



Getting Your Apple Internet Server Online

A Guide to Providing Internet Services

Apple Computer, Inc.

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About Apple's Internet Server

The Apple® Internet Server is an Apple Workgroup Server with a bundle of proven and powerful Internet software—the Apple Internet Server Solution for the World Wide Web. This is a complete Mac™ OS–based hardware and software platform that allows you to deliver a wide range of Internet services quickly and easily. There are numerous uses for an Apple Internet Server, from providing intracompany communications to setting up an independent web business. This guide will help get you started.

About this guide

This guide is based on the real-life experiences of Open Door Networks, Inc., a Mac™ OS-based Internet service provider headquartered in Ashland, Oregon. The guide was co-authored by Apple Computer and by Open Door founder Alan B. Oppenheimer. A long-time Apple engineer and software architect, Alan played a key role in the development of the AppleTalk® protocol stack, the Apple Internet Router, and Apple Remote Access.

Using Open Door's experience as a model, this guide takes you step by step through the procedures necessary to get the most from your Internet server investment. The topics covered include

- Choosing an Internet service provider
- Choosing and registering a domain name
- Making the physical connection
- Choosing Internet services
- Adding to your basic system
- Setting up and supervising your server
- Adding advanced services
- Running your server as a business

A tremendous amount of additional information is available, much of it on the Internet itself. Sidebars accompanying each topic section direct you to Internet addresses where you can find more detail.

Choosing an Internet provider

The Internet provider you choose will depend on your location, on the volume of traffic your server must handle and, finally, on whether you plan to resell access yourself. To make an informed provider choice, it is important to understand the underlying structure of the Internet, which is much like a standard distribution system, with the equivalent of wholesalers, distributors, and retailers. The wholesalers are the backbone providers, which in the United States include MCI, Sprint, ANS, UUNet, PSI, and AGIS/Net99. Each backbone provider maintains its own backbone network, and all meet at various points to form the Internet backbone. Individual organizations can contract with these providers directly (just as large businesses can buy wholesale), but such connections are usually quite expensive.

The distributors in the system are sometimes called network service providers (NSPs). NSPs purchase Internet access from a backbone provider and then resell it—sometimes to end users, but more often to internet service providers (ISPs), the retailers in the Internet distribution system. Individuals can sign up with an ISP to access the Internet and to create their own Internet presence. The hierarchy is in

Here are some provider leads you may find helpful:

Providers of Commercial Internet Access (POCIA):

<http://www.celestin.com/>

The List: <http://thelist.com/>

MCI: <http://www.mci.com>

Sprint: <http://www.sprint.com>

ANS: <http://www.ans.net/>

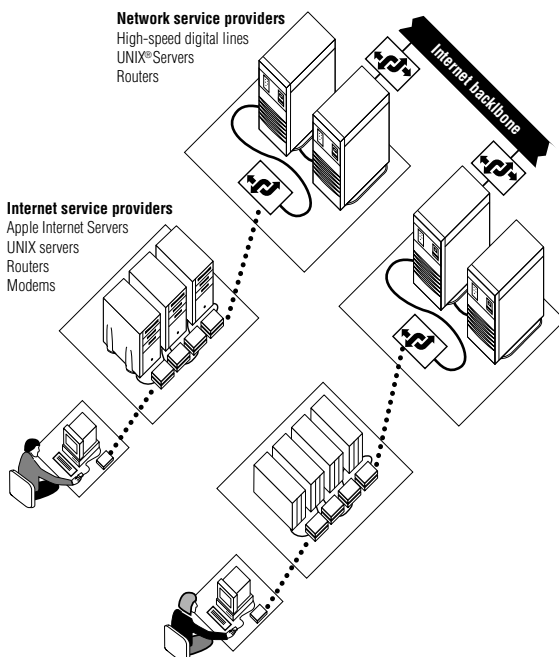
UUNet: <http://www.alter.net/>

PSI: <http://www.psi.net/>

AGIS: <http://www.agis.net/>

US Network Service Providers Interconnections:

<http://www.cerf.net/cerfnet/about/interconnects.html>



For more on registration requirements, see:

RFC 1591, "Domain Name System Structure and Delegation," J. Postel, March 1994: <http://info.internet.isi.edu:80/in-notes/rfc/files/rfc1591.txt>

RFC 1480, "The Domain Name System and the US Domain." A. Cooper & J. Postel, June 1993: <http://info.internet.isi.edu:80/in-notes/rfc/files/rfc1480.txt>

InterNIC registration services: <http://rs.internic.net/rs-internic.html>

General DNS information: <http://www.freedonia.com/ism/dns/dns.html>

the illustration below:

If you are setting up a single Internet server, you will almost certainly want to work with a local ISP. If, however, your system is elaborate, or if you are planning to provide ISP services yourself, you should explore contracting with an NSP or even contracting directly with a backbone provider. The investment will be larger, but the speed and reliability of access are considerably greater—important considerations if you are going to resell the service or if you anticipate that your server load will be very high.

Before making a final decision on an Internet provider, consider all of the following:

- Cost, both for initial setup and ongoing fees.
- Reliability. Be sure to check references.
- Mac OS savviness. Don't just ask providers if they support Mac OS-based computers. Probe their knowledge. Ask them about the Mac OS computers they have at their site. Talk to some of their Mac OS customers.
- Speed of the provider's connection to the Internet, and how the provider connects into the Internet.
- Connection types and speeds supported.
- Redundancy. Does the provider have multiple connections to the Internet?
- Services provided. There are some specific Internet services you may want to get from your provider, such as DNS and netnews.
- Length of time in business.

If you are going to act as an ISP yourself, you must also make sure that your provider allows resale of your incoming connection.

Choosing and registering a domain name

Every computer on the Internet is uniquely identified by a numerical Internet Protocol (IP) address. A domain name is a human-readable title assigned to a specific IP address. Like IP addresses themselves, domain names are hierarchically structured to pinpoint an exact location on the Internet. Domain names must end with a top-level domain (TLD) extension, indicating which of the major Internet divisions holds the address. In the United States, the principal TLD extensions are as follows:

- .com Companies and other commercial entities
- .edu Four-year colleges and universities
- .net Network service providers.
- .org Nonprofit, nongovernmental organizations
- .gov Agencies of the U.S. government
- .mil Agencies of the U.S. military

Any organization can use a country domain as an alternative to the standard TLD. Country domains are usually denoted by two-letter abbreviations of the country name—“.us,” for example, for the United States, and “.ca” for Canada.

The .us domain provides for the registration of various entities on the basis of political geography, following a hierarchy of <entity-name>.<locality>.<state-code>.us—for example, apple.cupertino.ca.us. In addition, branches of the domain are provided within each state for schools (.k12), community colleges (.cc), technical schools (.tec), state government agencies (.state), councils of governments (.cog), libraries (.lib), museums (.mus), and several other generic types of entities.

Other than the required extension, and any necessary branches of that extension, a domain name can consist of any combination of letters, numbers and hyphens within a 24-character limit. In addition, your domain name may not include a trademark you do not own, and your domain name may not already be in use. Most

organizations make their company name the core of the domain name—apple.com, for example—which maximizes recognition and avoids trademark conflicts.

Domain name registration is maintained by the InterNIC (NIC stands for *Network Information Center*), which is a sort of central clearinghouse for Internet regulation. Before you submit your registration application, you should check to make sure your proposed name is available. Your service provider may be able to check for you, but you can also contact the InterNIC yourself. If the name is not registered, it is probably available, although it is always possible that someone else's registration application for the same name is in progress.

If you want to register and maintain your domain name yourself, you'll need to have your own domain name server, plus access to a secondary domain name server. It is often possible to have your Internet provider register and maintain your domain name, and this is the easiest way to get started.

Once your domain name is registered, you can use it to assign human-readable names to your various Internet services. E-mail accounts are usually set up using just the domain name itself; for instance, info@apple.com. Other services are usually set up as subdomains within your primary domain. Apple Computer, for example, maintains the subdomains www.apple.com and ftp.apple.com. Further levels of subdomains can be created down to a single computer within an organization. These subdomains are created through your domain name server.

Making the physical connection

Once you have chosen an Internet provider, you must establish a permanent, physical link between your site and the provider's. Although there are numerous options, your actual choices depend on your physical location and on the types of connections supported by your Internet provider. Be sure to talk with your provider before choosing a connection method. Often your provider will handle much of the installation for you.

Choosing a router

The connection between sites is maintained by Internet Protocol routers. (Routers, often called *gateways*, are devices that connect networks together.) The Internet Protocol is the language of the Internet, so all IP routers must “speak” that language. An IP router at your site connects to an IP router maintained by your Internet provider. That second router, in turn, connects to the Internet itself.

In some cases, your Internet provider will include a preconfigured router as part of its services. If so, it is almost always a good idea to use it. If, however, you need to purchase a router, be sure it meets the following criteria:

- It must route IP.
- It must support physical connectivity both to your network and to your supplier's network.
- It must be compatible with your service provider's router.

A software-upgradable router is almost always preferable. Technology progresses rapidly, and being able to upgrade through software helps protect your investment.

Finally, a router that supports Mac OS–based administration and monitoring will simplify configuration and maintenance and also provide a better fit for a Mac OS site.

In addition to the router itself, you will often need a device called a *CSU/DSU* (channel service unit / data service unit) to connect your router to the high-speed line you have had installed through your phone company, as discussed in the next section. The CSU/DSU is essentially just a box that converts from one type of signaling to another. It is usually connected to the router through a V.35 or X.21 cable. You will often acquire your router and CSU/DSU from the same place, at the same time. The CSU/DSU plugs into the router on one side and your high-speed line on the other. The router plugs into the CSU/DSU on one side and your network

You can learn more about connection methods by checking the following resources:

Compatible Systems: <http://www.compatible.com/>

Farallon: <http://www.farallon.com/>

Tribe Computer Works: <http://www.tribe.com/>

Cisco Systems: <http://www.cisco.com/>

ISDN info: <http://alumni.caltech.edu/~dank/isdn/>

Frame relay info: <http://www.mot.com/MIMS/ISG/tech/framerelay/resources.html>

Frame relay FAQ: <http://www.etinc.com/frfaq.htm>

(usually Ethernet) on the other. Note that ISDN- and modem-based routers do not need a CSU/DSU.

Choosing a connectivity method

There are a number of major connectivity options. Which one is right for you depends on availability, performance, and price. All options must be ordered through your local telephone company, and may take as long as six months to obtain.

- A direct digital line, also known as a leased line, is essentially a direct connection between you and your provider that is reserved for your exclusive use. Speeds and network terminology vary from country to country due to differing telecommunications standards. In the U.S., digital lines can run at speeds from 56 Kbit per second to 45 Mbit per second. European speeds range from 64 Kbit to 34 Mbit per second. A 45-Mbit line is called a T3 line. Perhaps the most common speed is 1.5 Mbit per second. Lines of this speed are called T1 lines. The European 34-Mbit line is referred to as an E3 line; European E1 lines run at 2.048 Mbit per second. The cost of a digital line is based on both its speed and the distance between you and your provider.
- A frame-relay line is a digital line between your site and your local telephone company's central office (CO). From the CO, it goes into your phone company's frame-relay network. Your provider is connected to the same frame-relay network through its local CO. The advantage of a frame-relay network is that you pay only for the connection from your site to your local CO. In addition, your provider can receive a number of different connections through one physical link, making them more economical and easier to manage. Frame-relay lines, which can run at the same speeds as direct digital lines, are almost always more economical than direct lines.
- An ISDN link consists of two 64-Kbit channels, which can be aggregated together by the router to look like one 128K link. ISDN service is now widely available, but the price varies widely as well. Be sure to check the price carefully before choosing ISDN, or you could end up with an unexpectedly high phone bill. Some new routers support "dial-on-demand," which means they bring up the ISDN link only when there is traffic to be sent over it. In Europe, ISDN is in most cases the most cost-efficient option. Carriers that support ISDN can offer 128-Kbit line speeds for the price of a local call.
- A pair of 28.8-bps modems over normal phone lines can be used to establish a permanent connection between your site and your provider's. This is the slowest and least reliable option. However, if the phone call to your provider is free, this could be the most economical option.
- If your Internet provider is physically close enough, you may be able to connect your network directly to your provider's network via a LAN connection. You will then be able to get Internet access at the full speed of your provider's connection.
- Connectivity technologies continue to evolve. Two of the most promising are SMDS (switched multimegabit data service) and ATM (asynchronous transfer mode).

The type of connection you need is determined by the type of services you offer and the number of people who access those services. If your main service is E-mail, a 64K line may well be sufficient. A busy web site, on the other hand, might require a T1 line. For a commercial Internet service provider, a good rule of thumb is

about 2 to 4K per incoming line, plus some set figure for your other services.

Since the future is hard to predict, perhaps the most important guideline is to aim for a technology that you can afford now and that allows you growth in the future. When talking with your local phone company and your Internet provider, don't ask them only which technologies they support but also at which speeds and how easy it is to switch speeds within a technology.

Choosing Internet services

There are numerous Internet services that your organization may require. Depending on your needs and capacity, you may choose to offer some or all of them.

World Wide Web

Most of the current enthusiasm about the Internet centers on the World Wide Web. It is the easiest part of the Internet for novices to use, and it offers the most commercial possibilities. The Apple Internet Server Solution is designed for the World Wide Web. The center of the software solution is WebSTAR, the premier Mac OS-based web server.

WebSTAR is fully documented, but little is required to get started beyond planning the server's overall directory structure. You may, for instance, want to create one subfolder for each person in your organization (or customer of your service) who wishes to publish information on the web. Or you may want to organize your folder structure by subject or department. Keep in mind that each subfolder will be part of the URL (web address) of the files being served within that folder. Your overall directory structure is especially important if you will be renting web space to customers.

Most of WebSTAR's default parameters should be fine to start with. You may, however, want to reduce the default number of simultaneous connections. The default is 50, with each connection requiring about 100K of memory to be allocated in the Finder, in addition to the base 750K required by the application itself. Web connections are usually very short lived, so you will in general not need this many. You might want to start off with 20 or so, and increase the number if you notice they are frequently all in use.

Once your web server is up and running, you will probably want to tailor a few of

its standard files for your specific site. These files are located in the web server's root directory, and are usually named as follows:

- **default.html** This is the file that is displayed if just your web server name is specified in the URL (that is, <http://www.companyname.com>). It is the home page for your entire server. A file by this name can be placed in each sub-directory and will be displayed if the URL contains that directory name but no file name (<http://www.companyname.com/directory/>).
- **noaccess.html** This file is displayed if a user attempts to access a page to which they have not been granted access through the security mechanisms of the web server.
- **error.html** This file is displayed if the file indicated in the URL cannot be found. You may well want to provide a pointer to your home page or other general information in this file.

Web page software

The web page, with its combination of text and graphics and its links to other pages of related interest, is the key to the web's exploding popularity. HTML (Hypertext Markup Language) is the standard language for creating web pages. The Apple Internet Server Solution includes two full-featured HTML editors: tBBEdit and Adobe PageMill, a new WYSIWYG option, plus a licensed copy of Adobe Acrobat, an alternative to HTML-based web pages that has many advantages in certain situations.

Both HTML and Acrobat are simple to work with, and the Apple Internet Server Solution includes full documentation to get you started. There are also other software options that you may prefer. Just knowing the programs, of course, is no guarantee that you will be able to create high-impact web pages. You may well want to consult an expert in web page design or seek outside training. Conversely, if you become highly skilled, you may also want to sell your services as a web page designer, as discussed later on in "Running Your Server as a Business."

CGIs

The Apple Internet Server Solution features a selection of Common Gateway Interface (CGI) applications, which add a great deal to its core functionality. A CGI is basically a link between the web server and an external application running on the server computer or elsewhere on the network. CGIs perform diverse functions such as allowing the creation of clickable maps—graphics with "hot spots" that link to additional information. Other CGIs provide interactive forms support, database searching, and many other options. The CGIs supplied with the Apple Internet Server Solution are a good general set, but you may well wish to create or obtain more to meet your specific needs.

FTP

File Transfer Protocol, or FTP, is probably the most efficient way of distributing large files over the Internet. It is one of the oldest and still one of the most important Internet services. You can add FTP to your Apple Internet Server at a very low setup cost, using one of a variety of available shareware applications.

FTPD, a shareware server from Peter Lewis, is by far the most popular Mac OS

solution. FTPd coordinates with AppleShare® and file sharing, so you can set access privileges using standard Mac OS methods. FTPd also supports gopher serving. Gopher has been essentially supplanted by the World Wide Web, but if you have clients who require it, you can supply it with little cost or effort through FTPd.

Setting up FTPd requires enabling file sharing or AppleShare and sharing at least one folder. Since most FTP access is anonymous (that is, no name or password is entered), you will generally want to make sure that guests can log in and that at least one folder has read access available to guests.

After you have enabled file sharing, run the FTPd Setup application to configure the default login directory (usually called “Pub”) and to set access rights. You may also want to edit the startup messages displayed when a user logs in. If desired, you can associate a specific login message with each shared directory and each authorized user.

E-mail

E-mail remains the most widely used Internet service. The Apple Internet Mail Server (formerly known as MailShare) is a free, highly functional Internet mail server. You can obtain the Mail Server from www.solutions.apple.com/HomePage/Product. The Apple Internet Mail Server supports both SMTP (Simple Mail Transfer Protocol, used for sending mail) and POP (Post Office Protocol, used for receiving mail). Like most other Mac OS services, it is very easy to set up.

With any mail server, you will need to establish a number of standard accounts. Each of these accounts can be set up to forward to any other E-mail account you desire. Standard accounts include:

- *Postmaster* The person to whom inquiries about the mail service itself are addressed, and to whom undeliverable e-mail is often forwarded.
- *Webmaster* The keeper of web services for the organization
- *Hostmaster* The keeper of domain name (DNS) services, if any
- *Info* Requests for general information about the organization
- *Support, help, sales, admin, billing* Other addresses used by many organizations

Beyond the standard accounts, you will of course want to set up an account for each user or customer who desires an E-mail address within your domain. Although the Apple Internet Mail Server has a somewhat complex set of configuration preferences, in general none of the defaults has to be changed, so configuring accounts is all you need to do to get started.

Domain name service

Domain names, human-readable titles assigned to Internet addresses, are maintained by domain name servers. Apple is currently shipping MacDNS™, the first domain name application designed for the Mac OS, which greatly simplifies and expands the DNS options available through the Apple Internet Server. One highly useful MacDNS feature is *round-robin scheduling*, in which a single name is assigned to multiple devices. This allows you to set up multiple Mac OS–based web servers in a redundant array. MacDNS distributes your web site’s access load by returning different addresses to successive name queries. Such a configuration is a highly efficient and flexible way of adding extra capacity at low cost as demand grows.

MacDNS is quite easy to use, but providing domain name service is, in general, a fairly complex operation. Not only must you manage the mapping between domain names and numerical IP addresses, you are also required to maintain two domain name servers for each domain.

In many circumstances, then, you may wish to contract with your Internet provider to maintain the required DNS servers for your domain. As long as you need to register only a few names, and these names don't change very often, your provider should be willing to do this for you. If you have a large number of named services, or if the names change frequently, you may need to set up your own domain name server, but you still may be able to ask your provider to serve as the secondary DNS.

If you are going to rent out web space and establish custom domains for your customers, an onsite domain name server is a necessity.

Network news

Network news, often called *netnews*, *usenet*, or *news groups*, is another of the older services on the Internet. There are currently around 15,000 different news groups available. Network news is provided through a Network News Transport Protocol (NNTP) server. Netnews serving is highly resource intensive. A full network news feed requires somewhere between 64K and 128K of Internet bandwidth 24 hours a day, plus 8 GB or so of disk space just to hold the last week or so of news. Thus you should not even consider running your own netnews server unless you have a very high speed connection to the Internet, plus adequate disk space. Instead, you can ask your provider to make its news server available to anyone on your network (that is,

to any computer having an IP address in the address range given to you by your provider). Alternately, it is possible to receive a news feed from a source other than your Internet provider. One popular distribution mechanism is via satellite.

AppleTalk-IP gateways

An AppleTalk-to-IP gateway is not strictly necessary to provide Internet services. If all of the Internet users within your organization are directly connected to an IP network, such as an Ethernet network, they will not need to go through an AppleTalk-IP gateway. If, however, you have users on an AppleTalk-only network who require Internet access, then you must install an AppleTalk-IP gateway. Such users include:

- any user on a LocalTalk network
- any user dialing in via Apple Remote Access (ARA)
- any user on any other AppleTalk network that is not also an IP network at the same time.

Some IP routers can function as AppleTalk-IP gateways. If your router does not include AppleTalk-IP gateway functionality, you can run the Apple IP Gateway software on your Apple Internet server. (If you do use the Apple IP Gateway, be sure to configure it to be active at startup.) In all cases, you must provide the AppleTalk-IP gateway with a range of IP addresses to make available to AppleTalk users. This range should come from within the range given to you by your provider. You need to allocate one number in the range for each AppleTalk user who will be using Internet

services at the same time. Be sure to leave room for expansion, however. It is recommended that you set up your gateway to use dynamic (automatic) address assignment, which will allow AppleTalk users to obtain IP addresses dynamically from the gateway as needed, as opposed to assigning fixed addresses on signup.

AppleShare and other AppleTalk services

AppleTalk services greatly augment the power of the Internet. AppleShare (or Mac OS file sharing for a small server) is by far the simplest way for people within your organization to make their information available through the Internet services that you have set up. It is also the simplest way for clients to transfer their web pages to you for publication. By accessing shared folders with write privileges, people can use AppleShare to copy their information directly onto a web or FTP server running on the same machine as the AppleShare server. You can create a subfolder for each publisher within your web server's directory, and provide access rights that allow only the publisher to copy files into that folder. Once the files are copied, they will be instantly available over the web. This mechanism is especially useful if you are renting out web space.

AppleShare is also a great vehicle for making necessary tools available throughout your organization. Shareware applications, site-licensed HTML editors, and general company information can all be placed on an AppleShare server for easy access by local and remote users.

The Internet can also be used to connect geographically dispersed AppleTalk networks, making AppleTalk services available throughout your company. Any sites with permanent Internet connections can be linked through a technique called *IP tunneling*. Using the AppleTalk Update-based Routing Protocol (AURP), these AppleTalk networks can all be interconnected through the Internet. AURP is included as part of the AppleTalk/IP Wide Area Extension to the Apple Internet Router, which can be run on most Mac OS-based computers, including all models of the Apple Internet Server.

Finally, Apple Remote Access (ARA) extends the power of AppleTalk and IP services to remote users dialing in from home or on the road. ARA is detailed in the next section.

Dial-in services

As telecommuting becomes more popular, and as more and more people need network access from the road, dial-in access to Internet services is becoming essential. Dial-in access is also the only practical way to provide Internet services to that great majority of the community without leased lines or the like. There are two main technologies for providing dial-in access to Mac OS-based Internet services: Apple Remote Access and Point-to-Point Protocol (PPP).

Apple Remote Access is Apple's dial-in product. ARA products from Apple include a Macintosh client and a single-port and multiport server. A number of third parties also provide ARA servers, either as standalone products or integrated with a router or AppleTalk-IP gateway (both of which are required for Internet access through ARA). ARA is extremely easy to set up and use, highly functional, supports AppleTalk as well as IP, is integrated with the Mac OS, is bundled with PowerBook computers, and, in general, has excellent penetration into the Mac OS marketplace.

**To learn more about
Mac OS–based shareware:**

Just about every Mac OS–based shareware product is available on one of the Info-Mac FTP servers. A large number of Info-Mac mirrors have been set up throughout the world. On any Info-Mac server, most of the Internet applications (client and server) are available in the /pub/info-mac/comm/tcp/ directory.

Info-Mac server listing:

<http://www.opendoor.com/macstuff/info-mac-mirrors.html>

Web-based, searchable Info-Mac:

<http://hyperarchive.lcs.mit.edu/HyperArchive.html>

Pointers to Mac OS-based servers:

<http://www.freedonia.com/ism/>

Specific product information:**WebSTAR (StarNine):**

<http://www.stamine.com/webstar/>

WebSTAR-Talk mailing list:

<http://www.stamine.com/support/maillinglists/>

BBEdit: <http://www.tiac.net/biz/bbsw/>

Mac web servers newsgroup:

comp.infosystems.www.servers.mac

Apple Internet Mail Server:

<http://www.solutions.apple.com/HomePage/Products/MailServer/>

Apple IP Gateway: <http://www.abs.apple.com/HomePage/Products/Ip.gateway/>

AppleShare: <http://www.abs.apple.com/HomePage/Products/Appleshare/>

Apple Internet Router: <http://www.abs.apple.com/HomePage/Products/Internet.router/>

ARA Client: <http://www.abs.apple.com/HomePage/Products/Ara.client/>

ARA MultiPort Server: <http://www.abs.apple.com/HomePage/Products/Ara.multiport/>

ARA Personal Server: <http://www.abs.apple.com/HomePage/Products/Ara.personal/>

ARA security options:

<http://www.cyno.com/>
<http://www.securid.com/>

Many of your potential customers are already using ARA to access AppleTalk networks, either for telecommuting or for access while traveling. You can provide ARA dial-up access to the Internet with either the ARA Personal Server or the ARA MultiPort Server. Because the ARA MultiPort Server supports up to 16 dial-in ports, it is the obvious choice if you expect heavy usage. Mac OS–based ARA servers are integrated with AppleShare Users and Groups, so it is particularly easy to set up a Macintosh to provide both dial-in access and AppleShare file service. The ARA MultiPort Server also has sophisticated security features.

The Macintosh running the ARA server could also conceivably run the Apple IP Gateway. In some situations, however, it may be desirable to allow guests to call in to the ARA server to obtain general information or to sign up for Internet access. If you want guests to be able to call in but not to be able to obtain Internet access directly, you need to run the Apple IP Gateway on a separate computer, perhaps on the Apple Internet Server itself. If you then restrict guests to the ARA server machine, they will not be able to get on the Internet through the ARA server.

Point-to-Point Protocol is an Internet standard for dial-up connections. PPP is supported by a wide variety of machines, including Mac OS–based computers, PCs and UNIX workstations. Most machines will therefore be able to access the Internet through your PPP server. The Apple Internet Connection Kit includes an implementation of the client side of PPP. To support PPP dial-in service, you can choose from a variety of third-party servers—usually dedicated hardware with a number of serial ports and an Ethernet connection for attaching to your network. Some routers also support PPP dial-in. In evaluating third-party PPP servers, you should look for one that provides a Mac OS–based interface for administration and monitoring.

Even if you support PPP dial-in, you may also wish to support ARA dial-in for Mac OS clients. Most implementations of the PPP client do not provide AppleTalk connectivity, nor are they integrated directly with the Mac OS. Thus most of your Macintosh users will find ARA both easier to use and more functional. ARA services will also generally require less support than PPP.

Fast, reliable modems are a necessity if you are going to provide dial-in services. In general you should purchase 28.8-bps modems for your dial-in services. Although more expensive than 14.4-bps modems, 28.8-bps modems will become obsolete much more slowly, and will provide those dial-in users who have 28.8-bps modems themselves with significantly faster Internet access.

Reliability is difficult to assess, though trade press reviews and word-of-mouth are good indicators. More established brands and models are normally a better investment. In general, spending extra money on a reliable modem will more than pay for itself.

Other factors to look for in a modem include:

- **Mac OS focus.** Since you will most likely be attaching the modem to a Mac OS–based computer, be sure the modem’s manufacturer has a Mac OS focus. This will help to ensure good software and support.
- **Software-upgradability.** Although the V.34 28.8 standard has finally stabilized, small bugs are often found in modem firmware. The ability to upgrade the firmware by running a program on the Macintosh is thus highly desirable. The manufacturer may also be able to add enhancements to the modem in this way.

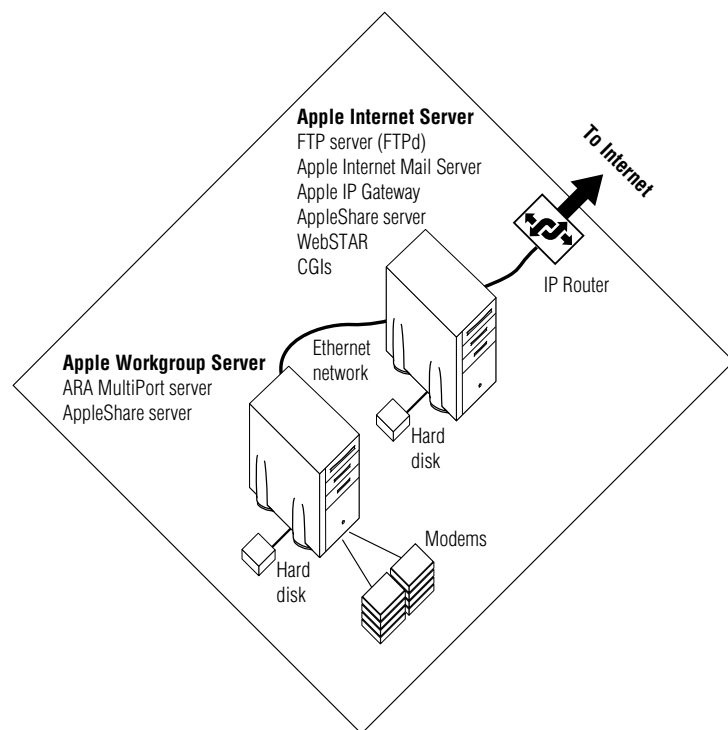
- Form factor and size. If you are going to be supporting a large number of modems, the physical size of the modem may be important. Certain high-end modems are rack-mountable and can easily be kept and maintained in a small, enclosed space.

In addition to modems, analog phone lines are also necessary for dial-in service. You cannot use the digital phone lines that come in most PBX installations. It often takes the phone company a long time to install new lines, so be sure to plan ahead. You may want to combine the installation of phone lines and your Internet connection line.

The number of phone lines needed depends on the usage pattern of those you are providing access to. Assume 10 to 15 users per phone line. Be sure that the phone lines are set up on a “hunt group” so that you can give out only one number and have that number automatically roll over to the next non busy line.

Adding to your basic system

It is possible to run multiple services, such as AppleShare, Apple Remote Access, and the Apple IP Gateway on your Apple Internet Server. Whether this makes sense or not depends on the load supported. It is certainly possible to start with the Internet Server on its own and add auxiliary machines as required. It is also easy to



add memory and disk space when the need arises.

Whether you're using one or several Workgroup Servers, be sure to check the documentation supplied with each software program to make sure that you have met all necessary memory and system software requirements.

Reliability is essential to success, so you should equip your system with an uninterruptible power supply (UPS). The UPS needed depends on the size and complexity of your system. In general, a 400-watt UPS is adequate for one computer

and one peripheral.

As discussed above, the software you need is determined by the services you plan to provide. The Apple Internet Server Solution provides a comprehensive collection of web software. Apple programs that can support your Internet effort, such as AppleShare, Apple Remote Access, and the Apple IP Gateway, are available from your Apple-authorized reseller. Much popular Internet software is available as shareware. There is also a fast-growing population of CGIs, HTML editors and other tools that you may wish to explore. It is important to check with the manufacturer to determine where the latest version of a given piece of software is available, since revisions are fairly frequent.

**To learn more about
firewall security, see:**

<http://www.greatcircle.com/>
<http://www.socks.nec/>
<http://www.atlantic.com/fire.html/>

Setting up and supervising your server

The most basic Internet service setup consists of an Apple Internet Server providing one or more Internet services. More advanced setups include multiple servers, multiple routers, modems, and perhaps a hardware-based dial-in server. Here's one possible arrangement:

The IP router connects your network to the Internet through your provider. The Apple Workgroup Server provides AppleTalk services, and the Apple Internet Server provides IP services. In addition to running the WebSTAR WWW server, the Apple Internet Server also runs the FTPd File Transfer Protocol server and the Apple Internet Mail Server. These three services—the World Wide Web, FTP, and E-mail—are the core Internet services. In addition, the Apple Internet Server can also run any number of CGIs that add functionality, such as forms support and image map support to WebSTAR. To provide IP services to AppleTalk users (such as those on LocalTalk or who have dialed in via ARA), the Apple Internet Server also runs the Apple IP Gateway, which translates between AppleTalk and IP. Finally, the Apple Internet Server runs the AppleShare File Server, which makes it significantly easier for users to copy their web pages over to the web server.

In the above arrangement the Apple Workgroup Server provides AppleTalk services. The ARA MultiPort Server, in combination with a number of modems, provides dial-in access to the AppleTalk network, and through the Apple IP Gateway on the Apple Internet Server, to the Internet. The AppleShare server on the Apple Workgroup Server has a number of uses, including file distribution and dissemination of general information to “guests” dialing in.

Assuming that your system is properly connected to your Internet provider, all that's left to do is configuration.

Configuring your router

When you sign up with your Internet provider, you'll receive a range of IP addresses for your network. You'll need one address for each device on the network that will be accessing the Internet (either directly or through an AppleTalk IP gateway). Be sure to get enough addresses to allow for future expansion (IP addresses are in somewhat short supply these days, so don't be surprised if your provider does not want to give out more addresses than the minimum). Assign one of these addresses to the router (usually either the first one or the last one), and configure the router with it.

You must also tell the router the subnet mask of the network it is going to be connected to. You should get this information from your provider. IP addresses contain two parts. The first part indicates the number associated with the network that the device is on. The second part indicates the number associated with the device itself. The subnet mask indicates which bits in the IP address correspond to which part, and helps the router figure out how to do its routing. See the *TCP/IP Connection User's Guide*, which is provided online with the Apple Internet Server Solution, for more information on subnet masks.

Talk to your provider about other configuration details. Possibilities include the address of your provider's router, a name for your router, and the addresses of various other services. If all you're doing is connecting a single network into the Internet through your provider, setting your router up should involve few such details. If, however, your network is part of a larger network within your organization, there will be many more pieces to configure, and things will get a lot more complicated. It is recommended that you get the advice of an expert (such as your network administrator or a consultant) before attempting to provide services on such a network.

Your router can and should be configured for security as well as access. Although Mac OS-based services present a much lower security risk than services run on UNIX machines, security considerations can never be taken too seriously on the Internet. Many routers have a number of "firewall" features built in, and these features should be carefully considered, especially for larger networks. Although most Mac OS security issues can be addressed simply by ensuring that access privileges are set correctly, investigating additional security options is always a good idea. In addition to router-based security, a SOCKS-based proxy server, written by Peter Lewis, is available for the Mac OS. SOCKS is an Internet-standard security protocol, which, when used in conjunction with a filtering router, can greatly enhance overall network security. Internet security issues are fairly complex, so you may wish to consider consulting an expert in this area as well.

Configuring the server

You must assign an IP address to the server, and you must configure that address through the MacTCP® control panel. In addition, you must tell the server the address of the IP router and the subnet mask of the router's network. Finally, you must enter the address of the domain name server to use.

Be sure to configure your server to restart automatically after a power outage. Even with a UPS, it is possible that the power will be out long enough to bring the server down. Most Macintosh computers can be physically set up so that they restart after a power failure. See your Internet Server's documentation for instructions. Also be sure to place aliases to all of your services in the Startup Folder, so that they will automatically run at startup. Finally, be sure to go to the General Controls panel and disable "Warn me if computer was shut down improperly." Otherwise the restart operation will be interrupted until you hit the OK button.

Configure the software services themselves following the instructions contained in their online documentation.

Testing

Once your Internet services are assembled and installed, you should test the system to make sure everything works as expected. Assuming you have configured IP addresses correctly, you should be able to test your services without connecting to the Internet (which is particularly useful if your Internet connection is taking longer to install than you had expected). If you are relying on your Internet provider for DNS services, however, you will have to use IP addresses instead of names until the connection is established.

Once you have tested services individually, begin tests of combined functions, such as E-mail and FTP links in web pages. Run through the procedure of setting up a complete account, and test to make sure things work as designed. If you are going to serve as an ISP, be sure to include the sign up and billing processes in your tests. Bring up a few “beta” clients on your services. Be sure they understand that you are still testing the system, and that you would appreciate their feedback. Monitor the overall system’s operation on a daily basis, and make sure that it is operating as expected.

Once you are happy with the way the system is working, open it up gradually to your users or customers. If possible, add users gradually so that you can continue monitoring and adjusting. Expect small mishaps here and there—Internet problems tend to occur either right at the beginning or well down the road, when your services have become popular and overload sets in.

Monitoring your services

Once your server is up and running, it is vital to keep tabs on all services to be sure that they are functioning correctly and are not overloaded. In general you should monitor services from both sides—that is, by looking at the service itself on your network, and by observing it from a client’s point of view.

WebSTAR provides a continuous status display that can be accessed remotely from anywhere on your AppleTalk network through the Admin application. The key indicator to watch for is the number of active connections. If the number of active connections reaches the maximum (as indicated by the “Busy” counter), you may want to consider increasing the number of connections WebSTAR supports. You need to be sure, however, that your server can effectively service these additional connections. If users are already complaining of slow service, then adding new connections will only make things worse—adding another server or increasing your bandwidth to the Internet may well be the correct answer.

The WebSTAR log flags errors such as dangling links, which don’t point to a valid page on your server. It is important to keep in mind, however, that some errors are normal. Browsing users often mistype URLs. If you are renting out web space, expect a much larger number of errors, since customers will often publish documents that contain invalid links.

The WebSTAR display also provides a counter labeled “Timeouts.” Some number of timeouts is also quite normal. If this number exceeds around 5 percent of total connections, however, it could be an indication that something is wrong. For example, your pages could be loading too slowly.

Most dial-in servers will alert you to a modem’s failure, usually through a log entry. Keep a close lookout for such occurrences, since this type of modem failure can often prevent any lines behind it in the hunt group from being answered (the

failed modem never picks up, so the call never rolls over to the next line).

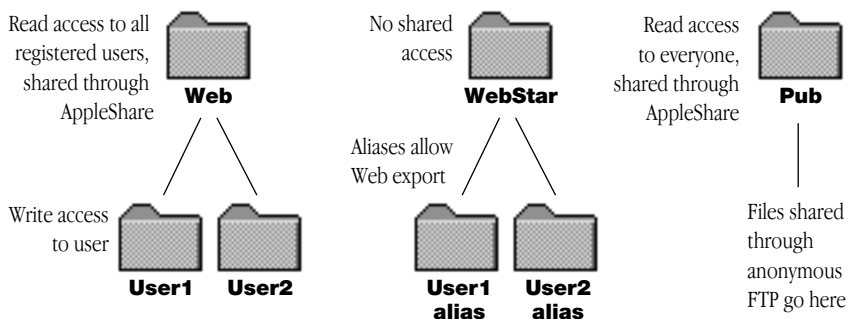
Adding new phone lines is sometimes a lengthy process, so it is also important to monitor line usage. That way you can plan ahead and know how far in advance to order additional lines.

Perhaps the most important service to monitor is your connection to the Internet. All services funnel through your Internet connection, so if it goes down or backs up, all other services are affected. The most effective way to monitor your connection is through your router. Most routers include a number of ways to determine their status. Two of the most popular methods are by using SNMP (Simple Network Management Protocol) and Telnet (that is, remotely logging into the router and issuing commands to it).

Monitor your router on a daily basis, concentrating on the hours of heaviest usage (often 9 A.M. to 3 P.M. PST Monday through Friday, when both coasts are awake and at work). If the total traffic through the router during these times is anywhere near 50 percent of your bandwidth, then you should consider increasing that bandwidth. Sometimes upgrading your Internet connection can be a lengthy operation, so it is important to keep track of usage and plan in advance.

Most Mac OS–based Internet services produce log files. It's a good idea to monitor operations by running periodic reports based on these files. Here are some possibilities:

- WebSTAR produces a highly detailed log of every access. The log can be custom configured to include various pieces of information. The log output is a simple text file, so it can easily be postprocessed to provide detailed access statistics based on day, date, time, folder, and so forth. ServerStat is one of the most flexible and fastest ways of doing the processing. If you are renting out web space, you may want to make available a report for each of your customers, based on accesses to their



particular subdirectory.

- FTPd produces a log of every access. The log cannot be custom configured, and does not really provide enough detail to be fully useful (for instance, only filenames are specified, not folder names). The log output is a text file, so some postprocessing can be done, if desired.
- The ARA MultiPort Server produces a detailed log of connect times and errors. Each user can be given a set of "remarks" that are carried over to the log and can be used for custom accounting or other purposes. The log is a text file.

For additional information on supervision, see:

ServerStat home page - <http://www.ericse.ohio-state.edu/ss.html>

Timbuktu - <http://www.farallon.com/www/product/tb2/tb2promac.html>

AG Group - <http://www.aggroup.com/>

- The Apple Internet Mail Server maintains a log file, but this log file is periodically reset when it reaches a particular size and thus may not be useful for reporting purposes.

The ARA MultiPort server can be configured to copy and then reset its log on a periodic basis. Neither WebSTAR nor FTPd has this ability, so their logs must be reset by hand (or by AppleScript) periodically; otherwise they will get too big. Be sure to suspend logging before resetting, and then to resume logging thereafter.

Third-party tools can make monitoring more efficient. Timbuktu from Farallon Computing is an extremely useful tool for remotely watching, and even controlling, any of your computers from anywhere on your AppleTalk or IP network.

Some third-party packages, such as those from the AG Group, can periodically poll a given set of machines to make sure they are still running. Although your Apple Internet Server, like all Mac OS-based computers, should be exceedingly stable, occasionally a new software version or an unusual situation may cause it to crash or become unreachable. A third-party monitoring package can, for instance, issue a page or phone call if it detects that a particular machine is no longer accessible.

You may also wish to consider installing a device that can cycle power to a particular machine or peripheral. Such a device often supports a telephone interface, so if a particular machine is determined to be inaccessible, you can simply call the device up and restart the computer or reinitialize the modem.

Creating and maintaining accounts

You may be asked to create and change a number of different types of accounts on a daily basis. Some accounts are integrated together through the Users and Groups file, and others are independent of it. Associated with these accounts will often be a shared set of folders.

AppleShare, FTPd, and Apple Remote Access all make use of the Users and Groups file. If you set up an account for one of these services, it will apply to all the others on the same machine. The account name and password you enter apply to all three services, and if a user changes his or her password on one it will be changed on the others. Folder privileges apply to both AppleShare and FTPd. Apple's ARA servers have their own set of connect privileges, which are included in the account information in the Users and Groups file. If you are using a third-party dial-in server, however, there will no doubt be an independent method of specifying account information.

It is important to keep in mind that Users and Groups information is not replicated across machines, so if you have, for example, two AppleShare servers, you will need to duplicate the account information on each one.

Each user with an Apple Internet Mail Server account must be given his or her own account name and password. You can also set a limit to the amount of mail storage allowed in the account, and specify any desired mail forwarding. Apple Internet Mail Server can also be used to set up simple mailing lists.

Under many conditions, you will not need to set up accounts on your web server. WebSTAR does provide the ability, however, to password-protect different subfolders or documents if desired. Such folders would then be available over the web only to the specified users. WebSTAR's user/password list is independent of

the Users and Groups file.

Note that since passwords are not shared across all services, you may not wish to allow users to change their own AppleShare/FTP/ARA passwords, since this change will not carry over to their E-mail and web accounts.

If AppleShare, FTPd, and WebSTAR are running on the same machine, sharing and publishing information is easy, particularly if you place all of a user's web pages in a single shared folder. To do so:

- Create a new folder for holding user information. In the illustration that follows, it's called web.
- Share the folder via AppleShare (and hence FTP also), giving read access to a group of all registered users.
- When creating a new account, create a subfolder within the shared web folder for that account. Give the account holder full write access. Give no access to anyone else (unless, for instance, the account holder wants to make files available via anonymous FTP, in which case you need to give everyone read access).
- If the information in the subfolder is to be shared over the web, create an alias to the folder and place the alias in the WebSTAR folder. If any specific web-based password protection is desired, use WebSTAR Admin to specify that protection.

Using this setup, any information copied by an account holder into his or her folder (via either AppleShare or FTP) can be made instantly accessible back out to the Internet through FTP and the web. This setup is an especially simple and powerful way to publish web pages.

Internet E-mail addresses and URLs cannot contain spaces or most punctuation characters. ARA and AppleShare account names, however, have no such limitations. For consistency, however, it is best to have ARA and AppleShare observe Internet restrictions.

To summarize, when creating a new account you will probably want to do most, if not all, of the following:

- Using the Users and Groups control panel, AppleShare Admin, or Remote Access Manager, create a new user for the account, and put that user in a group containing all registered users. Be sure to select “Allow user to log in.”
- Give that user dial-in access if desired.
- Create a folder for that user within the general web folder. Give the user full write access to that folder (through Sharing Setup or AppleShare Admin), and no access to anyone else (unless sharing with others is desired). If information in the folder is to be exported onto the web, create an alias to the folder and place it the WebSTAR folder; using WebSTAR Admin to password-protect the folder if desired (you will need to duplicate the user’s account name and password).
- Create an E-mail account for the user, duplicating the user’s account name and password.

Backups

You will probably spend a reasonable amount of time putting your Internet services together. In addition, you may also become responsible for a significant amount of data. For these reasons, it is essential to perform periodic backups.

The rate at which you should back up server files depends on the rate at which your data changes. Usually a full backup once a month will be sufficient, with incremental backups on a weekly schedule. Don’t forget to move a copy of your backup offsite every so often to protect against fire or natural disaster. Files that are especially important to back up include:

- The Users and Groups files from all servers (in the Preferences folder within the System Folder)
- Apple Internet Mail Server Preferences (in the Preferences folder)
- WebSTAR Settings (in the WebSTAR folder)
- WebSTAR, FTP, and dial-in server logs

Advanced services

In addition to the core Internet services that you will be expected to supply, a number of newer options are growing in importance.

Advanced mail services

In addition to the basic E-mail provided by a program like the Apple Internet Mail Server, some users may want more advanced mailing list services provided by programs called *listservs* or *mailbots*.

Listservs enable large mailing lists to be completely automated, so that large discussion groups, such as apple-internet-users and apple-internet-providers can be created and run with little manual effort. Until recently, listservs had to be run on UNIX machines or mainframes. Recently, however, a number of Mac OS listserv applications have become available. One such application is ListStar from StarNine, which integrates nicely with the WebSTAR web server.

ListStar and most other listservs also provide mailbots—“mail robots,” as the name implies. Mailbots build an automatic reply feature into an E-mail address. For instance, addresses of the form info@company.com are often run by mailbots, which simply send back general information on company.com to whomever has written to the information address. Such simple mailbots can be annoying to customers who have asked specific questions and do not want a generic response. Smarter mailbots can often perform additional processing, and can be quite useful.

CGIs

As mentioned earlier, the variety of CGI applications is evergrowing. Some of those listed here are included with the Apple Internet Server; all of them are compatible with it. Additional CGI software can be found on the Internet.

MapServe allows your web server to process image maps. It is simple to configure and requires little explanation. In addition to MapServe, you also need an application, such as WebMap, that can create the .map file that MapServe will read to define the different clickable regions within the image map. Both MapServe and WebMap are included with the Apple Internet Server.

Web-based forms require a CGI for back-end processing. The simplest of such CGIs takes the form's input and sends it in an E-mail message to the form's owner

For more on advanced services and CGIs, see:

ListStar: <http://www.starnine.com/liststar/>

MapServe: http://www.spub.ksu.edu/other/machttp_tools/mapserve/

WebMap: <http://www.city.net/cnx/software/webmap.html>

Maxum Development: <http://www.maxum.com/>

AppleSearch: <http://www.abs.apple.com/HomePage/Products/Applesearch/>

Extending WebSTAR: <http://www.starnine.com/development/extending.html>

Butler: <http://www.everyware.com>

Filemaker: <http://www.claris.com/Products/FMPro/Index.html>

4D: <http://www.netf.org/4d/4d.html>

AppleScript/Frontier CGI Tour: <http://cy-mac.welc.cam.ac.uk/cgi.html>

ScriptWeb: <http://www.ultranet.com/~mfenner/applescript.html>

Frontier: <http://www.hotwired.com/Staff/userland/>

HomeDoor: <http://www.opendoor.com/homedoor/>

(or to anyone else, actually). The E-mail CGI included with the Apple Internet Server is an example of such a CGI, and can be easily modified to fit any specific needs. A counter CGI keeps a real-time tally of the number of accesses to the page.

NetCloak is a commercial CGI available from Maxum Development Corporation. Although somewhat hard to categorize, NetCloak provides your web server with the ability to process a large number of new HTML commands (“tags”). Many of these commands allow your server to show or hide different web pages, or parts of web pages, to different users based on various criteria, such as the user’s address or browser type. Other new HTML commands added by NetCloak include the ability to display real-time information within a page, such as the time or date. A page counter is also included. It is important to keep in mind, however, that pages that use NetCloak tags will be fully functional only on web servers that are running the NetCloak CGI.

There are a number of search engine CGIs available. They provide browsers with the ability to navigate web pages by searching for specific pieces of information. The AppleSearch server and CGI included with the Apple Internet Server is a highly functional way of searching a large collection of information. AppleSearch performs background indexing of information, so there is no need to set up specific index files. It also provides relevance ranking. AppleSearch can also be made available as a general service to AppleTalk users.

At this point, just about all Mac OS databases for user queries provide CGIs for interfacing that particular database with a Mac OS–based web server. Options include HyperCard®, EveryWare Butler, Claris® FileMaker® Pro, and 4D from ACI. The CGIs associated with these databases enable browsers to both enter and obtain information from the database. Your choice of which database to use should depend on your familiarity with that database and on the functionality you need. Some databases are tailored more towards flat, simple information, whereas others are hierarchical and can handle significantly more data.

One of the significant advantages of using a Apple Internet Server is that CGIs can easily be written in a scripting language such as AppleScript® or Frontier. There is no requirement to write complex C or perl code. By taking one of the many publically available CGI examples, you should be able to create a simple custom CGI for your web server in well under a day. If you are an Internet service provider, you may even want to consider offering custom CGI authoring as a service to your customers.

Miscellaneous services

There are a number of additional Internet services that your Apple Internet Server can provide. As one example, Daemon, developed by Peter Lewis, implements some of the less widely used Internet services, including Finger, Whois, Ident, and Daytime. These services are used for obtaining information about the machine on which they are running, and about users of that machine. Daemon also includes an NTP (Network Time Protocol) server, which is useful for maintaining a single, coordinated clock across a network.

Other miscellaneous Internet services include Maven, Chat, Talk, and TFTPd. Maven is a real-time audioconferencing tool, compatible with the UNIX vat program. Chat is a shareware server used for creating chat rooms. Talk implements point-to-

point text-based talking. TFTPd is an implementation of a TFTP (Trivial File Transfer Protocol) server, a variation of FTP.

Custom domain names

The term “custom domain name” is used to refer to a wide variety of services based on registering and maintaining domain names other than the basic domain name you use to provide your own services. Custom domain names usually apply to the rental of web space to your customers.

The simplest service associated with a custom domain name involves simply registering that domain name. An organization may wish to register a number of custom domain names simply to reserve those names for the future. Although the InterNIC (which handles domain name registration) has become much more strict about reserving domain names, as long as your organization has a legitimate potential use for the name, it is still possible to register the name in advance. If you are serving as an ISP, there is a good chance a number of your customers will wish to reserve domain names in this fashion.

A more advanced form of custom domain naming involves not only registering a custom domain name, but using that domain name as an alias to some of your services. A domain alias simply takes the place of the principal domain name. Domain aliases are particularly useful to ISP customers who wish to appear to have set up all their own Internet services without really doing so. Thus instead of receiving their mail at, for instance, name@isp.com, the customer could receive mail at name@company.com. Instead of having their web pages accessible at http://www.isp.com/company/, their web pages could be accessible at http://www.company.com/company/.

It is important to keep in mind that a domain alias is just a replacement for the principal domain name. No other functionality is added. For instance, in the above examples, mail sent to name@isp.com and name@company.com would go to the same place. In addition, access to http://www.company.com (without the /company/ subdirectory) would access the same home page as http://www.isp.com, which is probably not the desired result (see below for a discussion of virtual domains).

Support of domain aliasing requires nothing more than using a DNS to list the custom domain (and associated subdomains, like www.company.com) as aliases to the principal domain name. A mail record within the DNS must be set up to point to the real mail server. Finally, the mail server must be configured to know to accept mail for the aliased domain (otherwise it will try to forward that mail onward). No additional configuration is needed to the web server for domain aliasing.

A virtual domain is the most advanced form of custom domain naming. A virtual domain implies that the custom domain functions, in essentially all respects, as a unique, independent domain name. Virtual domains are a very recent innovation, and so exactly what they entail is still being defined. At the very least, however, a virtual domain includes a virtual web service for that domain. A virtual web service is specifically a web server with the URL of http://www.companyname.com, where this URL accesses a specific home page for the virtual domain, rather than the home page for the whole server. Virtual domains thus include additional functionality beyond that of simple domain aliasing, since if only one web server is being used to handle multiple virtual domains, that server

To learn more about the business of Internet service, see:

Global Village Tour of the Internet:

<http://www.globalcenter.net/gcweb/tour.html>

Internet Starter Kit:

<http://www.mcp.com/hayden/iskm/book.html>

Internet Starter Kit for Macintosh, third edition. Adam Engst, 1995. Published by Hayden Books.

A Beginner's Guide to the Internet:

<http://www.screen.com/understand/explore.html>

Tellan Software: <http://www.tellan.com>

WebDoor System:

<http://www.opendoor.com/webdoor/>

In addition, the following information sources may be of value to anyone setting up an Internet service, whether as part of an organization or as an ISP:

Glossary of Internet terms:

<http://www.matisse.net/files/glossary.html>

Web66: <http://web66.coled.umn.edu/>

The Well-connected Macintosh:

<http://www.macfaq.com/>

Mac Webmasters Consultants Directory:

<http://www.macweb.com/consultants/>

These newsgroups frequently contain data of interest to service providers:

comp.sys.mac.comm

comp.protocols.appletalk

comp.infosystems.www.providers

comp.infosystems.www.servers.mac

Apple maintains a large number of mailing lists on a diverse set of Mac OS-related Internet topics. You can find out about these lists at:

<http://www.solutions.apple.com/apple-internet/>

To get on the WebSTAR-Talk mailing list:

<http://www.starnine.com/support/maillinglists/>

must process the domain name to determine which web page to return.

To enable virtual domains, you must assign an additional IP address to each virtual domain, and use a DNS to point the domain name (or a subdomain name like www.company.com) to that IP address. The use of a different IP address enables the web server to determine which virtual domain's pages are being accessed (the HTTP protocol used for the web does not pass the actual domain name, just the IP address).

The HomeDoor product from Open Door Networks enables Mac OS-based web servers to support virtual domains. For more information about HomeDoor, see <http://www.opendoor.com/homedoor/>.

Running your server as a business

Most Internet Service Providers offer a complete set of Internet services to their customers, making available all of the core services documented here. As the web becomes more and more the central piece of the Internet, however, a number of providers are beginning to specialize in web-based services without providing full Internet access. As an ISP, you will probably need to set up most of the services discussed in this document. You may not, however, need to make all these services available on a public basis, allowing you to better focus your efforts.

Renting and colocation

There are two main options that allow you to concentrate on web-based services: renting web space and server colocation. Both of these options are appealing to customers because they allow them to graduate to providing their own Internet services if and when they're ready, but without a sizeable initial investment. As a subset of full Internet services, you can provide web space rental, server colocation, or both.

By renting space on your Apple Internet Server, your Mac OS customers are ensured that it will be relatively easy for them to transfer their pages onto their own server should they decide to do so. It will also be easy for them to transfer their pages to your server. Some things to consider if you're going to rent out web space:

- What additional services will you make available through CGIs?
- Will you provide custom domain names?
- How will customers get their web pages to you?
- Will you support an integrated publishing system?
- What type of access statistics will you provide?
- Will you allow others to run their own CGIs on the web server?
- Will you provide custom services, like writing CGIs and helping customers design their pages?
- Will you provide other Internet services like an E-mail account and the ability to distribute files via FTP?

Server colocation involves customers putting their own Internet server on your network. Doing so saves the time, effort, and money associated with installing and maintaining a high-speed Internet connection. The customer may one day be able to afford a faster connection to the Internet, and the machine will then be ready to

go if the customer wants to move it in-house.

Colocating customers are usually responsible for purchasing or leasing their machines, and for maintenance and insurance as well. Both you and your customer usually have access to the machine, and there are many arrangements that you can make for ongoing administration. Customers should generally be given a good deal of flexibility, since, after all, the computers are theirs, and whatever they do with them should only affect the services they are providing, not the services you offer to others. You will definitely want to arrange to have your customer be able to administer the machine remotely using Timbuktu.

Logistics

Credit cards make billing significantly easier, and are a highly desirable form of payment for an ISP. However, getting one or more banks to grant you permission to accept credit card charges can be difficult and is always time-consuming.

An ISP must also have a complete, detailed statement of the terms under which service is being provided to customers. Not only is such a document important for legal coverage, but it also provides a clear definition of what you will and won't be providing. If you are going to rent web space, be sure the document is very clear about conditions of resale, that is, the ability of your customers to sublease to others the space that you rent them. If you are going to provide colocation services, be sure you have a separate document that indicates the terms and conditions under which you will accept others' machines (for instance, you probably want to make it clear that you are not responsible for the machines from an insurance point of view).

Signup

There are a number of online mechanisms that you can use to sign up customers. By setting up an ARA or PPP server with appropriate guest privileges, signup can be integrated directly into the accounting system. Potential customers also get a taste of your system while they are signing up. Signup through web-based forms may also be desirable, especially for customers who wish to publish web pages through your server.

Shareware distribution

Although commercial Internet software packages are available for the Mac OS, many of your customers will want to run the more popular shareware applications. You should determine if and how you will make these applications available. You may wish to put together a startup disk that contains a few of the popular ones, such as Eudora and Newswatcher. The Apple Internet Connection Kit is a good example of such a disk. You may also wish to maintain a more complete collection of shareware applications on one of the AppleShare servers on your network. Doing so enables your users to browse the collection and to download shareware applications simply by dragging them over to their hard disk using the Finder.TM

By far the most popular browser on the web is Netscape Navigator (a single-license copy of which is included with both the Apple Internet Server Solution and the Apple Internet Connection Kit). Netscape makes Navigator available through its FTP server, but does not allow redistribution of the application through other

servers. Thus your distribution mechanism can only contain instructions for downloading Navigator from Netscape, and possibly a bookmark to the Netscape FTP server. It is possible to license Navigator from Netscape for redistribution (the Apple Internet Connection Kit includes such a licensed copy). You could also distribute another web browser, such as NCSA Mosaic, through your standard shareware distribution mechanism.

Accounting

If you are going to be doing any sort of usage-based billing, you need to be sure that you have a mechanism in place to keep track of and process usage information. The ARA MultiPort Server log file can easily be processed to obtain detailed dial-in usage statistics. WebSTAR produces a detailed log that can also be similarly processed if you are going to bill customers based on total access to their web pages.

Support

The Internet is a quickly growing, popular field. Everyone is trying to get connected, and more and more people are trying to publish on the web. Many of your prospective customers will have a good understanding of the Internet already, but some will not. It is highly recommended that you have a good bibliography of available resources (both print and online) to which to point your customers. You also may want to consider creating your own custom help software, which not only briefly summarizes the Internet and Internet applications, but also provides information specific to your service (for instance, various specific configuration information). Open Door Networks has an example available. Such references and software will reduce overall support needs and make your customers feel more independent.

Regardless of the amount of information you make available to your customers, they will still require a good deal of direct support. One of the primary factors on which ISPs are judged is the strength of their support, so having technicians with sufficient expertise to handle E-mail and phone calls is very important. If you are from the Macintosh world, and you intend to support UNIX and Windows software-based machines, be sure that you have expertise in these areas available. Also keep in mind that Windows-based and UNIX machines require significantly more support per user than Mac OS-based computers do.

Billing

Collecting money from people is time-consuming and often difficult. Credit card billing is by far the easiest solution, and if you feel your market can be adequately served by requiring credit cards for payment, then billing will become significantly easier. You can simply charge your customers' credit cards monthly, and have the money deposited directly into your bank account. Once in a while you will get a refused or expired card, but these situations should be rare and easy to deal with. Credit card charging can also be automated through the MacAuthorize application from Tellan Software.

If you must deal with checks or cash, you may want to consider requiring some payment for anticipated usage up front. If you try to bill and collect on a monthly basis, the overhead costs could easily be greater than the monies collected.



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