

## Information Technology Solutions and Electronic Infrastructure Review:

### [Original Report](#)

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June 20, 2001

The Honorable Joe Putnam  
Mayor  
City of Irving  
Post Office Box 152288  
Irving, Texas 75015-2288

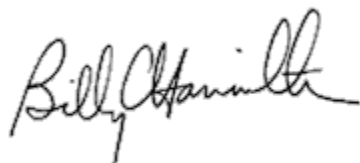
Dear Mayor Putnam:

Comptroller Rylander asked me to present the results of our Information Technology Solutions (IT) and Electronic Infrastructure review of the City of Irving government, as requested by the city council. The Internet and IT technologies are prompting a fundamental transformation in the way government thinks and acts. Our goal is to provide a roadmap for local government in the Internet Age. Our Financial Management Review (FMR) team found that the City of Irving performs many vital jobs well. In this report, we offer a number of recommendations that could make the City of Irving even more effective in serving its taxpayers.

The Comptroller, our FMR team, and I would like to thank the employees and officials of the City of Irving for their unfailing help and courtesy during the course of this review. If you have any questions, please contact Alfonso Casso, manager of our Local Government Assistance Division, by e-mail at [alfonso.casso@cpa.state.tx.us](mailto:alfonso.casso@cpa.state.tx.us) or by phone at 1-800-531-5441, extension 3-5631.

As always, we stand ready to help you implement our recommendations in any way we can.

Sincerely,

A handwritten signature in black ink that reads "Billy C. Hamilton". The signature is written in a cursive style with a large, stylized initial "B".

Billy C. Hamilton  
Deputy Comptroller

- c: The Honorable Joe Philipp, Mayor Pro Tem, City of Irving
- The Honorable James Dickens, Council Member, City of Irving
- The Honorable Herbert Gears, Council Member, City of Irving
- The Honorable Linda Harper-Brown, Council Member, City of Irving
- The Honorable Lewis Patrick, Council Member, City of Irving
- The Honorable Bob Romano, Council Member, City of Irving

The Honorable Rick Stopfer, Council Member, City of Irving  
The Honorable Terry Waldrum, Council Member, City of Irving  
Lynda Johnson, Department of Information Technology, City of Irving

## Executive Summary

In May 2000, the City of Irving agreed to participate in a Financial Management Review (FMR) focusing on information technology (IT) and technology infrastructure conducted by the Texas Comptroller of Public Accounts. An FMR is not an audit, but a review of local government financial and operational management practices. This review was part of a larger Comptroller project that studied the IT resources and telecommunications infrastructure of three other Texas cities and four counties. The results of these reviews are intended to serve as a blueprint for local governments across Texas, to aid them in acquiring advanced technology and using it for the benefit of their constituents.

The City of Irving's municipal court, technology, planning, finance, utilities, and administration departments participated in this review. In addition, the Comptroller's office examined the city's overall technology infrastructure.

The review team's research on the City of Irving included a review of applicable statutes and city documents; interviews with department heads and other personnel; and contacts with state agencies and other local governments for relevant information. The review team conducted on-site research in Irving in August 2000 and followed up with telephone interviews. City employees were very helpful to the FMR team and responded promptly to questions and requests for information.

This report provides background information on the functions of each selected department and the state of the technologies currently in use. These descriptions provide a basis for presenting best practices used by other communities in Texas and across the nation for similar functions. The best practices, along with analyses of the current situation in each department, led to recommendations for improving the city's technological resources. Implementation strategies provide practical steps for realizing each recommendation, while fiscal impact tables provide an estimate of costs and savings expected from 2001 to 2006.

The review team identified innovative practices in Irving that could be emulated by other Texas cities that strive for efficiency and excellence. The city has negotiated a franchise agreement with its local cable provider to acquire paired fiber connections for its city facilities and traffic lights in exchange for access to city rights-of-way. The fiber connections provide the city with a state-of-the-art wide area network (WAN), which connects city computers in different buildings and facilitates electronic file sharing among employees.

Another technological advancement that Irving employs is the electronic submission of plats. Electronic submission saves the developer and the city funds that otherwise would be spent on employee time, paper, supplies and mailing costs. In addition, the digital documents can be stored electronically, which saves filing time and reduces the need for physical storage space.

Irving's participation in the state's new Internet portal, TexasOnline, ensures the city's inclusion in an ambitious and innovative effort to provide a one-stop shop for individuals seeking information and services regarding Texas and Texas governments. Through TexasOnline, Texas citizens, businesses, and visitors are able to obtain information and resources

about Texas state and local governments at a single site.

This FMR examines ways that Irving could make improvements in customer service for city residents and businesses.

Several recommendations would improve Irving's Web site by including more information and interactive services online, such as planning and zoning information and conducting auctions to dispose of city property. Other recommendations urge Irving to equip police officers with handheld terminals to accept on-the-spot ticket and citation payments by credit or debit card; encourage city vendors to use electronic billing and payments; and negotiate for assistance with online bond auctions when the contract for financial advisory services comes up for renewal.

This report also urges Irving to ensure that planned computer system purchases are compatible with existing systems and with one another, which may save the city time and money in the future.

This report emphasizes the importance of coordination and stakeholder involvement in the identification of needs and the development of an improved information technology infrastructure. Improved electronic capabilities should streamline services and yield other benefits as well, such as improved communication with state agencies, vendors, city businesses, and city job applicants.

This report contains 11 recommendations, some of which would affect several city departments and would require initial, short-term expenditures to reap long-term savings and efficiencies.

## Overview

Advanced telecommunications services and high-speed connectivity can be important tools for economic development in both rural and urban communities. Internet access allows businesses and individuals to locate in any isolated community and still participate in a global marketplace for goods and services, while “e-government” functions can provide communities with access to previously unavailable resources and options for the manner in which government services are delivered. The Internet also can provide new educational opportunities through distance learning and access to better health care through “telemedicine.”<sup>[1]</sup>

As part of an effort to help more Texas cities and counties offer services over the Internet, the Comptroller’s Local Government Assistance Division worked in concert with Resource Consultants, Inc. to review four Texas cities and four counties. These reviews were intended to determine the extent to which the governments’ online services and electronic infrastructure comply with state law, fundamental principles of sound accounting and internal control, and appropriate security measures; and to identify information technology (IT) tools that could improve their telecommunications infrastructures and their use of computers and the Internet.

The review of Irving, Texas involved an overview of city IT-related functions, including the municipal court, the city’s utilities, and the city’s planning, financial and administrative functions (**Exhibit 1**).

### Exhibit 1 City of Irving Project Scope

Municipal Departments	Functions Reviewed
Technology	<ul style="list-style-type: none"> <li>• Planning, organization and management</li> <li>• Connectivity within each office</li> <li>• Connectivity among buildings</li> <li>• Telephone system</li> </ul>
Court	<ul style="list-style-type: none"> <li>• Class C misdemeanor case filing and online fine payment</li> <li>• Online filing of court cost reports</li> </ul>
Utilities	<ul style="list-style-type: none"> <li>• Online water and wastewater information and payments</li> </ul>
Planning	<ul style="list-style-type: none"> <li>• Planning and zoning</li> <li>• Online building permits and related inspections</li> </ul>

Finance	<ul style="list-style-type: none"> <li>• Electronic banking</li> </ul>
Administration	<ul style="list-style-type: none"> <li>• Online feedback and comments (e-mail access)</li> <li>• Online job opening postings and application submission</li> <li>• Purchasing functions: bids, requests for proposals and auctions</li> </ul>

*Source: Texas Comptroller of Public Accounts.*

The City of Irving is located in Dallas County, midway between Dallas and Fort Worth. Its population has grown to 185,200, an increase of 19 percent since the 1990 census count of 155,037. [2] Irving is home to the Dallas/Forth Worth Airport (D/FW), one of the world's busiest. Its unique location has attracted major developers, national and international corporations, training centers and the entertainment industry. Irving is a home-rule city with a council/manager form of government. [3]

Irving has a strong tax base. In early 1999, for the fourth year, Moody's Investor Service, Inc. and Standard and Poor's rated the city's general obligation Bonds as Aaa and AAA, respectively. Irving is one of only two cities in Texas and 18 nationwide with these ratings. [4]

Irving's boundaries encompass 69.3 square miles with more than 15,000 acres dedicated to master-planned developments, including Las Colinas, D/FW Airport, and Valley Ranch. The city is served by the Irving, Coppell and Carrollton-Farmers Branch independent school districts and has three fully accredited institutions of higher learning: the University of Dallas, North Lake College and DeVry Institute of Technology.

The city has made communication with residents a high priority. Irving's bimonthly newsletter, City Spectrum, is mailed to more than 89,000 residences and businesses, and the Irving Community Television Network (ICTN) telecasts more than 3,000 hours of programming per year on three cable channels. [5]

Property taxes make up 36 percent of city general fund revenues. The fiscal 2000 tax rate for operations and maintenance is 36.09 cents per \$100 valuation and 12.71 cents per \$100 for debt service. These rates are expected to raise \$59,188,927 for fiscal 2000. Sales taxes will account for about 34 percent of that amount, or \$41,853,774. The city has 1,742 full-time employees and 314 part-time employees. [6]

According to a June 2000 survey conducted for the Texas Electronic Government Task Force, 60 percent of Texas residents use a computer and the Internet, [7] and Irving Internet usage is comparable. A November 2000 survey, conducted by the City of Irving Information Technology Department, revealed that 65 percent of city residents had Internet access at home, 52 percent had it at work and only 20 had no access. [8]

A recent report by the Public Utility Commission of Texas highlighted some of the demographic factors affecting computer

and Internet usage in rural and urban areas:

- Income: An urban, high-income household is more than 20 times more likely than a rural, low-income household to have Internet access.
- Education: Persons with a college degree in rural areas are 26 times more likely to have Internet access than those with an elementary-only education.
- Ethnicity: 47 percent of Anglo households have computers, compared to 23 percent of African-American and 26 percent of Hispanic households. Virtually no gap in computer ownership exists between households earning more than \$75,000, regardless of ethnicity. [\[9\]](#)

Texas governments that are not doing so already should address parity issues concerning computers and Internet access. City governments moving more services online must ensure broader access to the Internet at public facilities such as libraries, and train citizens needing such aid in the use of computers and the Internet. These are important prerequisites to an effective e- government system.

To compete successfully in today's global economy, government can no longer be content to do things in the same old ways. Local governments that not only prepare themselves for the digital age but fully embrace it will see their opportunities expand and their communities prosper. Work will be performed more efficiently and accurately, and the public will become better informed. Doing things electronically can free time for important human interaction rather than inhibiting it.

Information technology is irrevocably changing the way the world works, shops, learns and communicates—and will continue to redefine the landscape for years to come. The Internet has changed the way the whole world does business, and government must change to keep pace if it is to provide the sort of efficient, personalized customer service to which Americans have become accustomed.

E-government service can range from accepting credit-card payments for fines and taxes, to allowing developers to review the status of permit request online, to accepting job applications via e-mail. Such services can improve government's relationship with its citizens, streamline governmental organization, and improve productivity and cost-effectiveness.

The Comptroller's office recommends that all local governments develop the technological infrastructure needed to support new ways of doing business, as quickly as their resources allow.

## Chapter 1

### Overview of Technological Infrastructure

Adequate planning is the most critical element in the development of an IT infrastructure. The benefits of effective technology planning include:

- improved communication and participatory consensus-building among stakeholders.
- effective use of available funds through open technology systems, the blending of existing equipment within a multi-vendor approach and more efficient buying practices. [10]
- increased access to technology resources within the boundaries of a city and beyond via telecommunications.
- a clear picture of equipment needs, which improves the city's ability to secure appropriate funding.
- an adequate number of effective training workshops for staff members.
- improved access to and use of governmental information to assist city staff in decision-making.
- improved operations, enhanced working environments and more effective management.
- elimination of redundant data entry and other inefficient practices.

At a minimum, a city's technology plan should include:

- evidence of wide involvement of city staff and community stakeholders.
- support from executive leadership (all elected officials and appointed department heads).
- support for overarching city goals.
- an assessment of staff and external users' technology skills, knowledge and comfort level with technology.
- an IT inventory with sufficient detail to support informed decision-making for future technology purchases.
- a compilation of technology expenditures over the past three years.
- an infrastructure design and the capacity needed to support the city's communication and information needs.
- common technology standards for software and hardware.
- a three- to five-year implementation plan for expenditures tied to specific goals and budgets.
- training and support plans.
- an evaluation and revision process.
- staff requirements and organization.

As the city develops its technology plan, it must allow for rapid change in IT. The plan should allow for the introduction of new technologies at the appropriate times and establish designs that provide for flexible growth in a changing technological environment.

Moreover, planners should consider the cost associated with moves and changes to data and voice connections whenever employees are hired or relocated. In the past, such considerations only concerned movements of furniture and the

relocation or addition of telephones. A data network, however, requires the city to budget for the cost and manpower needed to track and facilitate voice and data moves whenever an employee is relocated or added.

A local area network (LAN) links an organization's computers together. Although experts generally agree that wireless LANs will emerge as the inevitable successor to cabled systems, there is room for argument about which wireless standard will emerge as the dominant standard. During 2001 and 2002, wireless standards for computing are likely to evolve enough to allow local governments to make intelligent choices among the alternatives. These years are expected to bring a significant increase in available bandwidth (communications capacity) and a large drop in product prices.

### Commendation

**The City of Irving's five-year, citywide technology plan identifies technological needs and service improvements that will move the city toward the widespread electronic delivery of services.**

### Background

The City of Irving has a well-coordinated, long-range technology plan, including implementation strategies, timelines, fiscal impacts and possible funding sources for projects. Irving's plan can and should serve as a "best practice" for Texas cities.

#### Resource: Public Technology Inc. Checklist

Public Technology, Inc. (PTI) is a nonprofit organization that provides technology assistance to US cities and counties. A June 2000 PTI publication, Local Government Checklist for Developing a Partnership with an E-Government Vendor, is designed to assist local officials in implementing e-government services. The checklist, available on the Web at ([http://pti.nw.dc.us/links/docs/egovcheck\\_final.doc](http://pti.nw.dc.us/links/docs/egovcheck_final.doc)), features a "strategy" section and other information regarding the implementation of strategic planning. The checklist provides a good starting point for local governments considering e-commerce.

#### Resource: Center for Technology in Government's Internet Services Report

The Center for Technology in Government's 1996 report, Developing & Delivering Government Services on the World Wide Web, outlines a "best-practice" model for strategic technology planning. The report (see **Attachment B**) outlines the steps needed to develop and deliver government services on the Internet. The seven stages identified in the model are:

- Assemble and support the Web team
- Gather ideas
- Set and refine service objectives
- Design the service
- Implement the service
- Manage the service
- Evaluate results

The report is an excellent resource for entities engaged in technology planning and can be downloaded at no cost from the center's Web site at (<http://www.ctg.albany.edu/projects/inettb/pract2.pdf>).

### **Commendation**

**The City of Irving has an easily navigable, informative and helpful Web site (<http://www.ci.irving.tx.us/>).**

### **Background**

Irving maintains a Web site that was developed in-house in 1997. The city's Webmaster and a student intern update its content daily to provide visitors with timely and accurate information. In 1999, the city developed an employee Intranet site, also maintained by the Webmaster and a student intern. Both sites are scheduled for upgrade in the early phase of the five-year technology plan.

Most city departments have a Web page on the city's Internet site with helpful phone numbers, locations and links to other sites. Employees who use computers on a daily basis have Internet access. Citizens and employees alike can view city meetings and the city cable station, and the city gathers statistics periodically to monitor hits to the city Web site. E-mail and the city's online feedback form, which can be submitted online, makes it possible for the public to direct questions and concerns to city employees.

### **Commendation**

**The City of Irving Information Technology Department provides a high level of technical support to its employees with a ratio of one IS staff member for every 45 employees, compared to the typical business ratio of one to 200.**

### **Background**

Irving's Information Technology (IT) Department employs 39.5 staff members who support more than 1,800 city

employees (**Exhibit 2**).

**Exhibit 2**  
**City of Irving Information Technology Department**

Number of Staff	Functional Area
11.0	Support to mainframe and midrange application and hardware
14.5	Network, micro-computer and customer support specialists (7.5 of the 14.5 staff are located in other city departments)
5.0	Geographic Information System
3.5	Special projects
1.5	Web sites
4.0	Management and clerical

*Source: City of Irving Information Technology Department.*

### **Commendation**

**The City of Irving adheres to wiring and cable infrastructure standards proscribed by the Telecommunications Industry Agency, Electronics Industry Agency and Building Industry Consulting Services International.**

These wiring standards are extensive, setting strict guidelines for the quality of materials, cabling and termination techniques and the layout and conditions of telecommunications closets. Irving can be used as a best-practice model for municipal and county governments.

### **Background**

Cables and wires provide the foundation for all IT technology. Inadequate infrastructure slows the transfer of information and makes it difficult and costly to relocate telephones and computer equipment.

The cabling infrastructure includes vertical and horizontal copper and fiber-optic wiring and associated hardware on both ends. This infrastructure includes pathways and conduits on one floor (generally called the horizontal wiring subsystem), as well as pathways and conduits between floors (generally called the vertical wiring subsystem), equipment racks, frames, wire management systems, communication rooms and the electrical, mechanical and environmental equipment required to support them.

The design, materials and installation of telephone and data cabling used in all locations should be compliant with standards set by the Telecommunications Industry Agency/Electronic Industry Agency (TIA/EIA) and Building Industry Consulting Services International (BICSI), which have established industry requirements for telecommunications activity. Adherence to these standards, when accompanied by appropriate warranties, can protect the city's cabling investment for decades.

The telecommunications infrastructure should be designed to meet both present and future needs. Horizontal and vertical wiring and pathways and communication rooms should be considered as integral parts of the building infrastructure. The infrastructure must be capable of growing and evolving as technology and customer needs change. Cabling projects released for proposals should be separate from security, audiovisual, and building control systems and any other equipment or materials not directly associated with high-speed data or voice communication.

The industry standards establish strict guidelines regarding the quality of materials, cable installation techniques, and the layout and conditions of telecommunications closets. These standards can be expensive to meet, however, doing so is usually justified, since the resulting infrastructure often is guaranteed for 20 years or more and is capable of supporting new equipment. That is, at least, until the quality and price of wireless technology make it a better choice. The appropriate TIA/EIA and BICSI standards provide guidance to best-practice design for all telecommunication infrastructure wiring systems and connecting hardware.

Security appliances include firewalls consisting of software or hardware that controls access to a computer network. Additionally, network security includes intrusion-detection systems that let the company know when a break-in has been attempted. Once a computer is connected to a network, especially a high-speed Internet "always on" network, security risks increase significantly. For these reasons, data and network security become critical issues to network managers. Current successful firewalls combine various levels of security and add features to detect attempted attacks and prevent electronic break-ins.

Irving's basic network infrastructure for its city-owned buildings is well designed, and most of it has been installed within the last three years. Technology closets have adequate space and environmental conditions, and the cabling in them is properly installed and organized.

### **Commendation**

**The City of Irving has negotiated a franchise agreement with its local cable provider to acquire paired fiber connections for its city facilities and traffic lights in exchange for access to city rights-of-way.**

## Background

A wide area network (WAN) typically is used to speed the transfer of information between employees in different buildings and to allow them to share common files. In considering a WAN, the city should consider several questions. Should it build its own telecommunications infrastructure, or lease existing lines and circuits? Who will use the infrastructure? What type of lines should be used? How will the project be financed?

A WAN can be established through existing circuits leased from a private network, telephone or cable company, or by installing a separate network of lines owned by the city and possibly shared with the county. In either case, the WAN can use conventional copper wire or more expensive fiber-optic cable. Cable companies and other utility companies often use fiber-optic lines. These companies typically operate under franchises negotiated with city governments and the use of their lines in a WAN can form a part of this negotiation.

The City of Irving's wide area network is based on a combination of owned fiber linked to three locations, leased T1 circuits to 13 sites, high-speed Area Digital System Link (ADSL) connections to 17 sites and frame relay circuits to two more. This network, however, will change significantly in the near future as the local cable provider Wide Open West (WOW) implements its build-out plans for the city. As part of an agreement with Irving to use city rights-of-way, WOW has agreed to provide one fiber pair to every city facility free of charge and up to 500 such connections for traffic lights throughout the city. The city will incur costs only to connect the fiber cable to each building, acquire and install the electronics needed to drive it, and provide ongoing system maintenance.[\[11\]](#)

## Commendation

**Irving's networked telephone system enhances the productivity of city employees and improves all aspects of telecommunications service within city government.**

## Background

Telephone systems are critical for communication among constituents, businesses, state agencies, and other local government offices. The basic parts of an effective telephone system include the following.

*Integrated Messaging:* The integration of all electronic messaging—e-mail, voice mail and fax— into a single system allows city workers to use a single application for all forms of communication. This, in turn, reduces the time spent on administrative chores by as much as 30 percent and provides users with more options and a higher probability of successfully transmitting messages within a short time.

Integrated messaging also allows users to access all of their messages, including e-mail, voice, and fax, via a unified "in-box". This concept allows employees to see, hear, send, store and retrieve all of their messages with a phone and personal computer or laptop.

Furthermore, integrated messaging allows city organizations to streamline communications administration, maintain up-to-the-minute message directories, simplify network connections and reduce communication and administration costs. Finally, it allows network administrators to set up e-mail, voice and fax capabilities or manage moves, additions and changes from a single screen.

*Telecommunications Networking:* A networked telephone system, such as a Private Branch Exchange (PBX) or Centrex, helps avoid unnecessary duplication of equipment and services at separate locations. For example, it frees each city location from needing its own receptionist and back-up or relief receptionist; a single voice mail and call-accounting system can serve the entire network.

A networked telephone system provides its users with uniform access to a citywide dial plan, feature list and call coverage scheme, irrespective of their physical location, and allows system administrators to provide service to all users efficiently.

*Voice Mail:* Voice mail increases the efficiency of operations by allowing users to leave long, content-rich messages at any time, not just when an office is open for business. It allows the use of distribution lists to disseminate information to multiple recipients at once. Multiple callers can leave messages at the same time, and personalized security pass codes protect the messages in each user's mailbox. Moreover, voice mail can work with pagers, cellular service and the Internet to alert callers of important messages.

*Interactive Voice Response:* Interactive Voice Response (IVR) provides automated telephone access to information and services and is an important precursor to Web-based information delivery. In many ways, it is even more important at present, because far more constituents have telephones than Internet access and the cost to develop IVR applications is often lower than for Web-based applications. The telephone remains the most common communications device.

Integrated voice response systems bring together a company's telephone and computer system, creating a "voice computer" and transforming the caller's telephone into a terminal capable of directly accessing information and services. An IVR system answers inquiries by prompting callers to enter data onto the telephone keypad, looking up a record in a database and speaking information back to the caller. Such systems also can ask the caller for information, accept answers as they are entered on the keypad and store information in a database. As a voice computer, an IVR system is capable of many advanced transaction-processing tasks and can provide information to a caller more efficiently and conveniently than could a clerk searching a computer database.

IVR projects must be justified on an individual basis, as the equipment and software are expensive and require a high call volume to justify their expense. IVR systems often consist of standardized software operating on a PC or UNIX platform. This software programs a phone to direct a caller to enter data on the telephone keypad. Developers use application toolkits to interface with existing database packages. Development costs start at around \$12,000.

Typical IVR applications include the following:

- **Public Utilities**—Electric, water and gas utilities provide enhanced customer support by automating the most frequent customer requests and allowing representatives to focus on tasks requiring more in-depth analysis.
- **Property Assessor**—An automated property tax assessor or treasurer IVR system allows callers to obtain information about individual pieces of property. Information such as parcel identification, property value, assessment rate, tax amount and owner information can be relayed to callers or, with additional development, to Web users.
- **Building Permits**—Building-permit scheduling IVR systems are available to automate many of the tasks required of city or county building permit departments. Contractors and citizens can automatically schedule inspections and verify inspection status using their telephones or Web browsers. In addition, inspectors can call the system to report on completed and in-progress inspections, thus reducing paperwork and minimizing in-transit downtime.
- **Automated Payment Centers**—Some organizations have established a centralized and automated payment center for the processing of registration and renewal fees, corporate and personal taxes and tickets or fines.
- **Court Systems**—Court IVR systems automate a wide range of functions for court systems, including providing dates and times for jury duty; location, dates and times of trials; trial outcomes and judgments; and even the online payment of fines and tickets.

*Call Center Technology:* A call center automatically distributes calls to specially trained workers (agents) via special-purpose telecommunications equipment. The efficient and equitable distribution of calls and computerized support equipment allow a high volume of callers to be served by a relatively small number of agents. Call centers are effective when the call volumes justify the hiring of call center agents. The number of calls required to justify a call center varies depending on length and complexity.

Automatic Call Distribution (ACD) is a type of call-center technology that is capable of logging historical information about calls received. An ACD automatically answers calls; plays a delay message to alert the customer that calls are being answered in the order in which they are received; sequences calls by placing them in an answering queue in the order in which they were received and delivers the call to staff members as they become available. Typically, ACD groups are user-defined, serve one work area, like the tax department or the court, and help staff manage heavy use during peak times.

*Wireless Technology:* The coverage areas for digital, wireless telephones continue to increase, while airtime costs continue to fall. Wireless technology can be an important tool for providing clients with faster and more responsive customer service. Cities and counties should provide wireless telephones to key field personnel to improve their service. Wireless service, for instance, can put fire and police departments in direct contact with the public without the need to go through a dispatcher. Building inspection departments benefit from direct interaction between contractors and inspectors, which reduces the need for calls to city hall that must be relayed back to inspectors, tying up clerical employees. Road and public works supervisors also improve their efficiency when provided with wireless phones.

### ***City of Irving Telecommunications***

Irving has a large, integrated telecommunications system based on the Nortel Technologies Option 81 platform. Nearly all city users, irrespective of their location (with a few exceptions), share four circuits that provide for the highly efficient use of expensive telephone trunk lines. In addition, a number of non-digital lines can provide backup in case of trouble on the

digital circuits. Three outlying locations have off-premise extensions with either single-line phones or small telephone systems.

The city's telephone switches are connected via multiple fiber-optic cables that extend the network from city hall to the criminal justice center and other campus buildings. A field service center is connected to the city hall system via leased T1 circuits.

The city's Nortel telephone system was purchased from Verizon (formerly GTE), and a full-time Verizon technician services it. As telephone calls come into city hall, two computerized telephone units, called auto attendants, answer the calls in the order they are received. Callers input data into their telephone keypad, which sends calls to the appropriate city locations. Callers can also choose to speak with the main receptionist, who acts as a single contact for residents with general questions.

The City of Irving also has a fully implemented voice mail system and a partially implemented interactive voice response system in Court Services. Future plans over the next two to five years include the addition of full IVR system functionality in water utilities billing, building inspections and code enforcement.

## Chapter 6

### Municipal Administration

In the area of municipal administration, the review team examined employee access to e-mail service; the potential for implementing an online job application process; and the merits of online auctions of surplus property. The review of this function included interviews with management staff, as well as reviews of the city's technology and capital improvement plans and the "1999 Citizen Survey Results" report.

Commendation

**The city takes full advantage of the e-mail server, using it as another means of providing information to the public.**

#### Background

Irving provides e-mail services to all city employees who use computers via a dedicated server and city e-mail domain. Department Web links to key personnel make it easy for the public to contact Irving employees who can answer questions or otherwise provide information and feedback via email. E-mail is also used to solicit comments on matters of public concern. Visitors to the city's Web site can submit feedback and comments regarding any number of subjects from the online. The appropriate city employees then e-mail the requestor a response, bid specifications

**10. Accelerate the city's hiring process by allowing candidates to submit employment applications online.**

#### Background

Many government Web sites provide access to job opening information and application forms. The federal Electronic Signatures in Global and National Commerce Act (E-Sign) of October 2000 puts legal force behind contracts, purchase orders and other documents such as job applications that are completed online. E-Sign ensures the legal recognition of electronic signatures. The law is technologically neutral, meaning it specifies certain requirements but does not require that specific technologies be used to meet them.[\[52\]](#)

Under the new federal law, parties cannot be forced to conduct transactions entirely online. The law also excludes a number of documents that still must exist in paper form, such as wills, adoption papers and divorce documents. Even so, the new law should expedite the processing of forms such as personnel applications once a process and software for accepting electronic signatures are in place.

The Irving Human Resources Department has developed citywide policies and procedures to ensure a uniform practice for recruiting and hiring employees. All job openings are listed with abbreviated descriptions on the department's Web page, 24-hour job phone line and the city's cable channel. Two employees update these postings each week.[\[53\]](#)

The department publicizes openings in various ways, including the city Web site, to reach as many potential applicants as possible. Applications can be downloaded from the Web site, but cannot be submitted online. Instead, applications must be submitted in person or by mail or fax. The current application process requires original signatures on all documents. Applicants must appear in person to provide samples for drug tests, and sign a series of medical release forms and sample certification forms at the time of the test.

#### **Best Practice: City of Santa Barbara, California, Employment Online**

The Santa Barbara County, California Web site (<http://www.jobaps.com/sbc/default.asp>) provides comprehensive job listings and allows users to apply for jobs online or download the application form and return it to the county via mail or in person. [54]

#### **Best Practice: Texas Comptroller of Public Accounts**

A Texas State Comptroller Web page (<http://www.window.state.tx.us/careers/>) provides comprehensive job listings and allows users to apply for employment online.

#### **Best Practice: Dell Corporation, Submitting Resumes Online**

Dell Computers' Web site allows users to search for jobs by department or keyword, and the site's "Resume Builder" feature allows users to maintain a personal "Job Portfolio" that can be attached to their online resume. [55]

### **Recommendation**

**Accelerate the city's hiring process by allowing candidates to submit employment applications online.**

The city should develop and distribute new policies and procedures to allow for the acceptance of applications online. The city should request original signatures on release forms as part of the interview process and conduct background checks only after candidates have been interviewed and are being seriously considered for a position.

### **Implementation Strategies and Timeline**

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1.	The Human Resources director and key staff members participate in the citywide technology committee.	July 2001
2.	The Human Resources director determines whether any city policies or procedures for job application submission should be modified and acts to have them revised as appropriate.	August 2001
3.	The Human Resources director, with the assistance of key staff, determines what needs to be done to create an application form that can be completed and submitted online.	September 2001
4.	The Human Resources director develops an action plan to begin accepting applications electronically.	October 2001
5.	As the process is implemented, the Human Resources director monitors its progress closely to ensure that all city policies are followed.	December 2001

### **Fiscal Impact**

This recommendation can be implemented with existing resources.

### **11. Conduct online auctions to dispose of surplus city property.**

Online auctions are similar to “live” ones; items are offered for sale, buyers place bids and items are sold to the highest bidder. Internet auctions, however, often bring higher prices and result in lower disposal costs. [56] Other advantages of Internet auctions include a larger pool of potential bidders, reduced storage needs for surplus property and free advertising via the auction Web site.

Online auctions can be conducted “in-house” using city personnel, or can be contracted out to a third party. Internally managed auctions allow the city to control the sale, set its terms and keep all of the revenue generated. Disadvantages include the staff time required to take pictures, show items on the Web and collect money, and the costs associated with Internet auction software (which could be \$50,000 or more), hardware upgrades, administration and advertising. A contract with an auction company has the advantage of passing up-front, administrative and advertising costs to the third party. It would, however, require the city to depend on the auction company to set all the rules, maintain its hardware and software satisfactorily and make the site easily accessible.

Other options include an auction hosting company, which allows its customers to sell items with no up-front costs, set the terms for the sale and link the auction to the city Web site. However, this requires the city to advertise the auction itself,

and to and rely on the auction house to maintain hardware and software satisfactorily. Cities also can contract with a vendor to sell surplus items. Under such an arrangement, the contractor provides labor, advertising, and auction administration at no cost to the city, but the city pays a negotiated commission for each sale. Specific auction dates are set for each item type, so surplus property may accumulate to the extent that more storage space may be required. Moreover, the contractor may not opt to sell inexpensive items.

Irving's Purchasing Division is considering a move to online auctions for surplus property. When the city's current contract with a local auction company expires in 2001, it can choose from a variety of online auction types.

The purchasing division's Web page, ([..\..\Purchasing\index.htm](#)) currently provides information on surplus property auctions and related procedures like times and locations of auctions, however, actual bids cannot be received online. The purchasing division's Web page also provides a listing of bid opportunities and specifications. Bids of less than \$5,000, which represent about 20 percent of those received, can be submitted by telephone, facsimile or in writing, however not online. All other bids must go through the sealed bid process and be mailed or delivered in person to the City Secretary's Office on a designated form.[\[57\]](#)

#### **Best Practice: Harris County Online Auctions**

Harris County's Purchasing Department conducts online auctions for surplus and confiscated property to the general public. The property is brought to the central warehouse in Houston for viewing and then placed on the auction Web page that is part of the county's Web site. Registered bidders are sent information regarding items to be placed on the auction site. Bidders can place a "proxy" or maximum bid for an item and the system will bid up to the maximum against other bidders. Items are auctioned on an ongoing basis, and most items remain on the auction site for six days. The online system gives the county an opportunity to sell a large amount of computer hardware and software, electronics, office fixtures and furnishings, and other miscellaneous merchandise in an expedient manner.[\[58\]](#)

#### **Recommendation**

##### **Conduct online auctions to dispose of surplus city property.**

When its current auction contract expires, the Purchasing Division should explore the various options available for auctioning surplus property online. The city's current Web server should be able to accommodate online auction services, but the staff time needed to run an online auction directly could be considerable.[\[59\]](#) The city may want to continue contracting with a third party but include online bidding in the contract.

#### **Implementation Strategies and Timeline**

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1.	The purchasing manager and key staff members participate in the citywide technology committee.	July 2001
2.	The purchasing manager determines whether any city policies or procedures need to be modified to accommodate online auctions and takes appropriate action.	August 2001
3.	The purchasing manager and key staff members determine which type of online auctioning is most appropriate and, if necessary, develop criteria for outsourcing all or part of the online auction process.	October 2001
4.	If the decision is to use an outside vendor, the purchasing manager negotiates for online auction services.	December 2001
5.	As the online auction process is implemented, the purchasing manager monitors it closely to ensure that all city policies are followed.	Ongoing

### **Fiscal Impact**

The planning phases and implementation of this recommendation could be accomplished with existing resources. The full costs of the recommendation cannot be estimated until the city chooses which among the various options for supporting online auctions.

## Chapter 5 Municipal Finance

Irving's Financial Services Department is responsible for city finance, budget preparation, accounting, customer service, tax and revenue collection and purchasing. In fiscal 2000, the department's general fund budget was \$2.6 million, with 31 authorized positions. The Customer Service Division within the Financial Services Department has an additional 31 positions funded at \$1.4 million through the water/wastewater system fund and a couple of tax assistance positions funded through the general fund.

### **8. Consider using online auctions to sell municipal bonds.**

#### **Background**

Historically, the City of Irving has issued large multimillion dollar municipal bond packages. Recent examples include a \$249 million, 10-year bond package issued in February 1999 to finance long-term capital improvements such as the construction or upgrading of city streets, parks, a new police station, and at least one fire station. In addition, the city has committed to a \$21.5 million bond package for implementation of its five-year technology plan.

Traditional municipal bond sales have required substantial printing costs for bond notices and bid packages. Commendably, in March 2001, Irving recognized the opportunity to reduce bond issuances costs by providing notices of its \$30 million bond issuance for capital electronically, via email. Through Irving's financial advisor firm, First Southwest, the city also was able to accept bond bid packages electronically, via email.

Online bond auctions allow state and local governments to accept real time competitive bids on bond issuances over the Internet. According to Public Financial Management, financial advisors to the City of Austin, no city hosts an online bond auction itself. [46] Instead, cities contract with one of the online auction providers or firms that house the online bidding systems which make online auctions possible, some at no cost to local governments. [47] Using Web page templates, bids are submitted electronically to the proprietary bidding systems operated by the online auction provider hosting the auction. Currently, at least three online auction providers perform this service nationally.

Municipalities generally use the following process when conducting online bond auctions. Depending upon the city's agreement with its financial advisor firm, either the city's finance director or their financial advisor firm informs the online auction provider of the approximate time and date of the scheduled bond sale. The city's finance director or financial advisor firm then provides the online auction provider with a PDF version of the Notice of Sale (NOS) language and the Preliminary Official Statement (POS) in addition to a distribution list, which simply consists of the contact names, numbers and addresses of all interested parties in the bond sale: issuer (city), financial advisor firm, bond counsel, auditor, underwriter, etc. A template is posted on the provider's Web site before the bond sale, sometimes for as long as a week in order for potential bidders to become familiar with the site. The issuing city and the potential bidders are assigned passwords for access to the secure Web page hosting the auction. The issuing city and the auction provider have access to

all bid information in real time, however, bidders only see their bid information. When an electronic bid is submitted via the Internet, the amount of the bid is not publicly displayed until the bond sale has been completed. However, at least one online auction provider uses software that informs bidders instantly if their bid is not the lowest so bidders have the opportunity to resubmit a lower bid, time permitting. The online bond sale (auction) typically lasts just 30 minutes but the highest volume of activity usually occurs in the last two minutes. [48] Marketing for online bond auctions is achieved through advertisements in national and state publications, such as the Bond Buyer, the Texas Reporter and the Texas Bond Reporter as well as through electronic notification (email to all potential bidders).

There are several advantages to using the Internet to sell municipal bonds. Through electronic notification of a bond sale and the ability to accept bids electronically, a city could realize considerable savings in printing costs alone. However, online bond auctions provide an even greater advantage, which is the increased competition due to the potentially global community of bidders. More participants aggressively bidding against each other could result in lowered interest rates, or true interest costs (TIC), to local governments. Most if not all of the fees associated with online bond auctions are absorbed with the bond sale proceeds.

Another advantage of online bond auctions is a simplified bidding process. By using a common electronic template and a single system rather than phone, fax and walk-in bids, the opportunity for human error is reduced. Past mistakes, such as inaccurately hand recording the number of bids submitted and/or confusion resulting from ensuring bids were submitted on time, are eliminated or reduced. Furthermore, underwriters like it because it saves them steps in preparing and submitting bids. [49]

Cities experienced with online bond auctions offer the following advice to those considering the process. The role of the city's financial director or financial advisor firm is vital to ensure that the city or advisor firm has a good working relationship with the online auction provider that hosts the bond sale. City staff must also be capable of double-checking the results of the bond auction and subsequent sale; this suggests a level of financial expertise as well as computer competence equivalent to this task.

There are no current state or federal legal barriers to online bond auctions.

#### **Best Practice: City of Pittsburgh, Pennsylvania, Online Bond Auctions**

In 1998, Pittsburgh became the first US jurisdiction to sell bonds online. In November 1999, it opened up an electronic sale of \$56.9 million in general obligation bonds to institutional investors. By reaching a wider range of investors, the city believes it realizes a better price than it could through traditional auctions. Forty-five bidders entered the November 1999 auction and about half of those submitted bids. Each bond received an average of at least eight bids. [50]

**Best Practice: City of Austin, Texas, Online Bond Auctions**

From September 1999 to May 2001, Austin held six online bond auctions. The city treasurer's office reports that online bond auctions resulted in lower printing and issuance costs and increased competition by expanding its bidder's pool.

**Best Practice: City of Portland, Oregon, Online Bond Auctions**

From April 1998 to May 2001, Portland held ten online bond auctions. The city treasurer's office reports that the online auctions resulted in some of the "best municipal bond pricing ever" for their city and that printing and issuance costs were also reduced.

**Recommendation****Consider using online auctions to sell municipal bonds**

Irving should consider trying one online bond auction to compare its results with the results of some of their past, traditional municipal bond sales. The city should use their financial advisor firm to assist them with this new bond sale approach.

**Implementation Strategies and Timeline**

After a city decides to hold an actual online bond auction, it must select an online auction provider to host the bond sale. Currently, there are a few online bond auction providers for a city to choose from. One consideration may be cost; some providers charge a fee while others do not.

The process for an online bond auction is essentially the same as a traditional bond sale with the following exceptions. About two weeks before an auction, the city notifies the online auction provider of the online sale. About one week before the sale, the city sends the Preliminary Official Statement (POS) to the provider. Two to three days before the auction, the provider disseminates the POS to potential bidders via the Internet. The city's finance director or financial advisor firm then requests and receives signed bid forms from prospective bidders and registers them as qualified bidders.

**Fiscal Impact**

The fiscal impact of this recommendation should be positive for municipalities. Notification of bond sales and submitting bids electronically, via email, should considerably reduce issuance costs, especially printing expenses. An even greater

fiscal impact would be realized by cities that participate in actual online bond auctions. As stated earlier, online bond auctions produce increased competition which results in more favorable interest rates and reduced costs for the city. An actual estimate of the basis points saved by using an online auction over the traditional method is difficult to produce because it is impossible to know how many more bidders would have participated, how they would have bid and whether or not they would have resubmitted a bid once they learned that they were not the lowest.

## **9. Encourage city vendors to use electronic billing and payments.**

### **Background**

The Finance Services Department uses electronic banking methods for payments to the state, insurance transactions, stop-payment orders and direct deposit of employee paychecks. Water utility customers can elect to have the city automatically bill their bank accounts for their monthly water bills.

Seventy-two percent of all city employees use direct deposit. The city has a four-year contract with a depository bank with an option for a two-year renewal. To improve efficiency and cash management, the Financial Services director would like to begin making vendor payments electronically, but is waiting for modifications to security controls at the city's depository bank before doing so. Since the department issues more than 30,000 accounts-payable checks annually, electronic banking should speed processing considerably. [\[51\]](#)

### **Recommendation**

#### **Encourage city vendors to use electronic billing and payments.**

The city could streamline its payment system by encouraging vendors to issue invoices and accept payments electronically. Many vendors prefer electronic banking, and some companies such as Microsoft conduct most of their payable and receivable business online.

### **Implementation Strategies and Timeline**

1.	The Purchasing manager, the Financial Services director and the city attorney work together to develop language for use in future requests for proposals and vendor contracts to encourage vendors to issue electronic invoices and accept electronic payments.	July 2001
2.	The Financial Services director conducts a cost-benefit analysis that compares the cost of billing vendors and receiving payments electronically to the cost of handling these processes manually.	August 2001

3.	The Financial Services director presents the language and results of the cost-benefit analysis to the council for review and approval.	September 2001
4.	If the Council approves the proposal, the Financial Services staff begins implementation, including but not limited to rephrasing proposals and contracts to encourage electronic transactions.	October 2001

**Fiscal Impact**

The fiscal impact of this recommendation should be minimal, since the city already uses electronic payments for other transactions. The cost-benefit analysis should take into consideration savings in check purchasing, storage and preparation, as well as interest earnings. Charges for existing electronic payment services in the depository contract are comparable to the cost of check processing.

## Chapter 4 Municipal Planning

“Municipal planning” refers to the functions related to the development of land within a city’s boundaries. Irving’s municipal planning functions are administered through two departments, Community Development and Inspections. The Community Development Department is responsible for creating and implementing a comprehensive city plan, carrying out regulations and providing technical assistance to the city’s planning and zoning commission.<sup>[33]</sup> The Inspections Department develops, maintains and enforces construction codes as well as minimum standards for working and living conditions and the abatement of neighbor nuisances.<sup>[34]</sup>

The 1999-2000 city budget called for 62 Inspections Department employees to review an estimated 2,000 plans and conduct more than 55,000 building inspections.<sup>[35]</sup> During the same period, six of the Community Development Department’s 20 employees administered more than 175 zoning cases and reviewed 125 plats or site plans.<sup>[36]</sup>

The two departments use a networked mainframe system to register contractors and generate certificates of occupancy. They rely on tax and water files to research property ownership. In addition, they work with the Irving Geographic Information System (IGIS), a subgroup of Information Technology, that creates and analyzes different kinds of maps used in platting.

Commendation

### **Irving’s encouragement of electronic construction plat submission saves time, expense and storage space.**

Electronic submission saves the developer and the city funds that otherwise would be spent on employee time, paper, supplies and mailing costs. In addition, the digital documents can be stored electronically, which saves filing time and reduces the need for physical storage space.

### **Background**

The Texas Municipal Code grants broad planning and zoning powers to home-rule cities such as Irving. Planning concerns how land is developed in conformance with area goals. Zoning pertains to land use and usually is driven by the owner’s desire to change how a piece of land may be used, a change that may require a change in zoning status. Zoning requests fall into three broad categories: zoning changes (i.e., from residential to a commercial designation), exceptions (permission to treat a property differently, providing certain criteria are met), and variances (an easing of rules granted due to hardship beyond the control of the homeowner, such as unusual plot slope or shape).

Prospective builders generally must submit several types of plans for approval, including site plans, preliminary and final site plats and zoning changes. Plans also may be submitted to determine whether they meet city code requirements. The final step is to request a building permit. The Irving Community Development Department strongly encourages developers

to submit their final plans and plats in a digital file in AutoCAD (computer-aided design) format.[\[37\]](#)

### **Commendation**

**Through its online publication of detailed maps and related databases of property characteristics, the City of Irving offers a high level of customer service and convenience to city residents, employees and developers.**

### **Background**

The Irving Geographic Information System provides public access to multi-layered property information over the city's Web site. Users can enter basic property data (such as location) and receive downloadable maps with information on size, zoning, taxes, topography, and utilities, among other data. For example, the city offers maps of water utility features that are so detailed that it is possible to locate all the water valves in a neighborhood.[\[38\]](#)

**Offer customer-specific planning and zoning information online.**

### **Background**

Irving's Community Development Department is responsible for both current and future planning and zoning activities. Current Planning, one of four divisions within the department, provides information and assistance to both the general public and developers by reviewing development plans, processing zoning changes and plats and developing zoning ordinances.[\[39\]](#) Although procedures, requirements and fees for various zoning-related activities are described on the Web page and applications may be downloaded, requests about specific pieces of property or zoning changes cannot be made online.

Advanced Planning, another division of Community Development, is responsible for ensuring that development plans support community values and goals. This division produces Irving's comprehensive development plan, which is available on the city Web site with entire sections that can be downloaded ([...\CommDev\advanced\\_planning.htm](#)).

#### **Best Practice: City of Sunnyvale, California, SunGIS**

Sunnyvale, California, a small city in northern California, has a SunGISm system that can handle permits, track complaints, schedule inspections and monitor hearings through a single database.[\[40\]](#)

#### **Best Practice: City of San Diego, California, Web-Based Zoning and Permitting**

### Information

The City of San Diego's Web site provides zoning and permitting information tailored to customers including construction industry professionals, small business owners and homeowners. Customers can access a wide variety of information and request further information, such as zoning information by property address, parcel number, or legal description, via e-mail. The city also answers frequently asked questions in a customer-friendly format called "Ask the Inspector." [41]

### Recommendation

#### Offer customer-specific planning and zoning information online.

Although the public cannot currently access or track job- or customer-specific planning and zoning data, such functions are included in the second year of the city's technology plan. [42]

The state's open meetings law requires that zoning change information be posted in a conspicuous place at city hall, and section 52-62 of the City of Irving zoning ordinance mandates posting on the property. [43] Providing such information online would enhance customer service. In addition, online planning information (such as hearing schedules, minutes, appeals, and fees) would reduce the amount of time city staff members must dedicate to responding to questions about these activities. [44]

### Implementation Strategies and Timeline

1.	The Community Development director participates on the citywide technology planning committee.	July 2001
2.	The Community Development director identifies planning and zoning processes that could be improved through online access.	August 2001
3.	The Community Development director and key staff determine whether existing policies or ordinances would need modification to place planning and zoning processes online and take appropriate action.	September 2001
4.	The Information Systems director and Community Development director plan an approach and timetable for adding online information and features.	November 2001

5.	The Information Systems and Financial Services directors develop specifications for the required hardware and/or software as well as any programming needed, perform a cost analysis and purchase the necessary products and services through competitive bid.	December 2001
6.	After a successful vendor has been identified, the Information Systems director and the director of Community Development monitor the implementation and testing of the new Web processes.	May 2002

### Fiscal Impact

Planning efforts for this proposal could be accomplished with existing resources. Implementation costs would depend upon the type of system procured and the specific requirements of the package selected. The cost of a system that could track planning and zoning information as well as permitting and inspection data from initiation through project completion is projected at \$200,000 with ongoing maintenance costs of 15 percent.

Recommendation	2001-02	2002-03	2003-04	2004-05	2005-06
Offer customer-specific planning and zoning information online.	(\$0)	(\$200,000)	(\$30,000)	(\$30,000)	(\$30,000)

**Expand the Inspections Department Web page to allow for the online submission of permit applications and inspection requests.**

### Background

The Inspections Department is made up of two divisions: the Building Inspections Division administers plan reviews, issues building-related licenses and permits and conducts a variety of inspections, while the Code Enforcement Division issues multi-family licenses and food permits; inspects apartments, investigates substandard housing and zoning and nuisance violations and reviews food establishments, among other activities.

The Inspections Department has put a good deal of customer service information on its Web page, including applicable city ordinances; zoning and platting requirements; policies and procedures for obtaining licenses, permits and inspections; downloadable forms; fee schedules; and answers to frequently asked questions. The department has made considerable progress toward the goal of making the inspection process interactive, but the process is not yet complete. For example, forms may be downloaded but cannot yet be submitted online, nor can inspection status be checked online.

**Best Practice: City of Dallas, Texas, Online Inspection Scheduling**

Dallas allows its customers to schedule inspections online and provides inspection results online to individual customers. Customers can review information regarding inspections, request inspections for individual sites, and view the results via the Internet.<sup>[45]</sup>

**Best Practice: City of Houston, Texas, Online Permit Service**

The City of Houston's Web page can accept online permit applications for commercial and residential buildings; plumbing, electrical, heating/air conditioning/ventilation and fire sprinkling systems and sidewalks and driveways, among other items. Customers also can use the site (<http://houston.onlinepermits.com/home2.asp>) to check the status of plans, inspections and permits.

**Recommendation**

**Expand the Inspections Department Web page to allow for the online submission of permit applications and inspection requests.**

Expanding the Inspections Web page for greater interactivity is part of Irving's five-year technology plan. This recommendation acknowledges the need for this function and endorses the city's plan to implement this function. These enhancements should allow users to apply for and track permits and inspections online. This would improve service quality, slash application processing time and reduce the number of phone and in-person inquiries that must be fielded by city employees.

This process would entail some expense, but the City of Irving has demonstrated its commitment to ventures of this type and has made plans to accommodate online activity where appropriate.

**Implementation Strategies and Timeline**

1.	The Inspections director participates on the citywide technology planning committee.	July 2001
2.	The Inspections director identifies permitting and inspections processes that could be improved through online access.	August 2001

3.	The Inspections director and key staff investigate whether city policies or ordinances would need modification and take appropriate action.	December 2001
4.	The Information Systems director and the Inspections director plan an approach and timetable to add the new information and features.	January 2002
5.	The Information Systems director and Financial Services director develop the specifications required for any necessary hardware, software or programming requirements, perform a cost analysis and purchase the necessary products and services through competitive bid.	April 2002
6.	After a successful vendor has been identified, the Information Systems director and the Inspections director monitor the implementation and testing of the new Web processes.	June 2002

### **Fiscal Impact**

The cost of implementing an online permitting and inspection process can be determined only after its specific requirements are developed and a package is proposed. Since the City of Irving already has interactive capabilities, implementation costs should be less than they would be otherwise. This recommendation could be accomplished at the same time and with the resources needed for Recommendation 6.

## Chapter 3 Municipal Utilities

The City of Irving provides water and wastewater services to its residents. The city's water and wastewater system handles about 38.2 million gallons of daily consumption through 41,400 active meters on 661 miles of water mains, 9,536 fire hydrants, 268 miles of storm sewers and 38,500 sewer connections on 655 miles of sanitary sewers.

The city's water and sewer fund finances the Customer Service Division of Irving's Financial Services Department because this is the unit that handles billing and collections, most of which are for water and wastewater service. The 1999-2000 budget includes 133 utilities-related positions, including maintenance service personnel and 31 customer service employees. [29] Capital improvements to the water and sanitary sewer system are funded through the issuance of revenue bonds that do not require voter approval, since customer fees are used to repay them. In 1999- 2000, budgeted revenues for the Irving water and sewer system fund were \$55.2 million, while the interest and sinking obligation, that is, debt owed to repay revenue bonds totaled about \$5.8 million. [30]

The review of water and wastewater functions included interviews with the Financial Services director and the assistant director for Public Works as well as a review of the 1999-2000 budget, the city's technology plan, the capital improvement plan and the utilities customer service Web page.

Commendation

**The city's plan to implement a new billing system, an interactive voice response system and an interactive Web site will reduce telephone inquiries and walk-in traffic at the customer service counter and expand payment options for customers.**

These systems will allow customers to review billing records, select payment options, enter appropriate information and make payments using a credit or debit card.

The implementation schedule for the three new systems is spread over five years and will involve staff from Financial Services, Water and Wastewater, and Information Technology. These employees will need to work together closely during the systems evaluation and selection processes to ensure that the new billing system can support online customer service options, like reviewing personal accounts or paying by credit card, and that it can support an interface with the new finance system.

### Background

Irving's Web site includes a page for the Customer Service Division of Financial Services ([..\CustomerService\index.htm](#)), with links to other pages and information related to water and wastewater services. The site includes information on beginning and ending service, office locations, phone numbers and payment options. The

Web site advises that the city's consolidation of tax, water, ambulance, paving, and other fees allows customers to make all these payments in one transaction.

Water and wastewater bills are generated in four cycles per month. Payments may be made at the customer service counter in the Civic Center Complex, at a drive-through window or by mail. They are not accepted online, although bank drafting is possible. Customer billing and usage records also are not available online.<sup>[31]</sup> Texas has no legal barriers to the posting of utility billing information on the Internet or expanded acceptance of credit-card payments.<sup>[32]</sup>

The city's billing system is housed on its mainframe, which is scheduled for replacement in the first phase (2000-2001) of the city's technology plan at a cost of \$330,700. The city has identified specifications regarding daily billing (20 cycles per month compared to the current four), maintenance of billing history for rate studies, access to monthly billing information via the Internet and e-mail notification for commercial customers. The new system will interface with the financial system, thereby expanding billing options. It also will allow the city to create an interactive Web site and voice response system in the second year of the plan.

## Chapter 2 Municipal Court

Two City of Irving municipal court judges hear traffic cases and local ordinance violations in municipal court. Volunteer attorneys hear and try juvenile misdemeanor and traffic cases in "teen court," where sentences are meted out in hours of community service. Court services directors supervise clerical functions.

The 1999-2000 municipal court budget of \$2,764,809 includes 44 full-time equivalent positions. For the same period, revenue collections are projected to be \$6,551,123 for the general fund and \$554,700 for the municipal court technology fund, which is dedicated to the purchase of technological enhancements for the court. [12] The municipal court technology fund budget includes \$244,700 in anticipated revenues and \$310,000 designated for transfer from the general fund.

The city collects a \$25 time payment fee for misdemeanor convictions in which a person pays any part of a fine, court costs or restitution on or after the 31st day after a judgment is entered. The Texas Government Code authorizes the fee, 50 percent of which is deposited into the State's general revenue fund, 40 percent into the city's general fund and 10 percent set aside for "judicial efficiency." [13] The fiscal 2000 budget includes \$198,000 in anticipated time payment fees. [14]

The review of the municipal court function included interviews with the Court Services director, Court Services supervisor and court specialist. It also included analyses of the fiscal 2000 budget, the court's Web page on the city's Web site, the city's new technology plan and associated activity reports generated by the Information Technology Department. [15]

### **1. Ensure that the new municipal court system is compatible with the city's new finance system.**

#### **Background**

Irving court officials expect more than 140,000 traffic and general violation cases to be filed in fiscal 2001, most of which will be handled without the defendant appearing in court. [16] In fact, unless a trial is specifically requested, the only cases requiring a court appearance are those involving juveniles younger than 17 years of age, defensive driving infractions and minors charged with alcohol- or tobacco-related offenses. [17]

Many court transactions are handled either in person or by mail. For example, pleas may be submitted in written form or entered verbally before the court, and fine payments may be mailed in or paid in person without a court appearance. Court costs are assessed at the time of trial disposition and paid at municipal court windows located in the Criminal Justice Center. Total court costs of \$828,600 were projected in the 1999-2000 budget.

Municipal court employees use e-mail and the Internet, as well as Microsoft Word and Excel for correspondence, notices, dockets, reports and the budget. A court Web page on the city site ([.\.\Courts\index.htm](#)) provides information on court operations, payment options, traffic fines, warrant information, teen court, location, phone numbers and frequently asked

questions. Customers may download some forms to a fax machine, complete them and mail or deliver them to the court along with required payment. Neither fine payments nor pleas can be made online.

According to staff, the court lacks the funding necessary to add additional personnel to develop and support an interactive municipal court Web site. [18] Although the municipal court has access to the court technology fund, its use is restricted to the purchase of technology. New positions would have to be budgeted through the general fund, time payment fees or other funding resources.

The mainframe system used by municipal court generates complaints, warrants, warrant notices, bond notices and monthly and daily reports. It also tracks cases. However, other clerical functions, such as the tracking of payments, schedules, dockets and community service activity, are performed manually. The court mainframe system provides a breakdown of fees into general ledger line items but cannot interface with the city's financial system. Financial information is presented to the Financial Services Department via reports that must be entered manually into the finance system.

The court mainframe is scheduled for replacement during the first phase of the city's technology plan, with money from both the general and court technology funds. Objectives call for an interface between the new finance system and online payment stations, or kiosks, that would be located in the court lobby, jail and elsewhere in a later phase of the plan. [19]

Through its participation in citywide technology planning efforts, the municipal court has developed a clear strategy including goals, expectations and needed linkages with other city systems. This is an important step toward developing online services.

### **Recommendation**

#### **Ensure that the new municipal court system is compatible with the city's new finance system.**

A new municipal court system that can interface with the new financial system would reduce duplicated efforts by court staff who generate reports and financial services staff who must reenter payment information.

The planning process should identify specific points where such interfaces should occur and pinpoint responsibility for creating them. The purchasing process should ensure that software acquired by the city has the features needed to support these interfaces. Finally, the implementation process should include checkpoints to document the function and thorough testing of interface features.

### **Implementation Strategies and Timeline**

1.	The Court Services director and key employees participate in the citywide technology committee.	July 2001
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2.	The Court Services director assigns responsibility for achieving desired interfaces to key staff.	July 2001
3.	The Court Services director and key personnel ensure that interface capabilities are clearly documented in all requirements for the new court and financial systems. They also ensure that responsibility for achieving the interfaces is clearly assigned to the appropriate vendor(s).	September 2001
4.	As systems are purchased, the Court Services director ensures that the interface features have been included in the final scope of work in the contract.	October 2001
5.	As systems are implemented, the Court Services director and staff ensure that interface features are tested and implemented.	January 2002

### **Fiscal Impact**

This recommendation could be carried out with existing and currently budgeted resources. The city has included in its technology plan a client/server system designed to interface with the finance system at a projected cost of \$550,000. Since this amount has been budgeted, it is not included in the Fiscal Impact figures in this report.

### **2. Equip police officers with handheld terminals to accept on-the-spot ticket and citation payments by debit or credit card.**

#### **Background**

Irving police officers and municipal court employees process most ticket and citation information manually. Although Irving police officers have mobile data terminals (MDTs) in their vehicles to verify criminal and driving records and warrant status, they still issue tickets and citations by hand. Court employees then reenter ticket information and fine payments into the city's mainframe system. According to city officials, this creates a substantial workload because Irving police file an estimated 280 citations per day, with more than half issued to non-residents because of the close proximity of the Dallas-Fort Worth airport and Texas stadium. Each ticket may contain from one to three violations, which must be entered into the court system manually and tracked separately.

Court payments must be made in person at the Criminal Justice Center or by mail. Foot traffic at the municipal court windows averages about 600 persons per day. Receipts are issued to persons paying at the window, but none are prepared for payments received by mail. Although the court accepts credit card payments in person, it does not actively promote this payment option and, consequently, credit card payments represent only about 10 percent of all collections. Defendants

may request and receive a time payment plan, but they must appear in person to enter a guilty or no-contest plea, sign documentation to establish a payment schedule and make an initial payment for each violation.[\[20\]](#)

<b>Best Practice: Electronic Payment for Traffic Fines in Wisconsin</b>
Wisconsin's State Patrol began a pilot project in August 2000 to accept on-the-spot electronic payments for traffic fines. State troopers in Kenosha County, between Chicago, Illinois and Milwaukee, carry wireless terminals that allow motorists to pay fines for speeding or other moving violations with a quick swipe of a credit or debit card. This payment is voluntary. This is the nation's first road test of a technology that has been in stores and restaurants for years. <a href="#">[21]</a>

### Recommendation

**Equip police officers with handheld terminals to accept on-the-spot ticket and citation payments by debit or credit card.**

Such a use of handheld terminals is legal in Texas and would make it more convenient for out-of-town residents to pay voluntarily. [\[22\]](#) The process also would decrease paperwork and foot traffic in the Criminal Justice Center and accelerate the movement of funds into city accounts.

### Implementation Strategies and Timeline

1.	The Court Services director and key staff work with the city Police Department to analyze the potential savings that might result from the use of handheld terminals to collect payments at the time of ticket issuance.	July 2001
2.	The Court Services director works with the Police Department and the Financial Services Department to identify specific requirements for the handheld devices.	September 2001
3.	The three departments develop an implementation plan for the acquisition and use of handheld terminals.	October 2001
4.	The Purchasing director requests and evaluates bids for the devices.	December 2001
5.	As the plan is implemented, the Court Services director ensures that court	March 2002

	goals and expectations are met.	
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### Fiscal Impact

The cost of each terminal is estimated at \$1,450, which includes hardware, software, a one-time activation fee, the average cost of a life-time maintenance agreement and limited training for trainers who would in turn train police officers and court staff in use of the system. This is an estimate for mid-range equipment. Maintenance agreements are available through a third-party processor and vary depending upon product. Monthly use charges, which are not included in the terminal cost, would be about \$13 per unit. Based on 105 patrol cars, the one-time cost for fiscal 2003 is estimated at \$152,250 (\$1,450 x 105), which includes an approximate cost for a maintenance contract. Annual usage would cost approximately \$156 per unit, or \$16,380 for 105 terminals. [\[23\]](#)

A credit card provider, MasterCard, is funding the Wisconsin State Patrol pilot project at a cost of \$15,000 for 10 devices; this might be an option for Irving as well. If using the terminals increases fine collections as it appears to have in Wisconsin, these receipts would help offset the cost of the new equipment. The effectiveness of the Wisconsin pilot project will be reviewed in 2001, at which time fee collection comparisons will be feasible. Current indications are that the project is working well and timely collections have increased. [\[24\]](#)

Recommendation	2001-02	2002-03	2003-04	2004-05	2005-06
Equip police officers with handheld terminals to accept on-the-spot ticket and citation payments by debit or credit card.	(\$0)	(\$152,500)	(\$16,380)	(\$16,380)	(\$16,380)

### 3. Increase public awareness that credit cards may be used to make fine payments.

#### Background

As noted above, the City of Irving accepts credit cards for fine payments in person but does not publicize this option on either its Web site or its 24-hour information phone line. Promoting this practice could have a substantial impact on both the timeliness and the amount of collections.

#### Recommendation

**Increase public awareness that credit cards may be used to make fine payments.**

The municipal court should publicize the fact that it accepts credit card payments in person by revising the fine payments section of the Web page and updating its 24-hour information phone line. Although the review team has no substantive evidence that this will necessarily increase the amounts collected, the practice may well accelerate payments from defendants who might otherwise wait until payday to write a check or money order.

### Implementation Strategies and Timeline

1.	The Court Services staff revises the municipal court Web page and telephone information line to emphasize the city's acceptance of credit cards.	July 2001
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### Fiscal Impact

This recommendation could be accomplished with existing resources.

### 4. Expand municipal court customer service to include various online options.

#### Background

The municipal court's main telephone line receives about 400 calls daily. The line features an automated menu to answer basic questions and direct calls to the appropriate employees. A staff member on the court's warrants line fields an additional 300 calls daily from the public and law enforcement agencies.<sup>[25]</sup> Because of this heavy activity, in 2001 the court plans to adopt a new client-server system that will allow customers to access information more easily and provide other online options. Since the city already accepts in-person credit card payments for fines and is enhancing its client-server system, online services seem to be a logical next step. Best Practice: San Antonio's Electronic Payment of Traffic Fines at Kiosks

#### **Best Practice: City of San Antonio, Texas, Electronic Payment of Traffic Fines at Kiosks**

The City of San Antonio allows persons to pay fines online through four "community link kiosks" conveniently placed in shopping malls around the city.<sup>[26]</sup>

#### **Best Practice: City of Austin, Texas, Access to Court Information and Procedures**

The City of Austin has a municipal court Web page (<http://www.ci.austin.tx.us/court>), an Interactive Voice Response telephone system and convenient fine payment options.

Payments may be made in person at the main court location or either of two sub-stations, at a 24-hour drop-box in the main court lobby, by mail or via telephone with a credit card. With a driver's license or citation number, customers also can access information specific to their violation via the IVR system.

#### **Best Practice: Los Angeles County, California, Public Access**

Los Angeles County, California provides free public access to case history and calendar information on civil, small claims and unlawful detainer cases via WEBCOURT, an Internet database of records from 19 of Los Angeles County's 24 municipal courts. Since December 1998, WEBCOURT has included records from the Los Angeles Municipal Court (LAMC), the nation's largest. With the addition of LAMC data, the Internet site provides access to more than 2 million cases. [\[27\]](#)

### **Recommendation**

#### **Expand municipal court customer service to include various online options.**

Performance is enhanced whenever a working environment allows for the free exchange of information among internal and external customers. The ability to pay fines, enter pleas, file motions or simply access personal information online would have a positive effect on the city and its customers.

At present, Irving does not offer any online payment or plea options, although it has the technological resources to do so. The city's primary objection to accepting online payments is the fact that their third-party processor charges a higher fee for collections made without a signature. [\[28\]](#) Certain credit-card companies, however, allow governments to pass their processing charges on to the customer, and the City of Irving can and should negotiate such an agreement. Irving should make it possible for its customers to handle a variety of activities online, such as making fine payments, filing pleas and accessing case history information. Information on warrant status, payment history, and the court calendar also could be made available.

The city's planning efforts for this initiative should include not only the mechanics of implementing these processes but also a communications plan designed to make the public aware of expanded services. Both the Web page and the city's 24-hour information telephone line should be updated to promote the new service. Although there is no concrete evidence to indicate that these services would increase city revenues, they should encourage more timely payments, improve customer service and reduce staff time devoted to processing walk-in payments.

### **Implementation Strategies and Timeline**

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1.	The Court Services director and key staff members participate on the city's Internet strategy planning committee.	July 2001
2.	The Court Services director and municipal judge identify initial information to be placed on the court Web page, such as nature of offenses, case status, court dates, and fine and payment schedules.	August 2001
3.	The Financial Services and Court Services directors identify credit-card providers who would be willing to pass processing charges on to customers and develop a plan to use these services.	August 2001
4.	The Court Services director and key staff members develop an internal implementation plan to integrate the online process with existing operations and publicize its expanded capability.	September 2001
5.	The Information Technology and Financial Services directors develop specifications for any additional hardware and/or software and conduct a competitive purchase.	November 2001
6.	The Court Services director and key staff initiate online options for electronic payments, making motions, filing pleas, and accessing case-specific information.	March 2002

### **Fiscal Impact**

This recommendation can be carried out using existing and currently budgeted resources. The city has included in its technology plan a client/server system designed to interface with the Finance system at a projected cost of \$550,000. Since this amount has been budgeted, it is not included in this report's estimated fiscal impacts.

### **5. Consider filing court cost reports through the Internet after the Comptroller's office has developed the capacity to accept and process such online reports.**

#### **Background**

Cities must file monthly and quarterly court cost reports with the State Comptroller's office. At present, Irving completes these reports manually and mails them to the Comptroller's office.

#### **Recommendation**

**Consider filing court cost reports through the Internet after the Comptroller's office has developed the capacity to accept and process such online reports.**

The comptroller is currently planning to develop computer applications to allow for the online reporting of these costs.

#### **Implementation Strategies and Timeline**

1.	The Court Services director and staff identify a process for filing court cost reports online.	July 2001
2.	The Court Services director and staff make decisions regarding services and determine an approach.	August 2001
3.	When the Comptroller develops the ability to process court cost reports online, the city should implement procedures that are in harmony with those the Comptroller adopts.	February 2002

#### **Fiscal Impact**

This recommendation could be accomplished with existing resources.

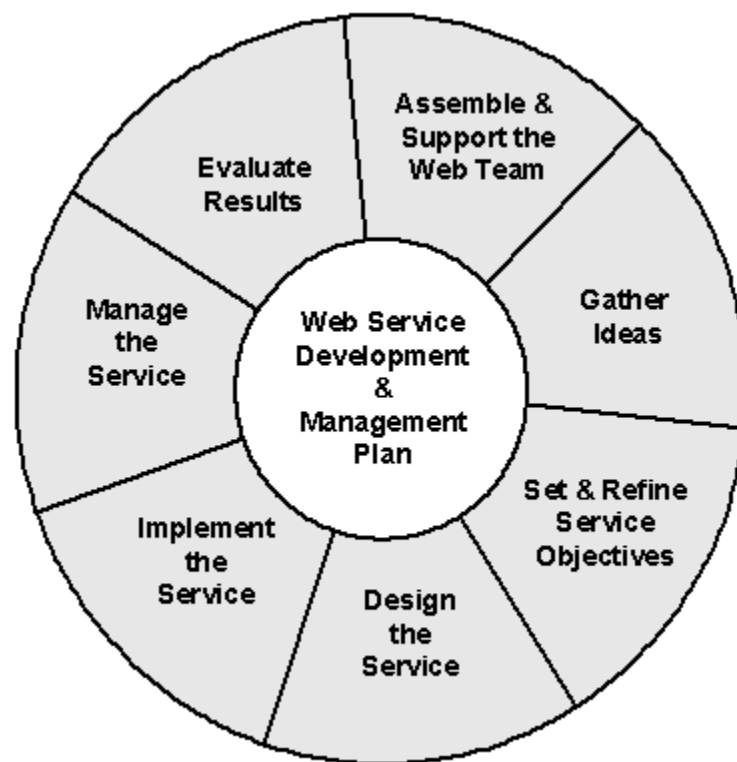
## Attachment A Cost Analysis

	Recommendation	2001- 2002	2002- 2003	2003- 2004	2004- 2005	2005- 2006	Total 5- Year (Costs)
<b>Chapter 1 Technology Infrastructure</b>							
<b>Chapter 2 Municipal Court</b>							
1	Ensure that the new municipal court system is compatible with the city's new finance system p. 17.	\$0	\$0	\$0	\$0	\$0	\$0
2	Equip police officers with handheld terminals to accept on-the-spot ticket and citation payments by debit or credit card. p. 19.	\$0	\$152,500	\$16,380	\$16,380	\$16,380	\$201,640
3	Increase public awareness that credit cards may be used to make fine payments. p. 21.	\$0	\$0	\$0	\$0	\$0	\$0
4	Expand municipal court customer service to include various online options. p. 22.	\$0	\$0	\$0	\$0	\$0	\$0
5	Consider filing court cost reports through the Internet after the Comptroller's office has developed the capacity to accept and process such online reports. p. 24.	\$0	\$0	\$0	\$0	\$0	\$0
	<b>Totals - Chapter 2</b>	<b>\$0</b>	<b>\$152,500</b>	<b>\$16,380</b>	<b>\$16,380</b>	<b>\$16,380</b>	<b>\$201,640</b>
<b>Chapter 3 Municipal Utilities</b>							
<b>Chapter 4 Municipal Planning</b>							
6	Offer customer-specific planning and zoning information online. p. 28.	\$0	\$200,000	\$30,000	\$30,000	\$30,000	\$290,000
7	Expand the Inspections Department Web page to allow for the online submission of permit applications and inspections requests. p. 30.	\$0	\$0	\$0	\$0	\$0	\$0
	<b>Totals - Chapter 4</b>	<b>\$0</b>	<b>\$200,000</b>	<b>\$30,000</b>	<b>\$30,000</b>	<b>\$30,000</b>	<b>\$290,000</b>
<b>Chapter 5 Municipal Finance</b>							

8	Consider using online auction to sell municipal bonds. p. 33.	\$0	\$0	\$0	\$0	\$0	\$0
9	Encourage city vendors to use electronic billing and payments. p. 35.	\$0	\$0	\$0	\$0	\$0	\$0
	<b>Totals - Chapter 5</b>	<b>\$0</b>	<b>\$0</b>	<b>\$0</b>	<b>\$0</b>	<b>\$0</b>	<b>\$0</b>
<b>Chapter 6 Municipal Administration</b>							
10	Accelerate the city's hiring process by allowing candidates to submit employment applications online. p. 37.	\$0	\$0	\$0	\$0	\$0	\$0
11	Conduct online auctions to dispose of surplus city property. p. 39.	\$0	\$0	\$0	\$0	\$0	\$0
	<b>Totals - Chapter 6</b>	<b>\$0</b>	<b>\$0</b>	<b>\$0</b>	<b>\$0</b>	<b>\$0</b>	<b>\$0</b>
	<b>TOTAL COSTS</b>	<b>\$0</b>	<b>\$352,500</b>	<b>\$46,380</b>	<b>\$46,380</b>	<b>\$46,380</b>	<b>\$491,640</b>

## Attachment B

### Center for Technology in Government's Web Service Development and Management Plan Model<sup>[39]</sup>



#### *Steps to Providing Government Services Online*

*Stage 1:* Members of the team that will develop and provide online services must possess various skills, including expertise in technology, business planning, financial analysis and research and policy development. The Web team could function in two groups: a core group for day-to-day activities and an advisory group that functions as a steering committee to provide high-level policy guidance and commit city resources. The group should include representatives from internal and external stakeholders.<sup>[61]</sup>

*Stage 2:* This is the gathering ideas stage, also known as "technology awareness." Members should thoroughly research the Internet

to identify the best practices of other organizations and determine how they promote their services. The technology awareness phase should stimulate group members with ideas about how they might apply technology to their own work areas and functions.[\[62\]](#)

*Stage 3:* Goal-setting and stakeholder input should provide a basis for determining the types of services to be provided and identifying potential partnerships to share resources. A cost-benefit analysis should determine if the benefits are sufficient for the costs of investing in Internet Web site development. The cost or benefit usually is expressed in terms of improved performance.[\[63\]](#)

*Stage 4:* This stage includes design considerations which deal with outlining the form and content of a Web service. An effective Web site should have a clear objective and a target audience. Other design issues to consider are:

- links to integrate information from other sites.
- types of communication pathways—one-way, static information provided to the user, or two- way, interactive information allowing the user to download forms or make online requests.
- the style and format of content.
- date-stamp information showing when the Web site was last updated.
- types of browsers employed by users to display the content of the Web site.
- counters to collect Web site statistics, such as who is accessing the Web site and how often it is accessed.[\[64\]](#)

*Stage 5:* Web site construction and pilot testing or prototyping should occur before the Web site goes online. During this stage, decisions should be made concerning the infrastructure needed to produce a Web site. The major decision is whether to procure a server and host the Web site internally, with a telecommunications connection to the Internet, or contract with an outside vendor to host the services on the Internet. Depending on this decision, infrastructure elements such as Web servers, networks, security and domain registration are considered and chosen.[\[65\]](#)

*Stage 6:* Once the Web site has been developed, it must be managed. This involves the development and implementation of policies and procedures that clearly assign team responsibilities to ensure the smooth delivery of services. Issues to be considered include the integration of Web services with current business functions; control of content and style; management of records created from the Web site; and maintenance of stable and reliable service. In this stage, policies must be put in place to ensure that employees understand and use the service appropriately; that the security, privacy and confidentiality of information accessed through the Web site are safeguarded; and that records are managed and retained according to statutory requirements.[\[66\]](#)

*Stage 7:* In the evaluation or feedback stage, success is measured by comparing the actual performance data with the service goals outlined in stage three. Pre-Web site performance data (baseline data) should be collected during the Web site development period. Once the evaluation has been completed, refinements or revisions to the services should be made.[\[67\]](#)

## Glossary of Telecommunication Terms

**56 Kbps (56,000 bits per second)** is the bandwidth required for one phone conversation and a common WAN connection speed, referred to as DS-0. The 56 Kbps transmission speed is achieved by breaking a DS-1 (1.5436 Mbps) into its 24 component channels.

**ADSL (Asymmetrical Digital Subscriber Line)** allows one-way transfer rates from 128 Kbps to greater than T-1 speeds over ordinary copper telephone lines. There is a distance limitation of approximately 12,000 to 18,000 feet from the nearest main facility (telephone company central office or equivalent).

**Analog Services** refers to communications that transmit voice at its different frequencies without changing it. In voice communication, there is some fluctuation in frequencies, similar to the gradual change of a sine wave; in fact, a person's voice creates its own specific sine wave as he/she speaks. This wave, except for the frequency changed for transmission, is exactly how the signal is sent.

**ATM (Asynchronous Transfer Mode)** is a high-speed, low-delay transmission method. ATM uses fixed length cells (chunks) to transfer voice, data and video over twisted pair and optical fiber. ATM can be configured to allocate bandwidth appropriately to meet the needs of both time-sensitive and non-time-sensitive applications.

**Backbone**, in the context of networking, refers to the highest speed and widest bandwidth point of a communications circuit or path. In most cases, all information central to the users is connected to the backbone (e.g., shared databases or servers).

**Bandwidth** is the amount of data that can be carried by a circuit between two points of a network. Bandwidth is typically measured in Hertz (cycles per second), bits per second or kilobits per second (shortened to Bps or Kbps). The top speed of today's modems is 56,000 BPS or 56 Kbps. The wire connecting a private home to the telephone company carries up to 128,000 BPS while one strand of fiber optics can carry 20,000,000,000 (20 Gigabits). A 20 Gbps fiber optic strand can interconnect 357,000 telephone calls.

**Bandwidth Crunch** occurs when more bandwidth is needed and little exists without great cost to the user. Bandwidth providers try to get greater bandwidth from ordinary copper phone lines rather than laying new fiber optic cabling.

**Baseband** is a form of modulation in which signals are pulsed directly on the transmission medium without frequency division.

**Broadband** refers to any service for data or video that can carry bandwidths greater than 128 Kbps. It is more accurately used to describe services at greater than T-1 capacity.

**Broadband Video** defines the capability of the network to carry numerous channels of television via one medium, coaxial

or fiber optics. Fiber optics can carry up to 110 television channels 20 miles, while coaxial distances are much shorter. Citywide cable systems carry broadband video.

**Call Accounting** is a device generally consisting of a computer, storage device and a means of attachment to a phone system to record and report information and statistics regarding call activity on the phone system. It is generally used to provide information about call origination and reception within the telephone system.

**Carrier Sense Multiple Access/Collision Detection (CSMA/CD)** is a network control scheme. It is similar to a party line where a person "listens" to see if anyone else is using the line. A computer "listens" to see if another computer is "talking;" if there is silence, it can transmit. Collision Detection works when two machines try to "talk" at the same time resulting in a collision. If a collision is detected, each machine stops transmitting immediately and sends a "jamming" signal. They then wait a random amount of time and attempt to transmit again.

**Category 5 Cabling** is a type of unshielded twisted pair (UTP) copper cabling that meets industry standards for use with voice and data installations. The cable must produce test results that will provide data transmission rates of up to 100 Mbps.

**Centrex** refers to a suite of services that a local telephone company would offer to a business. It allows the business to use PBX-type services located at the company's central switching office (e.g., call forward, call park, and intercom). It also provides extensions so that per-call, local charges are incurred when one person calls another within the same organization but at a different site.

**Character Generator (CG)** is a device that presents graphical information (text and pictures) via presentation equipment (e.g., monitor or projector). Many times the CG is used as a bulletin board for information.

**Coaxial Cable** is composed of an insulated central conducting wire wrapped in another cylindrical conducting wire. It is usually wrapped in another layer and an outer protective layer and has the capacity to carry great quantities of information.

**CODEC (Coder/Decoder)** is a device that converts analog-based audio and video (as produced by microphone or camera) to a digital signal that can be sent across the street or around the world. A second CODEC is then required to return the digital signal to analog for speaker and or display device. Digital rates must match on each end of a connection.

**CATV – Community Antenna Television (Cable Television)** is a broadband transmission facility. It generally uses a 75-ohm coaxial cable, which simultaneously carries many frequency-divided TV channels.

**C.O. Trunks** (also called CO Lines) connect an office to a local telephone company's Central Office, which in turn connects to the nationwide telephone system.

**Compressed Video** makes it possible to transfer full motion video (such as that provided via broadcast television, which

requires 90 Mbps of information to establish the detail and motion elements of a picture). Video can be transferred via lower bandwidth circuits if the number of bits is reduced via a compression device such as a CODEC. Rates of 36 Mbps, 1.5 Mbps, 384 Kbps, 128 Kbps and 56 Kbps are typical.

**CPU (Central Processing Unit)** refers to the computing part of a computer, or its "brain." The CPU manipulates data and processes software or operator instructions.

**Direct Inward Dial (DID)** refers to the ability to ring from the outside a distinct telephone station inside an enterprise, without going through the telephone attendant.

**DNS (Domain Name Server or Domain Name System)** is a distributed database system for translating computer names. DNS allows one to use the Internet without remembering long lists of numbers.

**DS-0 (see also 56 Kbps)** is the bandwidth required for one voice conversation. It is 64 Kbps and is one of 24 channels in a DS-1, or T-1.

**DS-1** (see also T-1) is the near equivalent of a T-1 though it is generally not channelized into 64 Kbps sub-channels. A DS-1 consists of 1.544 Mbps of bandwidth and may be carried by public or private services on two pair of copper cables. It takes 24 DS-0s to make up one DS-1.

**DS-3** is a digital circuit available from the PSTN with a bandwidth of 45 Mbps or 28 DS-1 circuits. A DS-3 requires the use of fiber optics or microwave for transmission.

**DSU/CSU (Digital Service Unit - Channel Service Unit)** is used at both ends of a digital signal to filter, decode and equalize the digital signal to make it usable to the end user. Routers can be and are often used in place of a DSU/CSU at the customer location.

**Electronic mail**, or e-mail, refers to text messages that are written by one person and sent to another, whether one desk away or in another country. These messages are often stored on a central computer in an individual "mailbox" and can be retrieved when the specific user is logged on.

**Ethernet, Fast Ethernet, and Gigabit Ethernet** are types of local area networks (LAN) that transmit at speeds of up to one billion bits per second (1 Gigabit). Ethernet is the main local area network transport in use today. Variations include "normal" Ethernet at 10 Mbps, Fast Ethernet at 100 Mbps, and Gigabit Ethernet at 1000 Mbps.

**Fiber Optics (FO)** refers to a kind of cable that consists of multiple individual strands of glass fiber capable of carrying high-speed light pulses from one point to another. This cable comes in two types, single mode and multimode, each with its own unique place in communications. Single mode FO cable is typically used where long distances and very high speeds are required, while multimode is used for intra-building communications and places where lower bandwidths are required.

**Home Run** refers to a kind of cabling which is installed so that the individual cables run from each telephone, computer or video station directly back to the central equipment or switching location.

**Hub** is an electronic device through which data station connections are made to the network.

**IEEE (Institute of Electrical and Electronic Engineers)** is a publishing and standards-setting body responsible for many telecom and computing standards, including those standards used in LANs.

**IP Address**, an Internet-working term, is a 32-bit address used in routing. It includes a network address identifier assigned by a central authority and a Host ID (an end-station identifier assigned by the LAN administrator).

**ISDN (Integrated Services Digital Network)** is a transmission scheme that comes in two different capacities: 1) BRI (Basic Rate Interface), which equates to 128 Kbps of usable bandwidth, and 2) PRI, Primary Rate Interface, equivalent to a T1 (1.5436 Mbps). ISDN is divided into bearer (or B-channels) and data (or D-channels). In BRI, ISDN is composed of 2B+D; the two bearer channels are 64 Kbps used to carry user data or one voice conversation and one 16 Kbps for control and signaling information.

**ISP** stands for Internet Service Provider.

**“Last-mile”** is used to describe the final connection to a building, as differentiated from the high capacity circuits extending across a city or county. The connection from the cable television trunk cable to your house is considered a “last-mile” connection.

**Leased Line Services** are typically voice, video or data communications circuits provided by a telephone company or cable company and leased for a cost-per-month to a customer. Typical lease lines include 56 Kbps, ISDN BRI and PRI, T-1, and DS-3.

**LAN (Local Area Network)** is a network within a single building. Components include the cabling to connect systems; the various electronics to transmit, amplify and receive signals; and shared resources such as printers and servers. LANs may be broken into smaller components known as subnets.

**MAN (Metropolitan Area Network)** is generally defined as a network used to connect LANs together, usually within the limits of a campus, city or metropolitan area. This is generally a higher speed connection than a typical wide area network (WAN) and uses various access methods.

**Media** (singular: medium) refers to the various physical methods of carrying communications signals (e.g., fiber optics, copper cable, coaxial cable, and/or radio systems such as spread spectrum or microwave).

**Microwave Radio** refers to the electromagnetic waves used to transmit voice, data and video. Microwaves are generally

considered anything above the 890 MHz range to about 20 GHz. These are often used in city-to-city links where there is a line of sight and a length of less than 30 miles.

**Modem** (short for **Modulator/Demodulator**) is a device used to convert a computer-required digital signal to an analog signal that can be transmitted over the voice phone line (analog line), and vice-versa.

**Multimedia** refers to the interface of audio and video with digital technology for sending-receiving or storing-retrieving images, moving pictures or sound.

**NOS (Network Operating System)** is the software side of a LAN, or the program that controls the operation of a network.

**Pathway** is the defined vertical and horizontal area/route where a telecommunications cable is placed and protected from harm. A pathway may be a conduit, surface mold apparatus, or a ceiling or floor tray. Another term that may be used to describe a pathway is "raceway."

**PBX (Private Branch Exchange)** is a CPE device that the customer often owns, although some are leased. It makes it possible to serve many internal phone lines with relatively few outside phone lines. PBX owners can choose options they would like on their system, such as "ring again" or "call park/forward" rather than ordering them through the local phone company as in a Centrex system.

**Plenum Cable** is specifically designed for use in a plenum (the space above a suspended ceiling used to circulate air back to the general living or work space via the building heating or cooling system). Plenum-rated cable is far more fire-retardant than PVC cable.

**POTS (Plain Old Telephone System)** refers to an unenhanced telephone service with the ability to send and receive phone calls. Features like call-waiting and call-forward are available.

**Proprietary** implies the ability to work with only one vendor's telephone system, i.e., phones are "proprietary" to one phone system or one manufacturer.

**Protocol** is a procedure for adding order to the exchange of data. It is a specific set of rules, procedures or conventions relating to format and timing of data transmission between two devices.

**PVC** (polyvinyl chloride) is material that is generally used as a sheath in the manufacture of technology cabling.

**Raceway** is the metal or plastic channel used for loosely holding electrical and telephone wires in buildings. It is usually located in the floor and is encased on three or four sides by concrete.

**RAM** (Random Access Memory) is the primary memory in a computer.

**RF (Radio Frequency)** refers to the electromagnetic waves operating between 10 KHz and 3 MHz propagated without guide (wire or cable) in free space.

**RGB Video** describes a color model based on the mixing of red, green, and blue – the primary additive colors used by color monitor displays and TVs. Typically these colors are merged together as a composite signal, but for maximum quality and computer applications the signals are segregated.

**Right-of-Way** (plural: Rights-of-Way) refers to a designated space alongside a street or other access (such as a railroad line). An entity wishing to install fiber optic cable between various sites/locations must first obtain the rights to a path along those routes. As the cable may be installed underground or on poles, right-of-way access may be granted by a city, a private landowner or the owner of poles such a cable company, a telephone company or power company. Cities typically require written permits – usually for a fee.

**Single-Mode Fiber** is fiber optic cable designed to carry only the single wavelength selected for transmission.

**SONET (Synchronous Optical NETWORK)** is an optical network used to transport many unique digital signals (ATM, T1, etc.) over the same optical carrier. Its physical interface is the OC (Optical Carrier), which has a base rate of OC-1 (or 51.84 Mbps), and continues to as high as the theoretical limit of 13 Gbps; however, OC-48 (2.5 Gbps) is the current limit.

**Spread Spectrum** is used to mix an analog signal with “noise” and spread it out over a broad FM frequency range in order to provide a secure transmission of information in a wireless environment. Anyone attempting to “listen in” would only hear unintelligible bits.

**S-Video** refers to a type of video signal used in Hi8, S-VHS, and some laserdisc formats. It transmits luminous and color portions separately using multiple wires. S-video avoids composite video encoding, such as NTSC and the resulting loss of picture quality.

**Switched Ethernet** segments a network using a “switching” function similar to that of a bridge. Segmented networks have fewer collision problems, thereby increasing performance.

**T-1 (DS-1)**, the T-1 standard, has a speed of 1.544 Mbps in the United States. The T-1 standard has carried over to data networking from the voice arena where it was used to describe a carrier that could carry 24 voice conversations over a clear channel (64 Kbps, DS-0).

**TCP/IP Protocol (Transmission Control Protocol/Internet Program)** is a set of protocols developed by the Department of Defense to link dissimilar computers across many kinds of networks, including unreliable ones and those connected to dissimilar LANs.

**Token Ring** is a local area network topology developed by IBM for physical medium access. It uses a ring (logical or physical) to pass a "token" around to each individual device within the ring to determine whether it has information to pass to another device.

**Transceiver** is a communications device capable of sending and receiving information.

**Trunk** is a communication line between two switching systems, which typically include equipment in a central office (the telephone company) and PBXs.

**Unified Messaging** generally refers to a system or group of systems that bring the various forms of messaging (voice mail, facsimile, e-mail) to one point of retrieval for the end user.

**UPS** (Uninterruptible Power Supply) is a device that provides a steady source of electric energy to a piece of equipment, thereby enabling electronic systems to function despite periodic commercial power spikes, brownouts or failures.

**UTP** is a type of copper cable in which individual copper wires are twisted together to form pairs, and multiple pairs are held under a sheath to form the cable.

**Video Headend** is the originating point of a signal in TV cable distribution systems. Video editing and other electronic equipment are generally found at the "headend."

**Video Streaming** makes it possible to transport high quality video and audio efficiently over broadband networks, optimizing bandwidth and enabling video services and applications via an organization-wide computer network.

**Voice Mail** is the equivalent of electronic mail in audio. A user is assigned a "mailbox" on a system along with a user ID and password. Users are either prompted through a Message Waiting Indicator on the phone or by dialing into the voice mail system and are greeted by the system that they have messages waiting.

**WAN (Wide Area Network)** is used to extend LAN connectivity beyond a city or county, usually through common carrier facilities at either 1.544-Mbps or 56-Kbps. Typical technologies used are frame relay, X.25, and ISDN.

**Wireless** describes a means of sending signals (voice, video or data) "over the air" rather than using cables. To date, wireless bandwidth rates (capacities) are significantly lower than wire rates. There are significant new developments in wireless, many of which will come to market in 2002 and beyond. Some wireless systems are designed to allow the user to move about ("roam") while still connected, but in these cases the bandwidth is minimal. Thus, the transmission rate for today's wireless phones that can access the Internet is 14.4 Kbps (considerably slower than a wired modem at 56 Kbps).



## Endnotes

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- [3] City of Irving, Texas, *1999-2000 Annual Operating Budget* (Irving, Texas, October 1, 1999), pp. 315-316.
- [4] City of Irving, Texas, *1999-2000 Annual Operating Budget*, p. 2.
- [5] Interview with Pat Nicks, cable services manager, Irving Community Television Network, Irving, Texas, March 2, 2001.
- [6] City of Irving, Texas, *1999-2000 Annual Operating Budget*, pp. 29, 52-59.
- [7] University of Texas, *E-Government Services and Computer and Internet Use in Texas* (Austin, Texas, June 2000), p. 7 ([http://www.utexas.edu/research/tipi/Reports/dir\\_final2.htm](http://www.utexas.edu/research/tipi/Reports/dir_final2.htm)). (Internet document.)
- [8] Interview with Lynda Johnson, process improvement supervisor, City of Irving, Irving, Texas, March 8, 2001.
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- [10] An open technology system allows for the use of compatible products from varying vendors. Its opposite is a proprietary system, in which only the products of one vendor can be used.
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- [12] City of Irving, Texas, *1999-2000 Annual Operating Budget*, pp. 121-5.
- [13] V.T.C.A., Texas Government Code §51.921.
- [14] City of Irving, Texas, *1999-2000 Annual Operating Budget*, p. 53.
- [15] Interviews with David Galvan, Court Services director; Wayne Lambert, Court Services supervisor; and Steve Hollabaugh, Court specialist, City of Irving, Texas, August 22, 2000.
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- [17] Interview with Steve Hollabaugh.
- [18] Interviews with David Galvan, Wayne Lambert and Steve Hollabaugh.
- [19] City of Irving, Texas, *Five-Year Technology Plan, 1999-2000* (Irving, Texas, August 2000).
- [20] Interviews with David Galvan, Wayne Lambert and Steve Hollabaugh.
- [21] Interview with Bob Bereiter, Wisconsin State Patrol captain, District II, Waukesha, Wisconsin, November 20, 2000.
- [22] V.T.C.A., Local Government Code §133.002.
- [23] Telephone interview with Joyce Leiser, director of Emerging Markets, US Wireless Data, Dallas, Texas, December 12, 2000.
- [24] Interview with Bob Bereiter.
- [25] Interview with David Galvan, Wayne Lambert and Steve Hollabaugh.
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- [27] Los Angeles County, California Web page (<http://www.lasuperiorcourt.org>). (Internet document.)
- [28] Interview with David Galvan, Wayne Lambert and Steve Hollabaugh.

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- [34] City of Irving, Texas, *1999-2000 Annual Operating Budget*, p. 107.
- [35] City of Irving, Texas, *1999-2000 Annual Operating Budget*, p. 109.
- [36] City of Irving, Texas, *1999-2000 Annual Operating Budget*, p. 133.
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- [47] Phone interview with Chris Allen, Financial Consultant, Public Financial Management, Austin, Texas, May 22, 2001.
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