

# The Internet, Web, and E-Commerce



A guide to assisting small and mid-size organizations in providing on-line services



Figure 5. GIS-Expert System integration



The Analytic Hierarchy Process  
The most frequently raised problem in MCDM is how to establish weights for a set of activ  
importance. Location decisions such as the ranking of alternative communities are repres  
that require prioritizing multiple criteria. Saaty (1980) has shown that this weigh  
with using a theory of measurement in a hierarchical structure (i.e.,  
to evaluate complex multi-attributed alternatives for rep  
employs a systematic procedure for rep  
smaller an



# **THE INTERNET, WEB, AND E-COMMERCE**

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## **A GUIDE TO ASSISTING SMALL TO MID-SIZED ORGANIZATIONS IN PROVIDING ON-LINE SERVICES**



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# INTRODUCTION

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Welcome to URISA's first publication aimed specifically at the needs of small to mid-sized organizations. The goal of this publication is to provide the reader with the information necessary to: 1) get your organization on-line, 2) develop a useful World Wide Web site (web site), and 3) begin conducting commerce via electronic transactions (e-commerce). This publication is intended to serve as a resource in designing a simple, comprehensive plan to execute an organization's on-line strategy.

Local officials have always known that, in the minds of citizens, nothing is more important than an efficient and effective local government office. Whether in a local municipality or a regional agency, today's local resident is on-line, expecting to learn, communicate, and transact business with you via the Internet. However, many local and regional agencies find it difficult to secure funding for this purpose and do not have the technical specialists on staff to set up this seemingly complex system.

Since budgets for this type of service vary, the services that may be provided will vary as well. On the low end of the spectrum is simple e-mail access to various departments and personnel. On the high end is a

complex e-commerce system that might include electronic permit application submission and the paying of fees. Somewhere in the middle of this spectrum is a web site that provides information about your organization.

According to the 2000 International City/County Managers Association Special Report on On-Line Government, local governments should have Internet access and an Internet presence for the following reasons:

- The Internet is becoming a standard and expected way of communicating with a vast array of users, citizens, and businesses.
- The Internet cuts down on research costs and time.
- The Internet gives citizens more complete access to government and gives government more complete access to its citizens.
- The Internet enables local governments to borrow and learn quickly from each other.
- The Internet can support more timely and effective data reporting by, and collaboration among, local governments.

Other notable reasons to make information and services accessible via the Internet include: 1) reducing transaction costs for government and citizens, 2) providing customers with increased customization, value, and control, 3) streamlining business operations, and 4) reducing investment in more costly physical assets.

In the following chapters, you will learn that an organization of any size can get on-line and meet the needs of its constituents. Whether you have a small or large budget, it is possible to learn ways to accomplish this and learn from examples of organizations like yours that have already achieved these goals. In the end, we hope you will be prepared and motivated to provide your constituents with the services they want in a cost-effective and customer friendly manner.

Finally, this publication mentions a number of products and services by name, brand, Trademark, or Servicemark. These are intended to serve as examples only and do not constitute a recommendation to purchase, nor are they intended to be a comprehensive list of available products or services. All Trademarks and Servicemarks are the property of their respective owners. In addition, please note that this publication mentions a number of Internet addresses or Universal Resource Locators (URLs) as a source for additional information. These addresses and their associated World Wide Web sites are operated and maintained by their respective owners. While these addresses were accurate at the time of publication, URLs can change and may not be valid at a future date.



# CHAPTER 1:

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## Getting Your Office Connected To The Internet

Over the past several years, the Internet has become an essential tool and modern convenience for nearly half of all Americans. According to the eGlobal Report, 1999 (published by eStats.com), by the year 2000, 66% of the U.S. population will have ready access to the Internet.

Given the explosive growth of technology surrounding the “Internet phenomenon,” it is to be expected that there will be some confusion as to the best way to “get on the Information Super Highway.” In fact, there is no “best way,” since the choices faced depend on many factors. Among the factors are the number of people using the connection, the services available in your geographic area, and your budget for this project.

This chapter is designed to provide you with the background information necessary to make plans to connect your organization to the Internet and then to implement those plans. We will review the terminology used and discuss the differing needs of offices of varying sizes. We will also discuss what to look for in an Internet Service Provider (ISP).

### Terms and Technology

As you probably know, there are several methods of connecting to the Internet. However, before developing a plan and connecting your system to the Internet, it is necessary to understand several terms and their underlying technologies. While this text does not seek to make you the world’s foremost technical specialist, it does strive to give you an overall idea of what frequently used terms mean, and perhaps even more important, how these technologies and methodologies differ from one another.

Some of the technologies discussed below have been in the marketplace for only a year or two. Others have been around for several years. This is one reason that some technologies are relatively inexpensive yet provide performance that is equal to others at considerably higher cost. While some of these new technologies offer impressive performance, it is important to note that most also come with significant restrictions and are not available in all areas. All of these factors must be taken into account when deciding on a connection or access technology.

- **ATM** (Asynchronous Transfer Mode) is a network technology based on transferring data in *cells* or *packets* of a fixed size. The cell used with ATM is relatively small compared to units used with older technologies. The small, constant cell size allows ATM equipment to transmit video, audio, and computer data over the same network and assures that no single type of data monopolizes the line.

Current implementations of ATM support data transfer rates of from 25 to 622 Mbps (Megabits per second). This compares to a maximum of 100 Mbps for Ethernet, the current technology used for most LANs (Local Area Networks).

Although some believe that ATM holds the answer to the Internet bandwidth problem, others are skeptical. ATM creates a fixed channel, or route, between two points whenever data transfer begins. This differs from TCP/IP (Transmission Control Protocol/Internet Protocol), in which messages are divided into packets and each packet can take a different route from source to destination. This difference makes it easier to track and bill data usage across an ATM network, but less adaptable to sudden surges in network traffic.

When purchasing ATM service, there is generally a choice of four different types of service:

- *Constant Bit Rate* (CBR) specifies a fixed bit rate so that data are sent in a steady stream. This is analogous to a leased line.
- *Variable Bit Rate* (VBR) provides a specified throughput capacity but data are not sent evenly. This is a popular choice for voice and videoconferencing data.
- *Unspecified Bit Rate* (UBR) does not guarantee any throughput levels. This is used for applications, such as file transfer, that can tolerate delays.

- *Available Bit Rate* (ABR) provides a guaranteed minimum capacity but allows data to be *burst*ed at higher capacities when the network is free.
- **BANDWIDTH** refers to the amount of data that can be transmitted per second. The larger the bandwidth, the more data that can be transmitted per second and the faster the connection will perform. Bandwidth is measured in either Kilobits per second or Megabits per second. Devices that can transmit data in excess of 64 Kilobits per second (64Kbps) are usually referred to as “broadband” devices.
- **DHCP** (Dynamic Host Configuration Protocol) refers to a method of automatically assigning a unique network address to a computer. It means that computers configured for this protocol can be added to your network without manually configuring the network with a unique address. This is useful, for instance, when moving a laptop computer between home and the office.
- **DNS** (Domain Name System, or Service) is an Internet service that translates domain names into the numeric addresses used by the Internet (Internet protocol (IP) addresses). Because domain names are alphabetic, they are easier to remember. The Internet, however, is really based on IP addresses. Each time a domain name is used, therefore, a DNS translates the name into the corresponding IP address. For example, the domain name “www.example.com” might translate to 198.105.232.4.

The DNS is, in fact, its own network. If one DNS server does not know how to translate a particular domain name, it asks another one, and so on, until the correct IP address is returned.

- **FIREWALL** is a dedicated computer, device, or piece of software that stands between your network and the connection to the Internet. Its function is to protect your computers and data from malicious attack or tampering from other users connected to the Internet. A firewall does not typically provide protection from computer viruses and should not be confused with virus protection software, which should be considered an essential component of any computer system.
- **FRAME RELAY** is a service based on a packet-switching protocol for connecting devices such as a network router to your service provider via existing telephone company circuits. Most local or long-distance telephone companies provide access speeds from 56K to T1 speeds of 1.544 Mbps (Megabits per second).

More information about Frame Relay is available at: <http://www.mot.com/networking/frame-relay/>  
<http://www.alliancedatacom.com/frame-relay/tutorials.htm>

- **INTERNET** is a global network connecting millions of computers. More than 100 countries are linked to the Internet. Unlike on-line services, which are centrally controlled, the Internet is decentralized by design. Each Internet computer, called a host, is independent. Its operators can choose which Internet services to use and which local services to make available to the global Internet community.

There are a variety of ways to access the Internet. Most on-line services, such as America On-line, offer access to some Internet services. It is also possible to gain access through a commercial Internet Service Provider (ISP).

- **I2 (Internet 2)** is a “new and improved” version of the Internet that is not yet available and will be designed to support much higher data rates, offer

an addressing scheme that allows for tremendous growth, have improved security features, and be able to prioritize data packets to allow for improved audio and video communication.

What is now referred to as the Internet is descended from a military network built in the 1960s called ARPANET. Later, universities and other research sites were added to the ARPANET so that scientific information could be quickly shared. At the end of the 1970s and into the 1980s, the number of computers attached to this network could be numbered in the hundreds. When the network was finally made public, its name was changed to the Internet.

The creation of the World Wide Web, which uses the Internet for its infrastructure, caused an explosion in the number of computers attached to the Internet. According to the Standard web site ([www.thestandard.com](http://www.thestandard.com) *Forecasts for the Year 2000*, January 17, 2000), the number of unique hosts attached to the Internet is now in excess of 5 million and still growing rapidly. According to recent estimates, there are in excess of 137 million users of the Internet in the U.S. alone. World wide, there are more than 19 million “dot com” names registered. Total world-wide users of the Internet are estimated to be as high as 350 million, with the number expected to grow to more than 750 million by the year 2005. It is interesting to note that in this year (2000), the estimated number of Internet users who speak English make up only 57% of the total Internet population (the Standard web site ([www.thestandard.com](http://www.thestandard.com) *English Loses Ground in Online Languages*, January 17, 2000)).

When the creators of the ARPANET first designed this network, it was never imagined that it would have to support this level of use or growth. In fact, the Internet as we know it, is rapidly approaching its maximum addressing capacity. Compounding matters is the increasing

use of multimedia and streaming media transmitted over the Internet. Obviously, a data stream that is carrying an audio stream must not be delayed or the result will be very difficult to understand by the person listening to the message. On the other hand, an e-mail message could be delayed for several seconds with no adverse affect on the recipient. As it now exists, the Internet is not sophisticated enough to distinguish between these types of information.

It became obvious several years ago that a “new and improved” version of the Internet needed to be built. This project is now underway and is casually referred to as Internet 2.

- **ISDN** (Integrated Services Digital Network) is an international communications standard for sending voice, video, and data over digital telephone lines or normal telephone wires. ISDN supports data transfer rates of 64 Kbps. Most telephone companies offer two lines or channels at once called *B channels*. One line can be used for voice and one for data or both can be used for data giving you data rates of 128 Kbps or about three times as fast as a 56K modem.

More information about ISDN is available at: <http://www.alumni.caltech.edu/~dank/isdn/> <http://www.3com.com/nsc/500606.html>.

- **ISDN SHARED** Some companies package an ISDN terminal with a small hub, router, and computing device to create a device that can be shared on a network. An example of this is the 3COM Office Connect ISDN LANmodem. More information on this product is available at <http://www.3com.com/products/dsheets/400396.html>.

- **MODEM** (MODulator DEModulator) is a device that converts digital data into “sound” or tones that can be sent over a standard telephone connection. Since the telephone system was designed to transmit human speech, the rate at which these tones can be sent reliably is limited. By using sophisticated encoding techniques and data compression, currently available modems can transmit data no faster than 56K bits per second. A “K” is equal to 1000 and is an abbreviation for “kilo.”

- *56K Modem* A connection to the Internet via a 56K modem is used most often for homes and small offices. 56K refers to the theoretical ability of the modem to transmit data at 56,000 (56K) bits per second (often referred to as 56 Kbps). In reality, owing to regulations of the Federal Commerce Commission, this device never transmits data at more than 53K. Because the performance of this device is affected by distance and the number of digital devices it must pass through between your computer and your Internet Service Provider, a 56K modem usually performs at speeds below the allowed 53K rate.

There are currently three types of 56K modem technology, only one of which is an international standard. Prior to the V.90 international standard, two competing technologies were available (Kflex and V.Fast). Older modems are often not compatible with the other technologies. It is, therefore, usually best to purchase a modem that adheres to the V.90 standard. It should be noted that, since most 56K modems are built on programmable technology, older Kflex and V.Fast modems can usually be upgraded to V.90 by downloading new firmware into the modem’s programmable signal processing chip.

- *56K Modem Shared* Some companies package a 56K modem with a small hub, router, and computing device to create a device that can be shared on a network. An example of this is the 3COM Office Connect 56K LANmodem. More information on this product is available at <http://www.3com.com/products/dsheets/400397.html>.
- *Cable Modem* is designed to operate over cable television lines. Because the coaxial cable used by cable television provides much greater bandwidth than telephone lines, a cable modem can be used to achieve extremely fast access to the Internet.

Because this is a “shared” technology vs. a dedicated connection, performance varies depending on the number of users in your area (not just on your own internal system, but the number of users in close proximity to you) as well as the type of information those sharing the service with you are accessing. In addition, concerns regarding capacity on the part of the Internet Service Providers means that this technology is usually only available to the home user. The majority of cable providers do not sell service to a business office.

While cable access service is being rapidly deployed in the U.S. and in some other countries, it is not available from all providers or in all areas.

Additional information is available at <http://rpcp.mit.edu/~gingold/cable/> <http://www.catv.org/modem/cablemodem/>.

- **NETWORK ADDRESS TRANSLATION (NAT)** is a method of translating the computer addresses on your internal Local Area Network (LAN) to

one or more different addresses on the Internet. In the case of “one to one” address translation, each local computer address is translated to a different address that appears on the Internet or Wide Area Network (WAN). This provides some security by hiding the true address of your computer behind a “false” address. A more common use of NAT that provides improved security is to translate each address on your LAN to a single address that is exposed to the Internet or WAN. The Internet Service Provider (ISP) and thus the Internet only sees the “public” address associated with your LAN. The individual addresses of the computers connected to your LAN are hidden, providing some protection from malicious mischief and some types of attack by hackers. NAT is usually provided by a router, a proxy, or a firewall device.

- **NGI INITIATIVE** (Next Generation Internet Initiative) is a U.S. program designed to fund and coordinate federal agencies and academia to design and build the next generation of Internet services. The program was first proposed by President Clinton in 1996 and has not yet been formally specified or funded by the U.S. Congress. It is still unclear how the NGI Initiative will complement other initiatives, such as the National Science Foundation’s very high-speed Backbone Network Service (vNBS) and Internet2 (I2).
- **PROTOCOL** is an agreed-upon format for transmitting data between two devices. While many things can be determined and set by the protocol, the following are common. The protocol determines:
  - the type of error checking to be used,
  - the data compression method, if any,
  - how the sending device will indicate that it has finished sending a message, and
  - how the receiving device will indicate that it has received a message.

There are a variety of standard protocols from which programmers can choose. Each has particular advantages and disadvantages; for example, some are simpler than others, some are more reliable, some can be routed while others cannot, and some are faster than others.

From a user's point of view, the only interesting aspect about protocols is that your computer or device must support the right ones in order to communicate with other computers. The protocol can be implemented either in hardware or in software. For example, the protocol used by the Internet is TCP/IP version 4, while a Novell network would use IPX/SPX protocol. More than one protocol may be in use at any given time.

- **T-1** Sometimes called DS1, T-1 is a point-to-point data communications connection supporting data rates of 1.544 Mbps. A T-1 line actually consists of 24 individual channels, each of which supports 64 Kbps. Each channel can be configured to carry data or voice. Most telephone companies will let you buy fewer than 24 channels, which is known as *fractional T-1* access.

T-1 access is a popular access method for mid to large-sized organizations. It does not suffer from distance limitations and offers consistent and reliable performance as well as the flexibility of mixing the types of information carried on a single line (i.e., data and voice).

More information about T-1 is available at:  
<http://www.dcbnet.com/notes/9611t1.html>  
<http://www.zdnet.com/products/content/pcmg/1619/pcmg0126.html>.

- **TCP/IP** (Transmission Control Protocol/Internet Protocol) is a suite of communications protocols used to connect hosts on the Internet. In order to use the Internet or share a connection to the Internet, it will be necessary to have these

communications protocols installed into your computers and to be properly configured.

More information about TCP/IP is available at:  
[http://www.wdvl.com/Authoring/Tools/Tutorial/TCP\\_IP\\_basics.html](http://www.wdvl.com/Authoring/Tools/Tutorial/TCP_IP_basics.html)  
<http://www.microsoft.com/technet/deployp/tcpintro/tcpintro1.htm>.

- **vNBS** (very high-speed Backbone Network Service) is an experimental wide-area network backbone sponsored by the National Science Foundation (NSF) and implemented by MCI Worldcom vNBS has replaced NSFnet and is designed to serve as a platform for testing new, high-speed Internet technologies and protocols. It currently links several Supercomputer Centers (SCCs) and Network Access Points (NAPs) at 2.5 Gbps (Gigabits per second). In addition, it supports data, voice, and video traffic.
- **xDSL** refers collectively to all types of digital subscriber lines, with the two main categories being ADSL (Asymmetrical Digital Subscriber Line) and SDSL (Symmetrical Digital Subscriber Line). . Using ADSL, the data are transmitted to your office at a faster rate than transmitted from your office to the service provider (i.e., fast incoming data and slower outgoing data.) SDSL means that the data are transmitted at the same speed in both directions.

Digital Subscriber Line (DSB) technologies use sophisticated modulation schemes to pack data onto copper wires. They are sometimes referred to as "last-mile technologies" because they are used only for connections from a telephone switching station to a home or office, but are never used between telephone switching stations.

xDSL is available in a variety of speeds, with the price varying with the speed. The performance varies with the distance from your location to the

telephone company switching station. There is a limit on how far the user can be from a switching station and get xDSL service. It is, therefore, not available in many areas.

Two variations on this technology that are commonly available are IDSL and RADSL. ISDN digital subscriber lines (ISDL) are a subset of an ISDN and use the same signaling technology. As such, it will function over a longer distance but it is limited to a speed of 144 Kbps. RADSL (Rate Adaptive DSL) is a version of ADSL in which modems test the line at start up and adapt their operating speed to the fastest that the line can handle.

To add to the confusion, there are two relatively new DSL technologies making their way into the market over the next few years. They are VDSL and G.lite.

- *VDSL* (Very High Speed Digital Subscriber Line) transmits data in the 13 to 55 Mbps range over short distances, usually between 1000 and 4500 feet (300-1500 meters), of twisted pair copper wire. The shorter the distance, the faster the connection rate. As the final length of cable into the home or office, VDSL connects to neighborhood Optical Network Units (ONUs), which connect to the central office's main fiber network backbone. This architecture will allow VDSL users to access the maximum bandwidth available through normal phone lines. VDSL is currently undergoing a standards issue, so it is not widely deployed yet.
- *G.lite* (also known as Universal ADSL, and referred to as G.992.2 by the International Telecommunications Union (ITU) allows for high-speed "always on" digital communications over standard copper phone lines. Although based on the same underlying technology as standard ADSL, G.lite does not require a splitter to be installed at the customer

location. The customer simply connects the G.lite modem in the same manner that one would hook-up an analog modem after signing up for the service. Unlike standard ADSL, G.lite works with DLC (Digital Loop Carrier - the local loop infrastructure that connects customers located more than 18,000 feet from the central office), which opens the technology to a much wider audience. The tradeoff for the increased availability of G.lite is lower speed. While standard or full-rate ADSL provides downstream speeds of up to 8 Mbps and upstream speeds of 1.5 Mbps, G.lite is limited to 1.5 Mbps downstream and 512 Kbps upstream.

*Information about and definitions for technical terms not covered above may be found at the following web site: <http://www.zdwebopedia.com/>.*

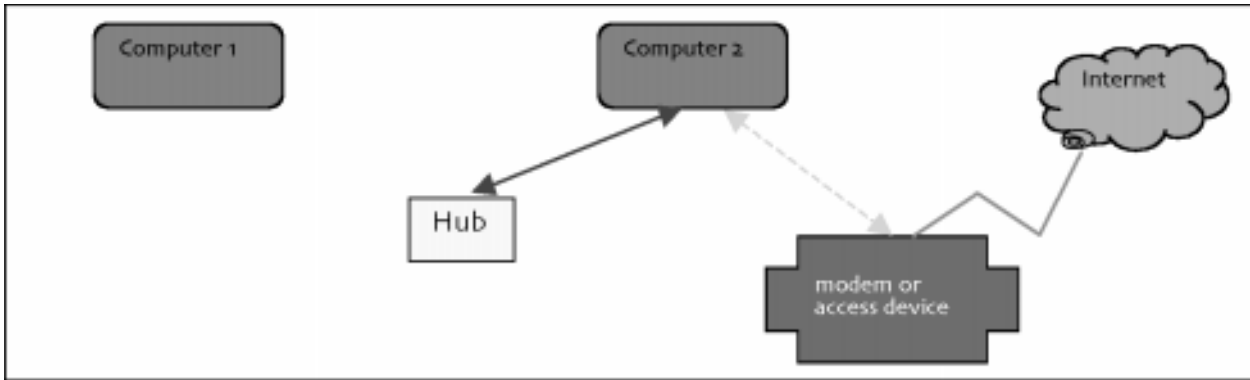
### **One Size Does Not Fit All**

Offices that need access to the Internet fall into three basic groups. These are determined by the number of users, the type of service chosen, and the type of equipment used. The choices available may also depend on whether you are using Windows 95/98, Windows 98 Second Edition, Windows NT Workstation, or Apple Macintosh OS as the primary operating system for your computers.

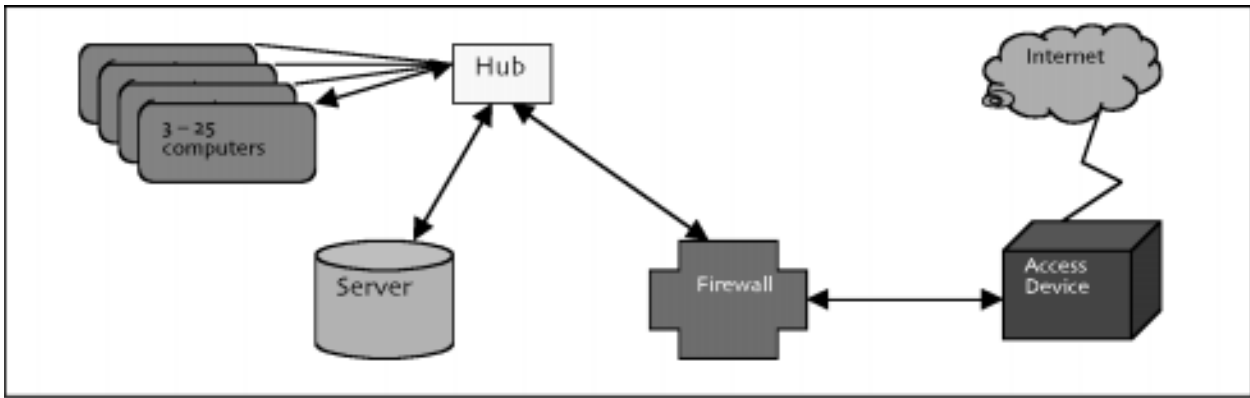
### **The Minimal Set Up/Connection**

This category assumes a small office or home office with only one or two computers that need to share access to a single connection to the Internet.

If you have two computers, it is necessary to network them together in order to share a common Internet connection. This involves adding a Network Interface Card (NIC) to each computer. This network interface uses a standard called 10baseT, communicating at 10 Million bits per second.



**Figure 1**



**Figure 2**

This circuit board or card installed in your computers will be connected to a small external box called a hub. The hub relays the electrical signals from each computer to the other so that they can communicate, share files, share a printer, and share the modem or Internet connection. They are connected via a special type of cable called “category 5 twisted pair.” This cable looks much like the cable that is used to connect telephones. It is not, however, the same cable nor is it wired the same way. Never try to substitute telephone cables for network cables.

The typical configuration usually looks like figure 1.

The following options are available and appropriate for an office of this size:

- 56K modem shared using Windows 98 Second Edition’s modem-sharing feature (only available when using Windows 98 Second Edition).
- 56K modem using shared access router/hub.
- xDSL using multiple static addresses or Network Address Translation (NAT). The device connects directly to your hub or single computer
- cable modem using multiple static addresses or Network Address Translation.
- ISDN using a multiple access router/hub/ISDN terminal.

Given the low cost of some of the new firewall devices and software packages available, a firewall is strongly recommended.

## Providing Internet Services for Fewer than 25 Employees

This category assumes an office with between three and 25 computers.

As with the small office, the computers will need to be connected via a network if this has not already been accomplished. Networking the computers will not only provide the advantage of Internet access, but the ability to share resources such as printers and files. Usually, but not always, a network of this size also uses a dedicated server, which acts as a repository for shared work and files, provides network security, and hosts other shared applications. In addition, a network of this size can usually justify the purchase and installation of a hardware-based firewall device.

Networks of this size often use a network interface called 100baseT. This is similar to the standard 10baseT interface used in the small office but transmits data at 100 Million bits per second as opposed to 10 Million bits per second.

The typical configuration looks like figure 2.

The following options are available and appropriate for a medium-sized office:

- SDSL (Symmetrical Digital Subscriber Line) using multiple static addresses or DHCP (Dynamic Host Configuration Protocol) and Network Address Translation (NAT).
- Frame Relay using multiple static addresses or DHCP and NAT.
- T1 (point to point) using multiple static addresses or DHCP and NAT.

## Providing Internet Services for More than 25 Employees

This category assumes an office with more than 25 computers.

The large office differs from the medium office only in its need for increased bandwidth and the number of computers on the network. In addition, the large office will usually include more than one server and may have a number of specialized features and dedicated services and devices. These may include interconnection between the network and the telephone system, color laser printers, and other items requiring a higher budget. These devices may be found in an office of any size that can justify the investment.

The typical configuration looks like figure 3.

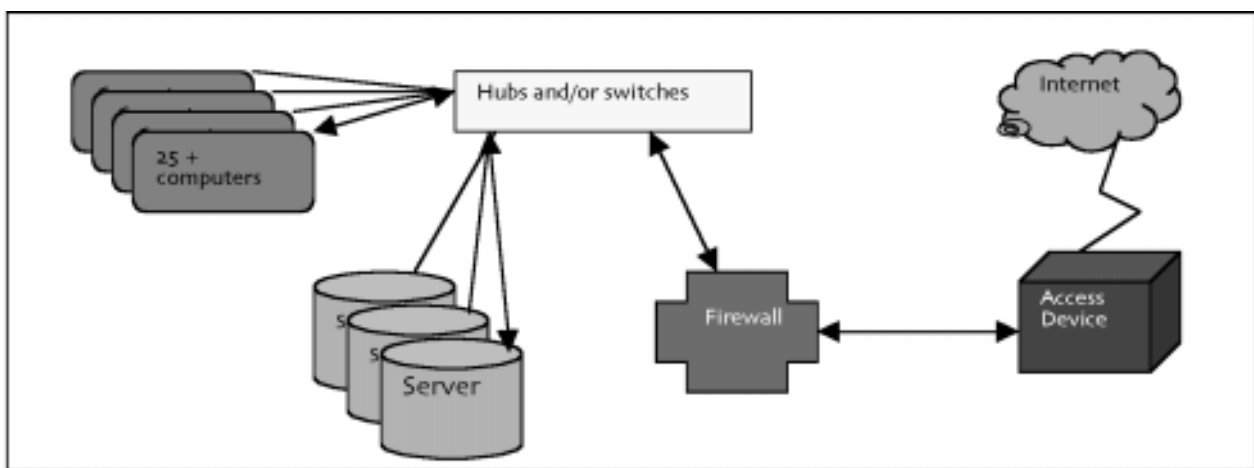


Figure 3

The following options are available and appropriate for a large office:

- SDSL (Symmetrical Digital Subscriber Line) using multiple static addresses or DHCP (Dynamic Host Configuration Protocol) and Network Address Translation (NAT).
- High Speed Frame Relay using multiple static addresses or DHCP and NAT.
- T1 (point to point) using multiple static addresses or DHCP and NAT.
- Multiple T1.
- ATM (Asynchronous Transfer Mode). This is recommended only for large organizations.

### **Circuit Provider vs. Service Provider**

The circuit provider supplies an organization with the physical electrical circuit, which connects your computer or network to the Internet Service Provider (ISP), who, in turn, provides access to the Internet. The circuit provider may be the local telephone company, a long-distance carrier, or another third-party organization.

The ISP is the company that owns and operates equipment that supplies access to the Internet network system. In addition to providing access to the Internet, this company usually offers a variety of additional services. These include e-mail access, DNS (Domain Name System) services, and hosting services for a World Wide Web site (web site).

The circuit provider and the ISP may be the same company. It is increasingly common for a single company to provide both services. Companies such as AT&T, Concentric, Covad, MCI, and Sprint are examples of this type of combination circuit and service provider.

Any connection to the Internet, other than a dial-up modem, will require your organization to work with a third party to install and configure the circuit and the service. Regardless of the circuit provider and ISP chosen, there will be periodic lease costs for the circuit and the service. Additionally, one-time charges may be incurred for setup and installation. Equipment necessary to install the circuit and to make the service functional is sometimes provided free of charge or there may be a one-time charge or periodic lease fee.

### **Internet Service Providers**

There are an enormous number of Internet Service Providers (ISPs) from which to choose. Competition is intense, so there are only minor variations in pricing between competing companies.

There are substantial variations as to the services and features provided by various ISPs. It pays, therefore, to shop and compare.

It is important to understand that any ISP makes its money chiefly by charging flat monthly fees for access. The chief expense of an ISP is the equipment and bandwidth necessary to serve the customers who are on-line at any given time. Therefore, the ISP attempts to maximize profit by having a large number of customers who only use the service occasionally. Additionally, the ISP may attempt to find ways to limit the actual number of data bits that need to be delivered to any given customer at any given time.

One way for the ISP to achieve maximize profit is to limit the data rate to the customer's modem. All modems have the ability to maximize throughput by using mathematical formulas to compress the data being sent and received. As a result, a modem connected at 53K can often achieve nearly twice that rate of transmission. This is, however, not in the best interest of the ISP and in many cases, the ISP will disable this data-compression feature. If two ISPs are charging a fixed rate per month to be connected but

one allows the user to use data compression and one does not, the first ISP is actually delivering almost twice as much data and performance for the same money.

The largest application on the Internet is electronic mail (e-mail). Numerous reports suggest that the Internet application that brings the most immediate benefit to all organizations is the adoption of e-mail. Every day, thousands of individuals join the 66 million Americans already on-line. The first application they will likely become familiar with is e-mail. So, before going on-line with e-mail, you will want to develop a policy that addresses such issues as response times, standardized responses, and the appropriate use of resources. Attorneys specializing in human resource issues frequently make available draft policies that can be used in the creation of an employee handbook.

Realizing that e-mail is usually the first and most critical function of any on-line organization, many ISPs have “official” lists of “supported” e-mail programs. They are usually Outlook Express from Microsoft and perhaps one or two others. This is done because ISPs prefer to limit the programs that their support people must be familiar with and support, thus limiting support expenses. Many ISPs “edit” files attached to e-mail messages to reduce their size. This is not usually a problem unless you choose to use a program such as Microsoft’s Outlook 98 or Outlook 2000, which can share folders and information with other computers. The shared information is transmitted via special e-mail attachments. ISPs who use Rich Text Format (RTF) editing will render these attachments useless. If you seek technical support for this problem, you will likely be told that Outlook 98 is not a supported program. Consequently, if you wish to use the advanced features offered in programs such as Outlook, make sure your ISP does not use RTF editing.

Certain ISPs require a user to obtain special software from them in order to sign up for their service; others provide only support for Windows 95 and Windows

98 and none for users of Windows NT or Apple Macintosh computers. It is important to understand which platforms are supported by the ISPs you are considering and what, if any, special software is required to install and use their services.

When selecting an ISP, ask or consider the following:

- Does the monthly fee allow unlimited access?
- Is there a limit to the length of time a user can stay connected at one time?
- Does the company allow use of the data compression features of my modem?
- Does the company have local access numbers for dial-in within my A-Band telephone area?
- Does the company have local access numbers in all major cities in the U.S. to support traveling employees?
- Does the company offer toll-free dial-in access? Is there an extra cost for this service?
- Is a special software disc required in order to sign up for the service? How about to use the service?
- Does the company allow a user to set up their own web site? How much free space is allocated for the web site?
- Does the company offer more than one e-mail account for each access account? How many?
- Does the company limit the amount or size of the e-mail that a user can receive? How so?
- It is possible to access e-mail from a Web browser when traveling or away from my computer?
- Will the company host my own domain name? What is the charge?
- Does the company support all e-mail programs including Microsoft Outlook?
- Does the company pass along all e-mail and attachments unaltered?
- Does the company allow the user to transmit data at the same speed it can be received at?
- Does the company offer 24-hour technical support? Will “real people” answer when I call?

- If the company provides technical support via e-mail, send them a message and see how long it takes to get a response.
- Is a contract required to obtain the service? What is the minimum length of the contract?
- Look at the company's web site. Is it easy to use and understand? Will you feel comfortable getting your support here?

**AOL is a Special Case.** America On-Line, or AOL, is an *on-line* service offering access to the Internet in addition to a wide variety of personal content available only to AOL subscribers. AOL requires that special software to access the service and does not support shared connections. AOL's software makes over 200 modifications to your computer's operating system and settings. This can complicate support and reduce reliability of your computer systems. Alternatively, a standard ISP acts only as a portal to the Internet and may not provide any additional services or information. Consequently, AOL is not recommended for business use.

There are many resources available to help locate the best ISP for your company. Talk with friends and colleagues and see what their experience has been.

For additional information on ISPs see:

[http://www.excite.com/computers\\_and\\_internet/internet/access\\_providers/](http://www.excite.com/computers_and_internet/internet/access_providers/).

### **Getting Ready and Staying Current**

You have surveyed your office and developed an on-line strategy. You have chosen an access technology and located a provider. How do you insure that your computers and network are ready? Just as important, how do you keep your installation current and safe from hackers and viruses?

Computer networks are like a living being. They constantly grow, adjust, and evolve or they slowly die. Here are some tips on getting your network ready and keeping it current. You will save yourself a lot of frustration and money if you prepare and then maintain your computers and network properly. If neither you nor an office colleague knows how, contact a reliable consultant for assistance.

- Keep all computers current by upgrading modems and making sure there is adequate RAM and disk space.
- Keep the operating system current by obtaining and installing all current Service Packs and security fixes. Do this regularly.
- Keep the browser software current by obtaining and installing the latest version and all related bug fixes and security enhancements.
- Make sure that the TCP/IP protocols are properly installed before beginning.
- Consider using DHCP to assign IP addresses, if you do not currently use it.
- Consider the installation of a firewall.
- Establish clear rules about Internet access by staff. Limit the types of material that can be downloaded. Communicate this clearly to your staff and enforce it.
- Obtain and install virus protection software. It should automatically scan all files that come from the Internet.
- Update the virus database in your virus protection software at least monthly and more often if possible.
- Consider using virus protection software that updates itself automatically.
- Interview an ISP the same way you would any vital service provider.



## CHAPTER 2:

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# DEVELOPING YOUR WEB SITE

In Chapter 1, you learned what it takes to get your office connected to the Internet. In this chapter, the basics of developing and implementing your organization's Internet presence (web site) are reviewed so that you will be prepared to begin developing and implementing an e-commerce solution, as outlined in Chapter 3.

### **Developing a Road Map to Achieve Success**

Before getting down to the business of graphics design and page layout, you will need to collect information and develop a plan to determine just what should be included in your web site. We recommend you begin by reviewing the web sites of similar organizations. Attempt to determine what appeals to you and what doesn't. Also, visit corporate and other sites to see what your web site should or should not include. Ask peers in neighboring jurisdictions what works well and what is frequently requested but missing from their sites. Finally, consider surveying your constituents and staff to see what services are most important to them.

Many organizations make the mistake of waiting until they have a comprehensive plan and/or web site that

contains everything they would like to ultimately include on the site before putting it on-line. Instead, consider starting with a basic plan that includes the following steps and a web site that can grow with your organization.

Include the following items in your plan:

1. A statement of the goals and scope of the proposed web site.
2. A listing of the departments and services to be represented on the site.
3. A priority listing of the order in which the site will be implemented.
4. A roster of the persons who will be working on the site and their specific responsibilities.
5. A listing of basic policy regarding accessibility, security, data privacy, and site standards.
6. A budget or estimate of cost and time to implement in segment of the site.

The most successful web sites are those filled with a wealth of information that is important to your constituency. If your web site is easy to use, filled with regularly updated content, and contains links to other valuable and related resources, your citizens and

customers will return regularly. A well-used web site is a successful web site. However, there are certain pitfalls that you must avoid in planning for a successful web site design.

1. **Long Download Times:** Research shows that after 10 seconds, users lose interest.
2. **Multimedia Overkill:** Just because you can use multimedia, does not always mean you should. Many individuals do not have the software or bandwidth required for multimedia.
3. **Use of Frames:** Frames, while popular for a short period, proved confusing to site visitors and provide little added benefit.
4. **Dead Links:** This is considered a big problem by 60% of users. With automated tools readily available to check links, keeping them working keeps your visitors happy.
5. **Awkward Navigation:** According to a recent survey by CompuMaster, the average web site user can find the information he/she wants only 42% of the time.
6. **Aggressive, non-stop animation:** While animation is fine for entertainment sites, it should be used sparingly on your organization's site. The risk is that your visitors will confuse your important content with irrelevant information.
7. **Orphan Pages:** Ensure that every page has a common footer that identifies your site so that users are not confused about whose site that they are on.
8. **Long pages:** Keep pages short to ensure that your visitor sees/finds the information that he/she is looking for. Most visitors will not scroll down the page to find information. They will continue to read by scrolling down if the information continues to be of value to them.
9. **Splash Screens:** Do not use screens that exist merely to act as an entry portal to your web site. While they may look good, many visitors never get past them.

10. **Outdated Information:** Understand the difference between important archival information and outdated content. Develop a plan to feed information to your web maintenance staff from all departments within your organization.

### **Outsourcing and/or Developing In-House Capabilities**

Thus far, we have discussed the many planning and technical issues involved in developing your web site. The above items must be considered whether you ultimately have your site designed and hosted externally or if you decide to internally develop the technical skills necessary to support this function.

When web sites were new to the world, most (particularly smaller) organizations turned to outside consultants to develop (and sometimes host) their web presence. Often, these consultants were relied upon to ensure that the above 10 mistakes were avoided. However, in today's information-based economy, the thinking has changed. Web sites have become a part of our core operations and often serve as our primary communications interface with the outside world. Because of this, basic web-authoring skills have become a core competency that organizations should develop internally. According to web expert Jacob Neilson (July 28, 1998) "Outsourcing should be limited to specific tasks and components. For example, contractors can contribute in areas such as graphic design, script writing, database interfacing, and providing hosting services."

Most smaller organizations will not be able to hire their own full-time "webmaster," at least at the beginning of their adventure on the Internet. Rather, these skills will need to be developed internally, usually by training a staff person(s) who has both the ability and interest in handling this added responsibility. Training several members of your staff will allow the site to be updated more regularly and

everyone will benefit by reducing the time it takes to get the latest information on the site. This collaborative team approach to development and maintenance of the web site has proved successful in both business and non-profit organizations.

The web author will find that he/she is working in a world dominated by acronyms such as HTML and XML. HTML (HyperText Markup Language) is the authoring language used to create documents on the World Wide Web. HTML is similar to SGML (Structured General Markup Language), which is commonly used in publishing, although it is not a strict subset.

HTML defines the structure and layout of a Web document by using a variety of tags and attributes. The correct structure for an HTML document starts with `<HTML><HEAD>(enter here what document is about)</HEAD><BODY>` and ends with `</BODY></HTML>`. All the information that you would like to include in your Web page fits in between the `<BODY>` and `</BODY>` tags.

There are hundreds of other tags used to format and layout the information in a web page. For instance, `<P>` is used to make paragraphs and `<I> ... </I>` is used to italicize fonts. Tags are also used to specify hypertext links. These allow Web developers to direct users to other Web pages via a click of the mouse on either an image or word(s).

Having access to someone who is fluent in HTML is essential when implementing advanced features or correcting a page that, for no obvious reason, does not display or function properly.

How do you develop HTML skills internally? Fortunately, there are many software tools and classes available today that your staff can learn from. The most widely used product is Microsoft's FrontPage 2000®. Other web site development software packages include DreamWeaver® by MacroMedia, HoTMetal Pro® by SoftQuad and Cold Fusion® by Forta.

All of these software tools have the familiar Windows® interface, making their use easy and efficient. For example, your staff will find the same familiar icons for such features as centering, making text bold, and underlining in these web-authoring packages, as they do in most word processing packages.

After only a brief course, your staff will be ready to begin maintaining your basic web site. If you are just getting started on your web site, it will be necessary for certain graphic elements to be designed for the site or re-purposed from previous graphics projects. The contractor that provides your current graphics will likely be able to supply these web-based elements. The more that your staff works with these web-authoring packages, the more familiar and proficient they will become and, in no time at all, your web site will begin to grow and flourish from their regular attention.

The most important part of your web site is its content. Concentrate your efforts on developing content as the technical skills necessary to maintain the basic pages of your web site can and likely should be learned by your staff, much as they have learned to use e-mail or word processing.

As your site evolves, you may find that you wish to implement functions or features that are more advanced than can be easily implemented using the tools discussed above. Interactive animations, custom-defined markup tags, streaming audio and video and interaction with existing databases or accounting systems are examples of these advanced functions. Tools and languages exist to implement these types of features. Among them are XML, MacroMedia Flash®, and the Java® programming language by Sun Microsystems, and the Perl® programming language.

Given the potential complexity of these tasks and the programming environments required, consideration should be given to outsourcing these tasks. An

alternative is to hire an experienced, dedicated staff person or investing money and time to train an existing staff person. Training an existing staff person is not a trivial undertaking from either a time or budgetary point of view.

As your organization grows or if you determine that you are able to hire a full-time staff person to maintain your web site, review URISA's related publication on "Finding, Hiring and Keeping High Technology Staff."

### **Registering Your Domain Name**

A domain name is necessary for visitors to find your site. You select and use a domain name so that your constituents will not be required to remember and enter the IP address (a long numeric address). The Internet is populated by Domain Name Servers whose job it is to translate your assigned domain name into the numeric IP addresses used to route traffic on the Internet. If you do not already have a domain name, or need additional domain names to bring users directly to particular areas or portions of your site, register the domain name(s) on-line (usually for \$100 or less) at any of the following sites:

<http://www.networksolutions.com>  
<http://www.signaturedomains.com>  
<http://www.domainmart.com/>  
<http://www.checkdomain.com/>

If you are using an outside vendor to host your web site, they will likely be able to provide you with the domain name registration service.

### **Database Applications vs. Static Html Pages**

Database applications are those in which the data displayed on the web site are taken directly from a database and displayed dynamically at the user's request. This is desirable when there are large amounts of data that can be cumbersome to place on the web

site manually using HTML or an HTML editor, such as FrontPage. This is particularly true if the data change frequently. Thus, having the information available directly from your database saves time. Database access can be accomplished in two ways.

First, and likely most simply, you may wish to use delayed dynamic database access. Using this model, you will contract with an Internet Service Provider to place a copy of your data on the provider's web server. The provider will develop a small database and web interface application to allow your constituents to access the information. You or your staff will output the data in a standardized format each week or month and send it to the provider. The provider will replace the database with the new copy, giving your visitors access to the most recent version of the information. It is important that sites that use this model indicate on their web site when the data were last updated.

Under the second model, larger or more sophisticated organizations may wish to use an in-house, real-time dynamic database on their web site. This model requires substantial internal expertise, equipment, security, and other tools. Using this method, web visitors access information and data in real time. However, costs are high and are only justified if large amounts of real-time data need to be served to constituents.

### **Getting Constituents to Your Web Site**

Now that you have an on-line presence, how are you going to go about getting your constituents to your site? Most people who are looking for web sites which contain information related to the desired topic make use of one of the many on-line services called "search engines." A search engine is, itself, a web site powered by a database that contains a vast collection of words taken from web sites all over the world, along with links to the sites from which those words came. A variety of methods are used to collect this word information.

One of the most effective ways to build traffic to your site is to take steps to insure that your site is listed in these databases, along with meaningful words that your constituents are likely to enter into the search engine. There are several steps and methodologies that can be used to both insure that you are entered into the search engine databases as well as to increase the likelihood of being listed near to the top of the search results. Among these are front-page content, the use of “Meta Tags,” and search site registration.

Search engines scan web sites for their content and build their lists of words based on what they find presented on those sites. Most search engines limit how deeply they will travel into your site to locate content. As such, it is to your advantage to have material on the very first page that contains as many of the key words as possible that you wish listed in the search engine databases.

Owing to artistic and other reasons, it is not always practical or desirable to have a front page stuffed with words for the search engines to locate. Fortunately, the designers of the HTML language have provided a mechanism for adding words to the front page without the need to display those words. These are called Meta Tags. Meta Tags are instructions to the search engine that provide information about the web site, including the name of the site and a list of key words and phrases associated with the site. Tools are available that, when presented with the appropriate information and word lists, will generate the HTML tags for you. Instructions for including these tags in your HTML code are also included. An example of this is the Meta Tag Builder web site located at <http://vancouver-webpages.com/META/mk-metas.html>.

Search engines are only useful if they know that your site exists. They are unable to provide information about sites that they have not encountered. The best way to insure that search engines scan and include your web site is to register your site with the search engines. You could, of course, go to each of the search engine sites

and fill out the required information forms. However, since there are hundreds of these sites, the time needed to complete this task would be onerous. To expedite this process, there are a number of registration services and programs that can be used to automate this task. For examples, visit the following sites:

- <http://www.submit-it.com/>
- <http://jwgc.freeyellow.com/./index.html>
- <http://www.doog.com/submit.html>
- [http://www.zdnet.com/anchordesk/story/story\\_3112.html](http://www.zdnet.com/anchordesk/story/story_3112.html).

In addition to these methods, remember to have your web site listed on the sites where you think your constituents may already be visiting. For example, if your town has an active Chamber of Commerce or other merchant site, contact the organization and attempt to get a listing and a link in the appropriate area of that site.

In addition to electronic methods of getting users to your site, remember the power of print advertising. Make sure that your web site address is listed on all of your printed matter (i.e., newsletters, billings, letterhead, and business cards).

Finally, while it is important to ensure that your site is well advertised, it is equally important to know how visitors to your site arrived there. Were they referred via a search engine? If so, what key search words did they enter? Did they come from a link on another site? All of this information can be collected by the web server software that runs your web site. These server “log files” contain raw data that must be interpreted by analysis software or an analysis service company. There are a large number of companies that provide analysis software or services. These vary in price from free to thousands of dollars depending on the volume of data to be analyzed, the sophistication of the analysis, and the number and type of reports produced. Companies that provide analysis products include IBM, Microsoft, Accrue Software, Inc., and WebTrends, Inc.





## **CHAPTER 3:**

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# **IMPLEMENTING YOUR E-COMMERCE PROGRAM**

In the last year alone, the percentage of consumers who purchased products or services on-line increased a hundred-fold, according to the 1999 Yankelovich Monistor Study of consumer attitudes. The study's results indicate that 60% of consumers purchased on-line "to avoid hassles;" 56% of consumers transact business on-line because they can do this at any time of the day or night.

On-line e-commerce transactions are expected to grow by upwards of 500% over the next 2 years, according to more than half of those responding to a recent survey conducted by the U.S. Chamber of Commerce and KPMG Consulting that polled 150 policy makers, company executives, and association heads. Nineteen percent of the survey respondents predicted that Internet sales, estimated to be \$8 billion last year, would top \$100 billion by 2001. Over half (53%) thought it would reach \$50 to \$100 billion, and 21% thought sales would reach \$25 to \$50 billion.

But how much does this behavior transfer to the local government or agency environments, where licenses, fees, taxes, and permits are likely to be processed, rather than clothing, toys, or CDs? You might be surprised if your results are anything like that of Fairfax County, Virginia, who not only processes

financial transactions via interactive web sites, but also employs kiosks and an interactive voice response system.

Offering a wide variety of information and activities builds interest in your web site and helps citizens to remember your site when they have the need for future interaction with your jurisdiction. However, the term "e-commerce" has become much more than shopping carts and order processing.

As can be seen from the above, an increasingly Internet-savvy citizen/customer is demanding a full range of Internet-based services. Web interfaces are becoming the most common front-end to networked applications and are often the citizen's interface of choice (as opposed to phone, fax, or coming to your office). While you may have only just begun to think about providing an information-only web site, your constituents are already expecting to be able to interact with your organization through your web site. To respond to these challenges, organizations must begin by developing and following an e-commerce business plan.

In May 2000, the GartnerGroup (New York City), a leading provider of technology and business strategy research, identified several key questions that an organization should consider when devising an e-government/business strategy. These include:

1. What is already being done on the Internet, and how do our activities align with citizen/customer needs?
2. How are similar organizations serving constituents on the Internet?
3. Will failure to act now precipitate a crisis within the next 2 years?
4. Can the Internet create sustainable value by improving customer service or improving the perception of quality of the organization?
5. Do our management team and business and technical staffs have the skills to implement and run Internet businesses? If not, how do we get the required skills and what functions can be outsourced?
6. Are we making assumptions based on our old way of business?
7. Will the new e-business strategy be compatible with, replace, or break our processes, technology infrastructure, and enterprise systems?
8. Can we use the Internet to lower our operating costs? If so, how long will it take from project beginning to cost savings?

The e-commerce business plan will likely become part of your overall Internet or “e-government” strategic planning document. The e-commerce portion of the plan should be customer focused and supportive of a framework on which to build an innovative, flexible organization. Like all organizational plans, this plan will need to contain a number of components such as:

- **An e-commerce technology plan** that lays out the technology blueprint that the organization will follow to move delivery of benefits and services, as well as communication, to the Internet. It should address in technical detail the

### **Fairfax County, Virginia (Pop. 818,000)**

The Fairfax County web site opened in 1996, and now more than 50 county agencies provide information to the public via this site. During 1999, the county has concentrated on providing public access to public documents and interactive applications that allow residents and others to conduct business with the county 24 hours a day. Some of the most popular items include:

- Paying taxes by credit cards or eCheck
- Getting information regarding job vacancies
- Renewing vehicle registrations
- Accessing requests-for-proposal
- Reporting changes of address
- Obtaining permit application and tracking
- Providing access to documents from human services
- Accessing the real estate assessment database

In addition to providing better service to its citizens, Fairfax County realizes the benefits of reduced costs (for items such as printing) and labor savings related to the reduction in repetitive processing tasks, such as cash receipts.

integration of Internet data with an organization’s back-office systems, as well as with vendors with which the organization has collaborative e-business relationships.

- **A business model innovation plan** that sets out a structured approach to the redesign of existing business processes, functions, and workflow to streamline business processes (as well as relationships with external supporting vendors) and the realignment of business processes and functions with the technology strategy.
- A funding and budget plan.

As mentioned above, e-commerce frequently refers to shopping cart type of transactions. However, e-commerce is much more than that and is often now referred to as “e-business” or “e-government.” In *e-Business Roadmap for Success* (1999, Addison-Wesley), e-business is described as “redefining old business models, with the aid of technology, to maximize customer value.” This of course includes the ability to pay parking tickets on-line, but also has a much broader implication.

The goal in e-government/business is to integrate business processes and technologies across and outside the organization, which requires a major structural transformation in the way the organization has traditionally done business.

### **Partnership Options**

Before discussing the details of implementing your own e-commerce plan, you should know that a growing number of partnerships between the private sector and local government are accelerating the implementation of transactional e-government systems. By collaborating with the private sector, it may be possible to get your e-commerce program on-line more quickly than if you consider this venture on your own. According to *Government Technology Magazine* (Not So Strange Bedfellows, February 2000, page 48), these partnerships focus primarily on the following four major areas of e-government: election processing, motor-vehicle registration, business filings, and tax collection.

A number of companies and organizations have developed programs and packaged software products to assist organizations with processing transactions on the Internet quickly and efficiently. Familiar companies such as Microsoft ([www.microsoft.com/industry/government](http://www.microsoft.com/industry/government)), Carta, Inc. ([www.cartainc.com](http://www.cartainc.com)), and Tidemark ([www.tidemarksys.com](http://www.tidemarksys.com)) all offer web-enabled e-government solutions for state, county, and local

governments and agencies. Additionally, organizations are working together to develop joint ventures to not only aid them in developing e-commerce solutions, but to distribute the cost of this development over a wide number of organizations. For example, Joint Venture:Silicon Valley Network ([www.jointventure.org](http://www.jointventure.org)) was funded by a number of bay area cities, counties, and high technology firms and recently implemented an on-line permitting project in seven pilot cities. This joint effort has produced numerous pilot projects and promises to

### **DeKalb County, Georgia (Pop. 610, 000)**

In August 1999, DeKalb County, Georgia implemented an on-line property-tax collection system. Not having technical expertise on their staff, Tom Scott, DeKalb County Tax Commissioner, was faced with the option of either hiring new technical staff or contracting with a vendor to develop this on-line service. Both options were unappealing because of the potential up-front cost and uncertainty of success. Instead, Scott chose to work with ezGov.com who agreed to bear the full cost of developing and implementing the on-line system, provided that it could collect a \$3 processing fee for each transaction. Since its inception, most visitors (over a million hits during the first month of operation) view the site to research property deeds or inquire about balances due on tax bills. In actuality, of the 220,000 tax bills due November 1999, only 100 were paid on-line. This low volume of transactions has not, however, deterred Scott who indicated that his department plans to increase marketing to encourage residents to pay property taxes on-line. Further, the county is now planning to participate in a state-wide effort to offer on-line motor-vehicle renewals through county web sites.

help these organizations implement e-commerce solutions quickly and less expensively.

### Getting Down To E-Business

Now that you have given some thought to developing and implementing an e-commerce plan, here is some practical advice on getting your e-business solution on-line.

**Ease of Use, Customer Satisfaction, and Avoiding the Pitfalls.** According to a recent ZDnet article by Margaret Kane (*One-in-four suffer e-shopping failures*, March 7, 2000), the longer time that consumers spend on-line, the more likely they are to engage in an e-commerce transaction. However, a recent study reported that 28% of all attempts at on-line commerce fail, for reasons ranging from technical problems to delivery errors. Not only do customers who have negative experiences on-line fail to return to your site, but also they often develop an overall negative image of your organization. So, it is extremely important for an organization to recognize that on-line experiences will affect the off-line perceptions of citizens/customers, making it essential to build sound on-line applications.

So, what must be avoided to achieve a successful e-commerce solution for your organization? A recent poll by Jesse Berst's *AnchorDesk* (May 15, 2000), revealed that difficulty in navigating through the site was the largest area of complaint (32%). This was followed closely by non-receipt of products and services (24%) and unanticipated transaction fees (21%). "Customer mistreatment" and "privacy lapses" were also significant areas of concern.

Customers/citizens often complain of difficult site navigation when they either cannot find the area/item/product they are seeking on your site or when they must complete numerous screens of seemingly unending information before being able to complete the transaction. The first part of this problem

### Kennebunk, Maine (Pop. 10,000)

The web site for Kennebunk, Maine (pop. 10,000) is a good example of a successful beginning in a small jurisdiction's quest to serve the on-line citizen. This web site was recently a winner in the Governor's Excellence in Telecommunications competition and it is the intention of Town Manager, Barry Tibbetts, to eventually make available all town information that both lends itself to reproduction in electronic form and is currently available to the public by virtue of Maine's Freedom of Information Act.

The site currently contains up-to-date meeting agenda information, demographic information, notices of upcoming events, and items of general interest. There is an extensive collection of maps, accompanied by the assessor's database. The site has proven to be a very popular alternative to gathering information at the Town Hall.

The site contains extensive information from the assessor's office, including access to the tax records database, geographical information systems (GIS), and on-line maps. The main users of the assessor information have been real estate brokers, sales personnel, attorneys, engineers, and surveyors. According to Tibbetts, the system saves time for the assessor and clerical staff, who previously spent half of their time answering questions from people who came into the office.

But what about cost? Providing all of this assessment and GIS data sounds expensive. It wasn't! The assessing program that Kennebunk has used for several years is a proprietary program. Nevertheless, for less than \$1,000, the town had the vendor write a software module that could extract the data for use on the town's web site (<http://www.kennebunk.maine.org>).

obviously extends beyond the e-commerce portion of your web site. Having an easy-to-navigate site that lets visitors go directly to the information they are seeking from the main screen is vitally important. If your site is so large and complex as to make this difficult, consider registering alternative domain names that you can print directly on water bills, parking tickets, etc., so as to bring the user directly to the page on which he/she can engage in the on-line transaction.

With regard to the seemingly unending number of screens required to complete a transaction, consider either of two solutions. First, collect all of the information on a single form on one screen. If this is not practical, ensure that the number of screens in the series is clearly displayed (i.e., Screen 2 of 6) on each form and ensure that the user will be able to move quickly from one form to the next. If a visitor has to wait more than a couple seconds for the next screen to load, the visitor often presses additional screen buttons or closes the program, ending the transaction prematurely and in frustration.

To track this information, numerous software packages are available that can run on your own server (if you are hosting your web site internally). If your web site hosting is outsourced, ask your vendor to provide you with reports at least monthly so that any problems with your site can be detected and corrected as quickly as possible.

It is important to remember that the reason a customer/citizen is visiting your site is to make it easier than going to your office or mailing in forms and checks. Consider designing your on-line forms to closely represent the paper versions while taking advantage of self-filling fields, drop-down menus, and form entry validation. This will increase the comfort factor for those accustomed to completing the forms with paper and pen, but who are now attempting to submit them on-line. Also, remember to design the web site to be accessible to all your constituents. Some

will have fast Internet connections, while others may be using slower dial-up modem connections.

An alternative to designing forms in HTML is to create electronic forms in Adobe Corporation's Acrobat® (.pdf) format. The advantage of this method is that the form on the screen will appear exactly like the printed version of the form. Acrobat includes electronic-form functions that allow the form to be completed on-line and submitted electronically to a file or database. While this method requires that the user have a copy of the Adobe Acrobat Reader®, this software is available for free from the Adobe corporate site. A link can be added to your web site that allows the user to download the free software in a separate window, so that the user never has to leave your site.

## **Selecting the Appropriate Technology Level for Your Organization**

**Self-Hosting vs. Outsourced.** At some point while you developed your web site strategy, you determined whether you should attempt to host your own web site on your organization's internal servers or if you should contract with an Internet Service Provider to host your web site for you. Some individuals assume that if this decision is made for the web site, the same must be true for your e-commerce applications. While it is likely true that the majority of organizations who host their web site internally also host their own e-commerce portion of the site, a number of organizations today are separating these functions.

A variety of organizations are now teaming up with companies who provide e-commerce solutions and hosting to small and mid-sized organizations. These companies offer complete web "storefront" design, order/transaction processing, and customer support to on-line users.

When considering whether to host an e-commerce application yourself or to outsource this feature, you

should take into account the following:

- the technical expertise of your staff,
- the available budget,
- your implementation time frame,
- the desired features and functions, and
- the fault tolerance and site availability.

Fault tolerance refers to the ability of the system to remain operational even if a component of the system should fail. This sort of feature is usually found only on larger and more sophisticated servers. Unless you plan to invest in a server of this type, this feature is more easily afforded in an outsourced situation. This decision must also be made based on whether or not

### **Maryland Heights, MO (pop. 26,000)**

This site was begun mainly as a small advertisement for the city, containing basic contact information, and has steadily expanded since its inception in 1998. The site was recently recognized as one of the top municipal web sites in the nation, according to the national organization representing government communicators (3CMA).

As of April 1, 2000, Marylandheights.com has received more than 800,000 hits since its debut.

“The site reflects a comprehensive approach to community life, viewing the City as a system of private and public sectors, of work and entertainment, of climate and geography,” judges said. They also noted that the site has current information such as the community calendar and press releases.

“We work hard to keep our web site fresh and up-to-date,” said Public Relations Supervisor Brad Lyons, who oversees the site. “The web site is an affordable and convenient way to communicate with our residents.”

Several features of the Maryland Heights web site are particularly notable:

- The FixiT Form and Whose Road Is It, Anyway were recognized for their creativity. The FixiT Form allows residents to report road damage, code enforcement problems, or even barking dogs. Whose Road Is It, Anyway helps residents determine which government agency is responsible for street maintenance in their neighborhood and provides a contact phone number.
- The Beautification Awards section, displaying the winners of the annual contest, “confirms the sense of pride and ownership that the city promotes.” This year, more than 50 nominations were submitted via the Internet.
- The Maryland Heights Chamber of Commerce web site, linked to every page on the Maryland Heights site, was recognized for information provided to both tourists and residents.
- The web site is maintained by city staff and can be updated at a moment’s notice. Agendas for upcoming meetings are posted on the web site and linked to the city calendar. Newsletter articles keep residents informed on-line about city activities and regularly up-date links off the front-page highlight city programs and keep residents checking to see what is new in Maryland Heights.

(<http://www.marylandheights.com/>)

it would be acceptable for your e-commerce site to be down for an extended period of time. For example, for a site that accepts tax payments to be unavailable to the public immediately before the deadline would not be acceptable.

**Web Forms vs. Shopping Carts.** Like the above consideration regarding hosting, the manner in which you handle e-commerce transactions is generally a matter of size and complexity.

Web forms may already be present on your regular web site. You may use these simple, client-side applications to collect names and addresses. If you have not used these functions before, you will find that most web page development tools offer a simple method for creating them.

A more sophisticated method of completing e-commerce transactions is called a “shopping cart.” This interactive method, like a real shopping cart, allows the user to browse the site, adding items or services as they go. Once finished, the cart can be examined, totals provided prior to purchase, items added or deleted, and quantities changed prior to checkout. In addition, shopping carts can often be saved by the user for future purchase. Several software providers and services offer the shopping cart feature with minor variations. If your site is being hosted, you should consult your provider to determine which features they can offer. If your site is hosted internally, several companies provide this type of software or service.

**Software Sophistication and Cross-Platform Integration.** At some point, the information collected on your e-commerce site must find its way into your accounting and back office systems. How you achieve this depends on the sophistication of your e-commerce software and how well it integrates into your back office systems. On the low end of the sophistication curve are simple paper reports that are printed by your e-commerce software. The data are

keyed by staff as they would any paper-based form received by your office including credit card transactions. A slightly more advanced method would be to obtain the information as an electronic file that could be imported into your existing systems as a batch process. Finally, the most sophisticated programs are fully integrated into your back office systems and operate in real time. These allow for on-line credit card authorization and processing, immediate database updates, and on-line inquiries by the user.

## **Privacy**

Privacy refers to the data you collect about visitors to your web site. While this is a complicated subject that many volumes have been dedicated to, in this brief context it is important to note that we are only discussing privacy as it relates to information that is collected via the web site for the purpose of completing a transaction. (See URISA’s other publications that deal with constituent privacy issues in more detail.)

It is important that you develop a policy regarding how data collected during the normal course of business is to be used and to post that policy clearly on your e-commerce site. This policy should completely state what this information will be used for, whether it will be made available to others, and if it will be used to contact the person in the future regarding unrelated matters.

If your policy is to make use of information collected from your web site for purposes other than completing the transaction, you should consider an opt-out provision.

There are some important issues surrounding the sending of unsolicited e-mail correspondence, otherwise known as SPAM. The federal government has issued guidelines (HR2162) regarding the sending of unsolicited e-mail, and the prevailing guidelines

and/or regulations should be consulted prior to deciding to transmit unsolicited messages to your constituents. Entities that engage in spamming, or who are perceived to be engaged in spamming, may have their communications blocked by service providers on the Internet. In addition, once blocked, the thousands of users who subscribe to those service providers will not have access to the site. Getting your site removed from these “spam lists” is a difficult and time-consuming process. It is better, therefore, to avoid activities that are likely to be interpreted as “spamming.”

## Security

**Transaction Security.** According to a recent study by the Boston Consulting Group, 60% of computer users who have been on-line more than 3 years are likely to engage in an e-commerce transaction. However, the number one concern that on-line e-commerce users have is still credit card fraud. So, what can you do to help alleviate these concerns?

If you already have a web presence, then e-commerce transaction processing can be added using packaged services from Cybercash, First Data, BankOne, or other such providers. Packaged services take the hassle out of processing and verifying credit card orders by acting as the conduit between your customer and your web site on the one end and the credit card company on the other end. The cost of such packaged services is a mix of fixed charges and per-transaction charges.

Regardless of the transaction processing package you choose, you should insure that all pages that collect sensitive data use data encryption technology to secure the transmission of that data. This makes use of a special version of the HTTP protocol, used to transmit web pages, called SHTTP. There are a variety of encryption and certificate-based security options available from companies such as Verisign and RSA Security.

**Database Security.** Once the data are stored in your computer systems, you are responsible for keeping it safe and secure. This is a complex subject and, as such, it is not covered in detail here. There are a number of consulting firms that specialize in this complex area, and you are encouraged to take advantage of their services.

Briefly, keeping data secure falls into two categories: keeping data safe from electronic attack and keeping data safe from physical attack.

Web sites and connected systems are connected to the public Internet and, as such, vulnerable to electronic attack by “hackers,” who may steal information, modify information, or simply destroy information. To reduce the probability of success for this type of attack, you should consider the following options:

- Install a firewall device. This is a dedicated device that restricts access to the internal network using sophisticated logic and monitoring software.
- Encrypt the data in the database so that, if stolen, it can not be used or sold.
- Pay for a “security survey” by a company specializing in modifying computers to eliminate known security flaws or vulnerabilities.
- Keep your system software up to date. Security patches and updates are released on a regular basis by Microsoft and other system software companies, including the providers of UNIX-based systems and Linux-based systems.
- Install and maintain virus detection and protection software on all servers and computers, including both your web server and your e-mail server. Make sure that this software automatically updates itself on a regular basis.
- Unencrypted data should never be transmitted over the Internet or over a wireless network.
- All access to data should be password protected and those passwords should be changed often. Passwords should not be stored in unencrypted files or written on pieces of paper that are taped

to monitors or servers. Passwords should not be kept in a book unless that book is kept in a locked safe or vault that is kept locked.

In addition to keeping data safe from electronic attack, consideration must be given to keeping your data safe from physical attack. Consider the following:

- Data kept on a server that is not located in a secure area or open to public access is susceptible to theft or damage by a disgruntled employee, a burglar, or an angry constituent. Servers that contain sensitive data should be kept in an area with controlled access and an alarm system.
- Data kept on a server is susceptible to damage or loss from natural disasters or electrical failure. Tornado, fire, flood, and lightning are common causes of data loss. Data should be backed up to removable media, such as tape, daily.
- Data on back-up tapes are easy to steal unless those tapes are kept in a secure area. Data tapes should be kept offsite at a location such as a bank safety deposit box. Data tapes on site, waiting to be used, should be stored in a locked safe or vault.
- A logbook should be used to log the use of data tapes of any kind.

- Password protect your back-up tapes. Most back-up software offers this option.
- Once a back-up tape is removed from service, it should be destroyed. Never throw a backup tape full of data into the trash.

To learn more about e-government and e-commerce solutions, consider the following resources.

- Urban and Regional Information Systems Association (URISA)  
**<http://www.urisa.org>**
- The National Electronic Commerce Coordinating Council (NECCC)  
**<http://ec3.org>**
- Government Technologies e.gov  
**<http://egov.govtech.net>**

International City/County Management Association

- **<http://www.icma.org>**  
(particularly Special Report: Local Government On-Line)





## ABOUT THE AUTHORS

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