achieved by providing information systems capabilities to continually increase staff productivity. Because the Authority is a government entity supported solely by providing services to its customers, it must continually strive to provide good value for every dollar spent in operations. In today's competitive world, this means that each year GCA personnel must do more than the previous year by working smarter and by using better information system tools and techniques.

By the end of September 1995, GCA had applied these two goals to formulate a basic computing strategy to guide its efforts in developing GCA Network System, GCANet. The plan implementing that strategy was to cover several years.

## 2.2 GCA's Computing Strategy

Recognizing that the two goals for our computing strategy were very broad, GCA next directed its attention to both immediate and long-range opportunities and problems. MIS personnel had conducted a three-month survey of the Authority and its facilities, including interviews with both managers and system users. Using the knowledge gained from Interex 95, MIS suggested a computing strategy to GCA management. Subsequent discussions narrowed the computing strategy to cover three main elements:

1. First, it was decided to use existing Authority resources and evolve its current information systems. No matter what specific actions were planned, GCA would factor in the capabilities of its personnel, existing hardware and software, operational application systems, and systems under development. Existing systems would not be scrapped, and existing efforts would not be stopped, but rather embraced in the planning process.
2. The Authority also committed to build an enterprise network system with capabilities for each user to do their job and acquire/develop software applications to access the data needed. GCA recognized explicitly that communication was the key to organizational success. The computing system for the future would consist of all the resources of the Authority, placed where they would do the most good, but accessible anywhere in GCA by those GCA personnel who needed them.
3. Finally, it was decided to develop an Authority-wide information systems architecture, with formal definition left to an appropriate future time. The growth of application systems was not to be left to chance, but harnessed to an overall architecture that was based on the business processes and needs of the Authority. A stable network system would provide the environment in which the information system architecture would be based.

Subsequent MIS planning was conducted so that it wove these three elements together to maximize the clout of the Authority. GCA is a relatively small organization with approximately 100 desktop PC's and a few locations. In its experience, GCA had already found that hardware and software vendors did not pay much attention to its needs. In hardware, Hewlett-Packard was a notable exception, providing a good long-term working relationship. In software, there was a need for a vendor that could provide

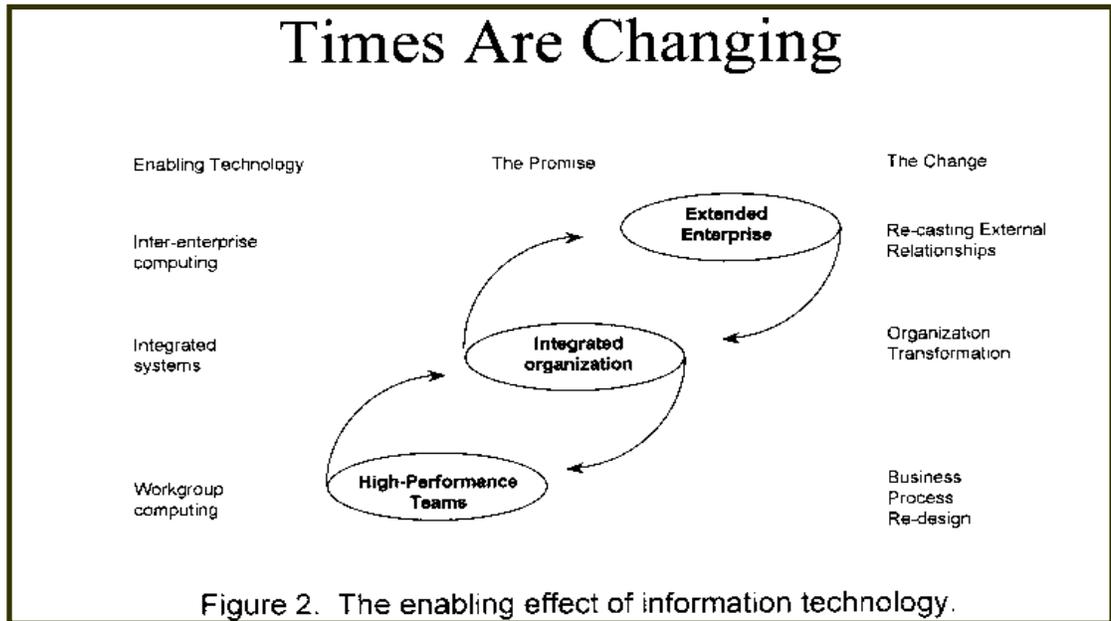
an integrated set of office automation products both for servers and the desktop. Microsoft offered definite advantages that later led to its selection to meet this need.

### 2.3 MIS Role and Objective

The role of MIS at GCA was a subject of much discussion. In order to make GCA strategy come alive, its MIS personnel had to provide leadership, be proactive and work with management and workers to plan ahead and make the right things happen. Accordingly, MIS formulated an overall objective, stated as follows: to provide information technology as one element of GCA's strategic plan. The supporting role of MIS was thus acknowledged, and its efforts were to be included in support of GCA's business plans and new initiatives, including those intended to address immediate problems and situations.

### 2.4 Industry Directions

The 1980's ushered in widespread development of open systems, and the demise of the centrally managed mainframe as the only host for enterprise applications. In 1995, there was a growing awareness in GCA's users about the capabilities of distributed systems and the widespread availability of client/server computing. In examining its standard suite of desktop software, the Authority's MIS personnel found packages developed by several vendors, each of whom had little regard for integration with the others. In order to maximize GCA's clout with its desktop vendors, it needed to select one vendor who could provide the bulk of its needs. Accordingly, MIS recommended the use of the MS-Office suite as GCA's desktop software for client PC's. The intent was to reduce problems associated with software integration and to provide a single source for solutions to problems involving different software packages. At the same time, it was recognized that the desktop software would need to work with the network operating system and server software in ways that were not fully known. MIS personnel recommended the selection of the NT operating system and MS Back Office suite of server software to reduce the likelihood of such problems. Moreover, the movement of MS toward using the Internet was certain to produce capabilities that would be needed in the future, especially considering the extended enterprise concept.



### 3.0 Planning

#### 3.1 Key Decisions

GCA's MIS personnel developed several recommendations in planning for a new computing system for the Authority. The following were key decisions made in the planning process and approved by GCA management:

1. Phasing. There was much too much work to be done at once. The work would have to be phased over a period of years.
2. Partners and suppliers. The computing system would require GCA to develop and maintain good working relationships with several vendors. Some vendors can be thought of as partners, while others are suppliers whose relationships are not as close as for true partners. GCA's management approved the use of Software Spectrum and its network consultants as partners in the planning and implementation of GCANet, due to the lack of NT network expertise in the Authority at the time.
3. Use of existing resources. In accordance with the computing strategy, all MIS personnel on staff, all hardware and software products, all application systems, and the existing communications equipment was considered relevant to GCANet implementation.
4. Use of the Internet. Starting in 1995, the promise of the Internet for ubiquitous communication and access to information sources, and the availability of many Internet products made it important in GCA's MIS planning.
5. Application of the Intranet concept. Although not fully formed in 1995, the concept of using Internet tools for internal information exchange was felt to be important to GCANet's success.

#### 3.2 Phasing

Preliminary discussions with our network consultant resulted in a GCA decision to start with an initial planning phase, Phase Zero. Phase Zero would be followed with four implementation phases, each of which would bring specific capabilities and benefits to the Authority. The four implementation phases were as follows:

1. GCA NT servers and e-mail
2. Facility servers and Windows 95
3. Office 95 and CD-ROM tower
4. Added services

During each phase, a detailed plan would be developed for the following phase, with adjustments in scope as needed after completion of Phase Zero.

In Phase Zero, MIS personnel and Software Spectrum consultants would develop an overall MS-Project schedule with specific goals, defined responsibilities, and a general time frame for each phase. The detailed plan for the next phase would also be produced. Planning would define the standards, policies and procedures to be implemented, as well as the hardware and software to be used, and GCA personnel training and resource requirements. The results of this phase were to be communicated to GCA management upon completion, for approval to go ahead, including necessary funding.

In Phase 1, several specific steps were planned to make internal communication easier. First, there were not going to be major changes to GCA users' desktops, i.e., the users would continue to use WFW3.11, Lotus 1-2-3 and WordPerfect. Second, this phase would result in the installation and operation of two HP NT servers at Central Office, using Microsoft Back Office as needed. Third, it would also produce reliable, enterprise-wide e-mail and calendaring, using Microsoft Exchange, as well as reliable server backup and recovery. Fourth, GCA users would also enjoy secure fax/modem/Internet capabilities. Finally, this phase would result in a detailed plan for phase 2.

In Phase 2, steps were planned to build on the basic capabilities provided in Phase 1. With a reliable set of NT servers and effective e-mail capabilities, the communication needs of the Authority would be a given for expansion of the network. New facility servers could be added one at a time to GCANet, bringing them a platform for building new client server applications. In this phase, the desktop could also be stabilized with a user-friendly, Macintosh-like environment of Windows 95.

In Phase 3, Office 95 was to be added to further revitalize the user desktops, and bring the advantages of an integrated set of desktop software for common use. The MS Office 95 product suite offered the seamless integration of word processing, spreadsheet, presentation and other software, easily making it possible for GCA users to be more productive. In addition, users would be able to access the centralized on-line library provided by a CD-ROM tower.

In Phase 4, GCA would add more network services. The specific additional capabilities were not defined for this phase because it was felt that user requirements would drive them. In other words, by the time that Phase 4 began, users would be setting new demands in place and the plan would have to be adjusted to meet those demands.

### 3.3 Partners and Suppliers

In order to be successful, GCA enlisted the support of many vendors as partners and suppliers in the implementation of GCANet. The decisions to use Software Spectrum, Hewlett-Packard and Microsoft were made up front. As shown in Table 1, there were several items that needed to be considered and/or acquired for GCA to implement GCANet as a system. For all of these items, discussion included not only the specific considerations shown, but also the availability of the items in the marketplace.

<i>Item</i>	<i>Considerations</i>
<b>GCANet Servers</b>	➤ Number and functions
	➤ Server configurations
	➤ Server locations
<b>Standard Desktops &amp; Notebooks</b>	➤ Software configuration
	➤ Desktop hardware and service
	➤ Notebook hardware and service
	➤ Docking stations
	➤ Palmtops
<b>WAN Services</b>	➤ T1, 56 KB and ISDN
	➤ Telephone service providers and choices
	➤ Routing
	➤ Long Distance
<b>Internet Service Configuration</b>	➤ Internet Service Provider
	➤ 64KB ISDN
	➤ Firewall
<b>Internet/Intranet Architecture</b>	➤ Firewall and other security features
	➤ Internal vs external user needs and wants
	➤ Internal vs external access mechanisms

**Table 1. Planning Considerations**

- The following vendors worked with us, almost from the start of our planning effort in 1995.
- Software Spectrum, providing both Network consultants and COTS software
  - Hewlett-Packard, through the Avnet channel partner, providing hardware with proven reliability and quality

- Microsoft, through Software Spectrum, as a single software vendor to reduce integration problems, providing software including Windows, Office and Back Office as *de facto* industry standards
- PC-Connexion, providing our desktop PC's as a one-stop source for production and maintenance
- Dell Computer, providing GCA with notebooks and docking stations, as well as maintenance for the life of the notebooks
- Cisco, via its partner Tel-Text, providing our routers
- Southwestern Bell Telephone, continuing to provide local data communication
- Charter Communication, once known as Phoenix Data Net, acting as our Internet Service Provider (ISP)
- Borderware via Alpha Data Communication, providing a turnkey firewall solution

Our experience with all of these vendors has generally been very positive. As with any other start-up situation, cooperative efforts were needed to establish new working relationships and to solve start-up problems.

### 3.4 Use of Existing Resources

Several of GCA's WAN links that existed in 1995 were replaced and/or new links were added to provide greater bandwidth and redundancy. Bridges were replaced with routers, although routing has just been implemented at one facility to date. The existing Ethernet links continue to be used, but we also have implemented a 100 MBPS LAN link between servers at the Central Office facility. In doing this work, we have used GCA personnel as much as possible, reducing the total cost of outside help and building our expertise. In certain areas, such as router and firewall implementation, our outside vendors have provided specific expertise that is not available in-house. These outside experts were a great asset in both planning and implementation, reducing implementation time and mitigating the risk of missteps.

### 3.5 Use of the Internet

We have published our initial external web page on our ISP's server, and are using it today to provide limited static information to the public. Our current plans call for increased use of the web, including implementation of an external web server, and using the server to provide data to our customers. In this area, we are proceeding cautiously, both from our concern for security and the desire to produce a first rate page of interest to potential readers. We are also building our in-house expertise, which may need to be supplemented for specific purposes. Further information on this will be provided next year, in an update to this paper.

### 3.6 Application of the Intranet Concept

In December of 1994, Bill Gates said that "It's harder to find documents on the LAN than on the Internet...[where] searching tools are better...and there are links between documents. Documents created in-house do not have these features, but they can if Web servers are deployed in-house." With this recognition of the power of the Internet, he formulated a concept that a single interface (the Web browser) could be used to access information on any server. In 1995 and 1996, GCA applied this concept in its GCANet planning.

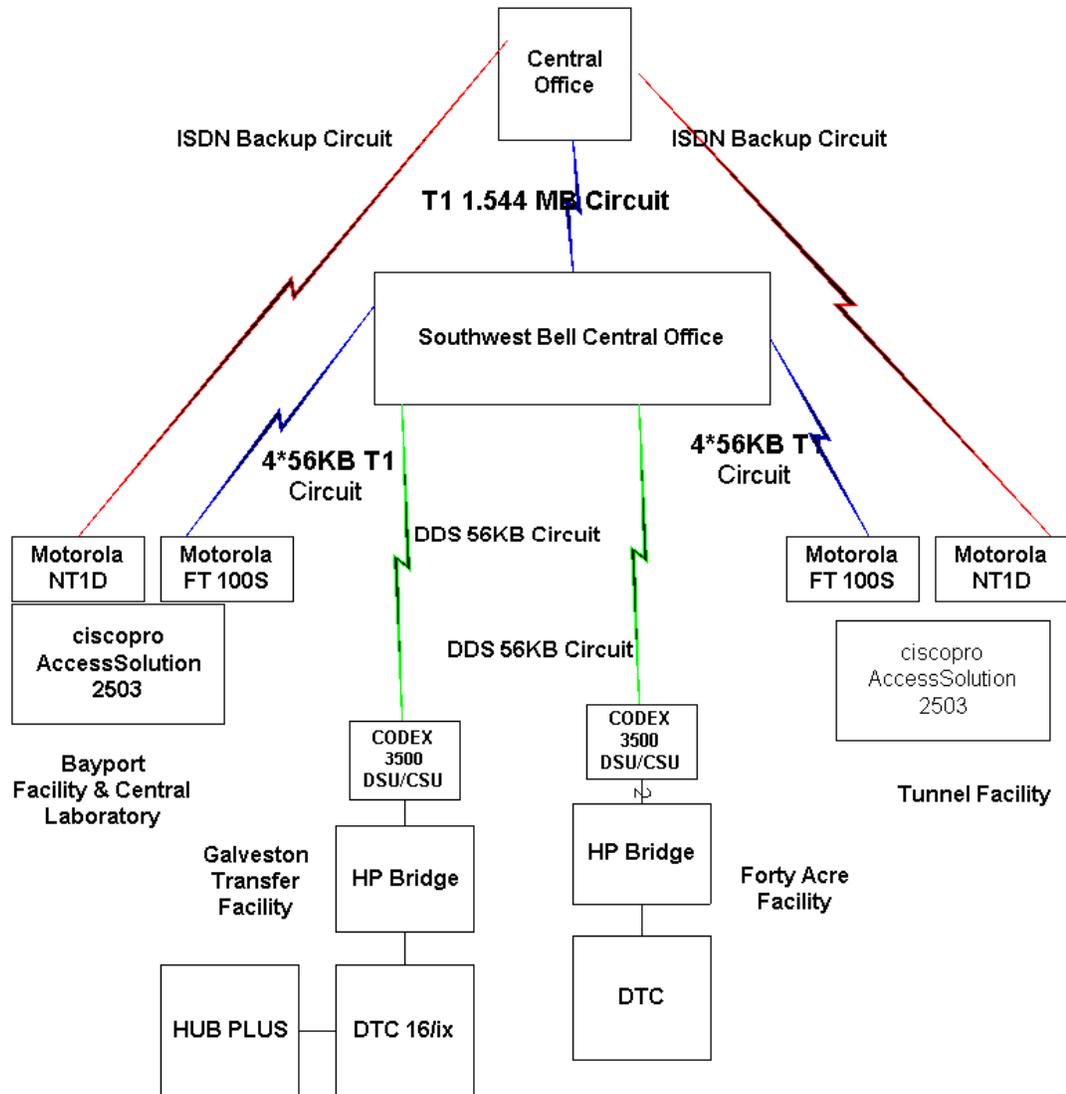
The use of the browser for our Intranet brings us close to the application programmer's Holy Grail, a single user interface. We envision our Intranet as running on an NT server, providing general data about the Authority, as well as detailed information about our processes, facilities, departments, and employees. We also are planning to use the Intranet to provide business information to managers. We are proceeding cautiously in this area, to ensure not only that our Intranet server planning is adequate, but also that the development of our management information systems is considered and factored into our plans. As noted for our Internet efforts, we are building our in-house expertise on the Intranet as

well, which may need to be supplemented for specific purposes. Please look for further information on this next year in the update to this paper.

#### 4.0 Progress Report

It is now mid-1997, two years after GCA started building its GCANet. Much of what was planned initially has come to pass. Progress has been excellent, but not everything happened as written in the original plan. Figure 3 shows our current network.

Phase Zero was completed on time and at approximately one-half of the budgeted cost. Phase 1 was also completed on schedule, with the major deliverables implemented as planned, including network servers, reliable e-mail and calendars, and Internet access. However, Windows 95 and Office 95 both were also tested and implemented during this phase, well ahead of schedule. Secure fax/modem capabilities were not delivered at the time, due to a lack of NT based products at that time. Phase 2 was begun on time, with the first facility server delivered in late 1996 and additional facility servers now on order. The use of NT to deliver software was accomplished using shared directories on the central office servers, and MS-System Management Server (SMS) is being implemented. Phase 3 Office 95 deliverables were put in-place in Phase 1, and the CD-ROM tower is onsite, ready for installation, well ahead of schedule. Phase 4 has been defined informally, with emphasis on developing Internet/Intranet capabilities and document management software. This phase is proceeding well, with external and external web sites planned for the end of this year.



**Figure 3. GCA Network Architecture in 1997**