



# **ESRI's ArcIMS<sup>®</sup>—GIS for Information Technology Departments**

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# ESRI's ArcIMS—GIS for Information Technology Departments

## **Making Business Better**

For the past three decades, the ESRI® geographic information system (GIS) software has been changing the way organizations conduct business. It is no surprise that most government organizations and businesses use GIS technology to unlock the location component of their data.

Most organizations' databases already contain a geographic component to their data. Information that organizations use includes customer street addresses or postal codes; customer product registration information; locations of stores, factories, and warehouses; the address, cross street, or geographic coordinates of equipment such as telephone poles and electric transformers; and routes for deliveries. ESRI's GIS software unlocks this location-based information and makes it available for organizations to use in their day-to-day operations.

Using location-based data and looking at it on a map has helped both private businesses and public organizations realize cost savings and a return on investment that would have been difficult to realize using another kind of technology.

One example is Sears, Roebuck and Company. Since implementing a GIS that includes the ability to schedule and route delivery trucks, Sears has been able to consolidate its 46 regional home delivery service centers into 12. Each vehicle makes as many as three more stops per day, allowing Sears to minimize third-party carrier costs even when delivery orders have gone up. Most important, the company's on-time performance has gone from 78 percent to more than 90 percent, and customer satisfaction rates have increased from 84.7 percent to 87.4 percent.

Crown American Properties, LP, owns, operates, and develops regional shopping malls in Pennsylvania, Maryland, West Virginia, Virginia, New Jersey, Tennessee, North Carolina, and Georgia. With a combined gross leasable area of approximately 16 million square feet, securing tenants to fill vacancies and keeping them are both high priorities. By implementing an ESRI GIS solution, Crown American was able to save the cost of hiring outside analysts. Moreover, Crown American was able to quickly provide their clients with accurate reports and detailed maps of many market areas.

GIS also helps government run more efficiently. Citrus County, Florida, found \$200 million in unrecorded property improvements and building additions by using GIS to look at changes in property improvements. This enabled the County to adjust 5 percent of the tax base. The City of Lincoln, Nebraska, was able to reduce crime in target neighborhoods by 67 percent in only seven weeks. Western Australia was able to

## GIS Over the Internet

save more than \$300,000 on the cost of land for a new fire station by modeling loss and response time for different parcels.

The Internet is a viable solution for organizations to centralize the maintenance of services and data. Using the Internet, software can be easily updated, and users can gain access to the applications and information they need for their specific tasks.

As businesses have found, the Internet does not change the nature of an application or its usefulness. The Internet delivers the application online and makes it available to more users. Now ESRI makes it easy for businesses to disseminate GIS data and applications over the Internet, making it more cost-effective and easily managed than ever before.

ESRI is investing heavily in the Internet in two areas, serverside GIS and client/browser connections, specifically through ArcIMS®, the ArcGIS™ desktop and browser interfaces.

ESRI's ArcIMS is an Internet GIS server that provides many services including mapping, geocoding, data streaming, and data download. It is a scalable, open platform that houses a whole family of GIS services that are appropriate for server-centric geoprocessing applications. The services of ArcIMS are available through a series of clients, the simplest of which are HTML browsers. Also, ESRI has developed ArcExplorer™, an Internet GIS data browser that can be downloaded for free from the ESRI Web site. There is also a version of ArcExplorer written in Java that is disseminated for free as part of the ArcIMS technology. It can view, display, and analyze both local data as well as data hosted at one or more ArcIMS Web site.

ESRI's professional GIS, ArcInfo™, and its popular desktop software, ArcView® GIS, can both access directly ArcIMS-based map image services as well as data streaming services. This allows GIS users to share their data with others using ArcIMS.

Other clientside applications to this network include integration with wireless mobile Internet mapping technologies, such as ESRI's ArcPad™ software, for mobile GIS and location services. ArcPad uses Wireless Application Protocol (WAP), the standard for providing Internet communications and advanced telephony services to phones, pagers, personal digital assistants, and other wireless terminals, to send and receive mapping and GIS data. ArcPad is an easy-to-use, lightweight, low-cost solution for mobile mapping and GIS. ArcPad enhances portable touch screen computers with intuitive mapping, GIS, and global positioning system functionality. It makes field data collection fast and easy, improves data accuracy, and provides immediate data availability and validation.

## ArcIMS in Action

### HUD E-MAPS

The U.S. Department of Housing and Urban Development (HUD) offers online environmental maps (E-MAPS). Powered by ArcIMS, this Internet site provides public access to health and safety information about local communities nationwide. Visit <http://hudemaps.esri.com> to see up-to-date data sets from community planning and development, multifamily housing, brownfields tax incentive zones, and public housing. This site also contains Environmental Protection Agency (EPA) environmental data such as discharges to water, hazardous waste generators, Superfund sites, and toxic release

sites. These maps can be scaled down from a full region, all the way to the neighborhood level.

The site also provides capabilities to link directly to additional data on EPA points and to run reports on congressional district, tract, or county-allocated program dollars by HUD. The E-MAPS site can map census data and overlay HUD and EPA data. Very easy to use, this site is powerful enough to meet the demanding needs of the HUD user community.

The HUD E-MAPS viewer gives users many easy-to-use options to assist in creating a map. Map "layers" of HUD or EPA data can be turned on and off by clicking on the list to the right of the map. Users can also pan in any direction and zoom in or zoom out to change the view.

For example, if the map of the Washington, D.C., area is being viewed, layers can be turned off and on by using the on-screen tools. Features can be selected and displayed in table format, as well. Maps can be created by finding a map of the selected area or by entering a street address.

HUD E-MAPS have been created to assist the general public in finding important HUD and EPA information about communities across the nation. This service promises to bring information to those who need it easily, and the program is looking into offering additional services in the future.

## **The Geography Network for Easy Online Publishing**

As easy as HUD has made finding data for environmental factors in the United States, ESRI's Geography Network<sup>SM</sup> makes publishing and sharing data, maps, and services just as easy for GIS users. The Geography Network is a collaborative and multiparticipant system for publishing, sharing, and using digital geographic information on the Internet.

Organizations that wish to publish data or provide mapping or geoservices can start by making their data available on the Web and "referencing" their data or services in the online metadata catalog at <http://www.geographynetwork.com>. There are three types of sites that may be referenced at the Geography Network.

- GIS sites that have data, mapping, or other geoservices to offer
- Geographic data catalogs describing available holdings
- Geographic data files (FTP sites)

The Geography Network, working with the U.S. Federal Government Data Committee (FGDC), has registered and directly integrates the several hundred existing geographic data catalogs around the world. Anyone can search or browse the Geography Network catalog, find the data or service they desire, and go directly to the site or sites that offer this information.

The Geography Network can be thought of as a large online library of distributed GIS information available to everyone. It has been designed to adhere to open standards for the dissemination and sharing of data and services. Professional users can connect to the Geography Network and directly use the data and application services provided by other

participants. Data can be shared and integrated using a wide spectrum of simple to advanced GIS and visualization software technologies. GIS browser software on the Geography Network allows users to freely visualize, query, and analyze data. GIS software can also be used to connect one or more sites at the same time and, using the techniques of digital map overlay and visualization, users can simultaneously combine and analyze many types of data from different sources.

Many businesses use the Geography Network for sharing and publishing their information. They find the Geography Network an Internet marketplace where users can search and preview information and a commerce engine that both supports online transactions and manages subscription access. As industry moves closer to the integration between the Internet and the desktop, the Geography Network provides a direct link between the user and service providers offering maps, value-added data, and industry-specific applications and solutions.

TrafficStation, Inc., is one example of a successful enterprise that is taking advantage of the Geography Network to provide content to those who need it. TrafficStation is dedicated to providing relevant, accurate, and timely traffic and traveler information and related content in one seamless service that includes the Internet, digital television, pagers, wireless handheld devices, and in-vehicle systems.

TrafficStation strives to make traffic and other mobile information and content services as easy to use as possible. Today, TrafficStation serves images of recent traffic incidents for several metropolitan areas in the United States over the Geography Network. The traffic data is updated every five minutes based on reports provided by a variety of local sources.

Many governments, including national, state, and local agencies, use the Geography Network to build GIS systems for their communities and constituents to access and use their information and services. The Geography Network helps the business of government, providing a framework for disseminating applications on land ownership, land use, and planning initiatives. Local governments are finding that the Geography Network encourages planning, developing, and maintaining geographic information, as well as enabling data sharing with other agencies and citizens. The U.S. federal government finds that by participating in the Geography Network, governments demonstrate support for the National Spatial Data Infrastructure (NSDI), the Geographic Spatial Data Infrastructure (GSDI), and other such collaborative interagency initiatives.

The New Jersey Office of GIS has published maps for Hunterdon County and the State of New Jersey including basemaps and maps of open spaces. The New Jersey Office of GIS works toward organizing the use of digital geographic information to implement priority initiatives by ensuring a coordinated network of GIS capacity across the State. These coordination efforts are attained by helping New Jersey organizations work together to develop, maintain, and share State-wide geographic data sets and knowledge to improve efficiency in government and to maintain the wise use of GIS technology as a decision-support tool.



## ArcIMS for Information Technology Departments

Organizations, professionals, and citizens will be able to freely access, browse, and integrate all this information for hundreds of practical applications including education. For example, the National Geographic Society uses information on the Geography Network to create new ways for children to explore geography. In addition, the Associated Press accesses the network to provide the world's news media with maps and visualization on specific stories happening at various locations.

Using ArcIMS over the Internet to disseminate GIS applications and data allows businesses to consolidate the GIS software and data in one centralized place such as an information technology (IT) department. ArcIMS is a smart choice for IT departments. It is based on standard software and data standards and is easily incorporated with existing software applications and protocols. With ArcIMS, IT departments can provide an organization's users with the best possible service by

- **Controlling Data:** Providing GIS data over the Internet using ESRI's family of products, including ArcIMS, means data can be maintained and updated in a centralized location. Access can be regulated and redundancy eliminated.
- **Providing Inexpensive and Easy Client-End Software:** Providing GIS applications over the Internet using ArcIMS means the end user needs nothing more than a standard Web browser. Installing and updating client software applications to many users in an organization can be eliminated.
- **Providing More Services:** ArcIMS makes it easy to provide services for more users because the applications are centrally located.

ArcIMS changes the way users access and interact with Internet mapping and GIS data at their desktops and makes the promise of distributed GIS a reality. ESRI views the Internet as a fundamental platform for GIS. The software architecture envisions ArcIMS as the server managing and disseminating GIS data to various clients including HTML viewers, ArcExplorer, ArcPad, and ArcInfo/ArcView desktops.

## ArcIMS—A Smart Choice for Information Technology Departments

As the size of Internet bandwidth increases, the ability to disseminate spatial information across the Internet will increase as well. ArcIMS is ESRI's first product that allows users to connect their location-based data sets with the Internet and provide them to other users. ArcIMS can deliver data using three means: sending an image map, downloading location-based data sets, and streaming individual features.

ESRI's ArcIMS is built on a scalable high-performance platform for deploying enterprisewide location-based visualization and analysis tools. ArcIMS can be used across any organization, no matter the size or industry. It can easily be integrated with any existing database management system (DBMS), the Internet, and enterprise resource planning software.

ESRI's ArcIMS software conforms to industry location data standards to ensure the most return on investment.

- **Standard Data Types**—ArcIMS is the only Web mapping solution that leverages your existing investments in GIS data. ArcIMS supports industry-standard GIS formats including ESRI shapefiles, ArcInfo coverages, Spatial Database Engine™ (SDE®) layers, DWG, DXF, DGN, and a variety of graphic images. There is no need to convert data to a proprietary format, so you can immediately Web-enable GIS data.
- **Integrates Local and Internet Data**—One of the key features of ArcIMS is integration of geographic data from many sources for display on your desktop. ArcIMS can simultaneously access Web data, local shapefiles, SDE layers, and images, putting a world's worth of information on your desktop.
- **Wealth of Available Clients**—ArcIMS supports streaming vector data to a client ArcIMS Web browser, resulting in true client/server processing capabilities with ArcIMS working against locally streamed data. You can choose from a variety of ready-to-use template applications or customize ArcIMS clients using Microsoft's Visual Basic Script or Sun Microsystem's JavaScript. ArcIMS also serves data to ESRI's popular client software including the professional GIS, ArcInfo; ESRI's popular desktop package, ArcView; clients created using MapObjects; mobile applications using ArcPad; and even to ESRI's free geographic data viewer, ArcExplorer.
- **Highly Scalable**—As the needs of your clients change, ArcIMS changes with you, allowing you to serve geographic data through single or multiple servers. This provides for a highly efficient and scalable environment.
- **Easy to Customize**—Simple and easy to implement, ArcIMS allows businesses to create custom applications quickly for a variety of clients.
- **Multiplatform**—ArcIMS runs on Windows NT 4.0 Intel and the Sun Solaris operating systems. Supported Web servers include Netscape Enterprise, iPlanet Web server, the Microsoft Internet Information Server, Apache servers, and IBM HTTP Web servers. With this broad spectrum of supported platforms, organizations find it easy to integrate ArcIMS with their existing infrastructure.
- **Easy to Install**—Simple instructions guide users through the steps of authoring and publishing maps. The easy-to-use ArcIMS Manager is a suite of Web pages that provides access to all ArcIMS functions and tools. Through ArcIMS Manager, the Internet services can be quickly set up and administered. For more advanced users, client and server configuration and management tools are available for developing secure, reliable, and highly scalable sites.
- **Serve Data the Way You Want**—Delivered using HTML or Java, ArcIMS gets the best data and services to those who need it.

- **Comes with Standard Sample Applications**—These can be used right out of the box, or users can develop their own.
- **Feature Streaming**—This allows for the binary streaming of location data, particularly vector data, from a database, such as a shapefile, across the Internet directly into intelligent clients that then use the vector data directly in the application.
- **Create Map Notes (redlining)**—Users can create notes on the maps for streamlined editing.
- **Link to the Geography Network**—ArcIMS is the first client available to connect your business to a world of data. The Geography Network delivers GIS content and functionality to users over the Internet.
- **The Best Cartography on the Web Today**—The highest quality cartographic rendering is offered through ArcIMS. Streamed vector data allows for a better looking on-screen display. In addition, advanced techniques, such as antialiasing, also improve the quality of raster maps.

ESRI's insistence on industry standards has always made sense for organizations looking to add a GIS. Now, using the Internet to deliver software services and data, ESRI makes it even easier for businesses to make GIS technology accessible all over their organization.

## Internet GIS— Making a Difference

User Success—  
Southern California  
Gas Company

For organizations that employ legions of mobile service technicians, using computers to automate the complex sequencing of their routes can boost productivity tremendously. For large operations, the difference between a poorly planned route and a well-planned one can be measured in millions of dollars. GIS analysis of transportation networks, coupled with Intranet access to the information, has allowed many service organizations to fully realize those benefits.

*Glad to Be of Service*

Southern California Gas Company (SoCalGas) Los Angeles, California, is the largest distributor of natural gas in the United States, serving more than 17 million people through some 45,000 miles of distribution and transmission pipelines.

Unlike telephone or electronic service, which can be switched on and off from a central location, the nature of gas service dictates that technicians must go where it is being delivered. Over 1,000 of the company's more than 7,000 employees work as customer service technicians.

For this reason, managers use the latest information technology to do the best job possible in keeping the field work organized.

### *Where It All Starts*

The standard way for customers to request service is to telephone SoCalGas. To better serve its busy customers, the company recently added a new way to schedule a service visit: the World Wide Web. By logging on to the SoCalGas Web site at [www.socalgas.com](http://www.socalgas.com), customers can now submit their requests online, at any time of day or night.

SoCalGas receives thousands of requests for service each day—requests to have the gas turned on when someone moves into a new home or business or turned off when someone moves out, requests for gas appliance repairs and adjustments, and even requests to have pilots lit.

SoCalGas operates 52 service facilities in five regions. Each of these facilities employs anywhere from 20 to 50 service technicians, and each technician handles between 20 and 60 service calls per day. With this many people on the road, the company wants its routes to be as efficient as possible.

### *The Magic of Automated Routing*

The service requests are stored as database records in a mainframe information system called PACER. SoCalGas employees, known as routers, group these service orders into routes and download them to the Geographic Routing and Integrated Dispatch (GRID) system. Each service order includes the type of job, the address of the home or business requiring service, and the estimated amount of time required to do the work.

A computer model of streets covering the company's entire service area is stored in the GRID system. Using ESRI software technology, the GRID application considers all the stops on each technician's route and arranges them in the best visiting order. Sophisticated software algorithms take into account everything about the street network that will affect the route planning such as one-way streets and speed limits.

Once all the stops that have been assigned to a technician are sequenced, the service orders are downloaded to handheld computers for the next day and also converted to shapefile paths. These are automatically served over the company's Intranet using ESRI technology.

### *The Map Interface*

The finished routes for each service technician can be displayed as different colored paths on a street map. Once the route maps have been put online via the Internet, the routers will be able to check the work in their Web browsers to make sure it makes logical sense. If anything seems amiss, the router can change it and reload the Web page to see the update. In fact, the ability to get to the route information using only a Web browser and no additional GIS software will make it much easier for all levels of SoCalGas administration to understand the routing function.

### *User Success— Cabarrus County, North Carolina*

County government agencies in the United States maintain information about local lands (such as ownership, property values, and taxes due) that they are required to make publicly available. In most counties, if you need to know something about a specific parcel of land, you visit the county offices and ask a busy employee to look it up for you. Thanks to the Internet, however, that routine is beginning to change.

### *Cabarrus County*

Cabarrus County, North Carolina, first launched its Web site ([www.co.cabarrus.nc.us](http://www.co.cabarrus.nc.us)) in 1996, with the idea of making the more frequently requested public information available. Since people liked it, the government quickly developed a truly interactive site that allowed taxpayers to connect with their elected officials and tax-funded agencies. The County gained the benefit of publishing information such as the building code, data on the Board of Commissioners, parks and recreation schedules, employment opportunities, and the like. With this success, when the tax assessor's office wanted local residents to have an easy way to access parcel and tax data, publishing the parcel maps on the Web was the most logical step.

### Querying the Parcel Database

The County created a Web-based application that provided both internal access to government employees (through an Intranet) and external access to all of the County. The simple interface allows either exact queries or general map searches. Users who know the exact address or parcel identification (ID) number can enter it and go directly to the map and table for that parcel, or they can use zoom and pan tools to locate parcels for which they may not have an address or ID number.

Once a unique parcel has been selected, the application displays a map of the immediate area, with the selected parcel outlined in green.

### Getting Results

Choosing the Describe option and pointing to the parcel then brings up a complete table of information about the land in question, including the owner's name, its tax value, the last price the parcel was sold for, how it is zoned, what school district it is in, and so forth.

Real estate agents who used to visit the County offices to research a certain property can now access the same information for as many properties as they want, 24 hours a day, seven days a week.

### **ESRI—A Company You Can Rely On**

For more than 30 years, ESRI has maintained its role as world leader in GIS based on its commitment to research and development of cutting-edge technologies. In the 1990s ESRI was the first to launch GIS on the Web. Consistently, ESRI has proven the value of using GIS technology to make better decisions. Now ESRI wants to empower you to use Internet mapping as a powerful service on the Web.