So you've recognized the potential of the World Wide Web, and now want to run multiple or enterprise sites economically, securely, and with total control? Now you can...

Until recently, establishing a web presence on your own premises was not something most experts would recommend, unless you had access to extensive technical expertise to build your own network and install and maintain your own Internet servers.

Building an ISP it is tricky. Until now, managing even a very small ISP has required a team of system administrators, dedicated to the running of machines, creating accounts, managing web-sites, trouble shooting, running a help desk etc. The required investment was substantial, and running costs were high. It simply wasn't feasible for the small operator.

There are, however, many indicators that suggest that an in-house ISP, or private server, is often the best – or perhaps the only acceptable solution for many situations. A private ISP affords a level security, control, and freedom of choice that just isn't achievable through any other option. As technology trends such as Voice-over IP, Wifi, and Peer-to-Peer continue to mature, there are strong indicators to suggest that private hosting servers will become commonplace, and will support a new wave of exciting changes in the way we communicate.

The Private Hosting Solution

Fortunately, improvements in communications technology, combined with software innovation, has now commoditized the ISP server. With the advent of high speed connections, the private hosting server is now a viable alternative to shared or managed hosting.

In response initially to their own needs, inteRAD Technology has developed a fully automated load-and-go ISP solution.

Now available commercially, *Netcityz* enables anyone to easily setup their own highly secure, reliable, low maintenance web server in under twenty minutes, for little more than the cost of a reasonable quality PC.

A business grade ADSL or wireless connection can comfortably support up to 200 users. The solution is fully scalable, by simply upgrading the connection and installing additional PCs.

By selecting from a range of optional add-on modules, or requesting a solution specifically tailored to a special need, it is now possible to virtually eliminate the technical management implications and maintenance costs that previously attached to a private hosting server.

Even sophisticated server administration, e-Commerce, website construction, content management and application integration can be enabled by simply selecting from a range of available options.

As awareness of the potential of connected computing increases, inteRAD's team are suggesting that the private server will soon become as common as today's connected PC. In addition to technical indications favoring the private server, the are a number of socio-economic indicators that suggest that private servers may quickly reduce reliance on large hosting operations and hosting reseller networks, driving major changes in the way we use the World Wide Web.

Here we compare *NetCityz* with the traditional approach to setting up an ISP, to evaluate the benefits of inteRAD's solution and the merits of the company's claims.
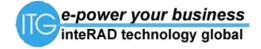
What is an ISP?

The Internet is a huge network of computers — or, more accurately, a network of networks. The job of an ISP is to send and receive IP packets to and from computers on this network.

To achieve this, you need to set up some essential equipment, and configure a selection of software solutions to enable name resolution, user authentication, website hosting, and email services.

The backbone of an ISP is the Ethernet switch. This is the common denominator that permits different vendor's equipment to connect. Think of the Ethernet as the "glue" that binds everything together.

Next, you need a router to connect your network to your upstream provider. This provider connects you to other networks and hosts (the Internet).

An upstream provider is simply an ISP selling Internet services to you. In fact, if you were to route a subnet to another user or ISP, then you would be that ISP's upstream provider.

An upstream provider gives you a subnet of IP addresses, and routes packets to and from your upstream router.

To install *NetCityz*, you need to install your Ethernet, then contract an upstream provider to supply a business grade connection — typically ADSL— which will usually include a suitable router.

Setting up the Servers

The basic servers, which all ISPs need to provide, are Primary/Secondary Domain Name resolution (DNS) server; User Authentication and Accounting (RADIUS), Web server, and Email server (providing POP3/IMAP4 and SMTP services).

DNS is the method computers use to translate names such as www.netcityz.com into an IP address (a series of numbers separated by dots, e.g. nnnn.nnn.nnn). All Internet traffic is based on IP addresses, which you can think of as being like telephone numbers. Humans prefer to use names, so the DNS acts like an automated phone book, matching names to numbers. As an ISP, you will need your own local DNS servers for your customers to use.

RADIUS (Remote Authentication Dial-In User Service) is the authentication protocol used to validate a caller, by comparing user names and password entered at login with information stored in a centralized database. RADIUS then captures statistics about each session which enables system administrators to verify who used particular services at specified times. Some ISP Billing systems incorporate RADIUS support in their packages. If you are not using such a billing system, you may need to secure a RADIUS server and integrate into your network.

Email and web hosting are the most important parts of the ISP's portfolio. These servers store and forward email addressed to your customers, and enable web sites to be published and accessible for web surfers to see. FTP services enable files, such as the HTML pages that comprise web sites, for example, to be transferred via File Transfer Protocol from client machines to the server. Other file transfer protocols exist which may substitute for FTP to enable files to be transmitted between connected machines.

Server Hardware

The start-up ISP obviously needs at least one physical server.

While all of the above services can be loaded on one physical server, the traditional approach recommends spreading the load across two or three servers, to allow backup services on alternate servers and enable 24 hour a day up time. *NetCityz* is able to deliver all of these services reliably and securely on a single physical server.

For *NetCityz* users, a basic Pentium III or IV "white box" is quite adequate, because a hardware failure requires simply replacing the faulty part and rebooting the computer. Even if the machine "dies" completely, placing the CD in an alternate machine and booting, then restoring the data from backup, restores full operations in minutes without any requirement for technical expertise.

The ISP adopting a more traditional approach should invest in high quality equipment, to minimize the necessity to invest in the tedious and time consuming re-configuration tasks that are required in the event of a hardware failure.

The traditional approach also requires a good quality firewall. If a router sustains a denial of service attack, your whole network could be paralyzed. For this reason, most network engineers select a high quality router from Cisco Systems or Nortel Networks. These routers are costly, and you should budget $2000 or more for a quality product.
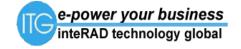
Software Choices

With your server in place, you need to install your software and configure the required services.

Using the traditional approach, you need to choose, at this point, between a Windows and a Linux or Unix operating system.

Windows 2000 or NT are popular choices for administrators wanting to run Windows specific database applications. Microsoft solutions are considerably more costly due to licensing costs. Windows also imposes huge system resource requirements, so you will need to budget for plenty of memory in your computer if you choose this option.

A maximized Windows server will cost around $15,000 for hardware and user licenses, against about $8000 for a Linux system.

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You may need to add another $2500, or more, for an e-commerce solution that can be integrated. Some administrators might also want to install content management, automated website building, and automated server administration tools as well, adding further to setup costs.

Accomplished system administrators generally favor Unix or Linux, which is available under GNU licenses that permit use free of charge subject to specific conditions. The trade of is that UNIX_based systems are extremely difficult to install and implement, and difficult and time consuming to maintain. Users need to know how to customize and compile C-based programs and multiple shell environments, and edit script-based applications —often without the aid of GUI tools.

It is also commonly believed that Microsoft solutions impose security risks not present in the Unix/Linux environment. If you are considering a Microsoft solution, you should read carefully about the security issues with IIS (Internet information Services) and PWS (Personal Web Server) before making a final decision. Security is a major concern in the Internet world, due to the volume of file transfer that can take place, and the poor habits of many of the unsophisticated users sending data to your server on a regular basis.

All of the System Administrators I speak to recommend a Linux/Apache system for security reasons. The fact that both the operating system and the Web Server software are available free is a nice bonus!

Once you have installed the Linux operating system, you need to install and configure Apache. You might also want to install firewall software anti-virus software, and anti-spyware software.

You might also need a database, PHP, and possibly other extensions to support the services your clients may request.

Configuration Requirements

Configuring Apache is likely to require editing the **httpd.conf** file to setup your email address, server name, and paths for file storage and error logging, among other changes.

Next, you need to setup the router and test all the computers connected to it. To actually view the website from the computers using the router, you have to go to the IP address of the web server and set the IP address, Subnet mask, Default Gateway, and Preferred and Alternate DNS server.

To ensure the web server can be seen by the outside world, the router has to be set up to allow HTTP and FTP calls to that computer. You do this using the Virtual Servers section under the Firewall heading of the router configuration.

You may be able to use a dynamic DNS server to contact nameservers and inform them of the server's IP address automatically. Otherwise, you will have to follow a set of manual procedures which might vary depending on the systems used by your domain name supplier.

All of these steps are completely eliminated by *NetCityz*. Configuration is completed by simply selecting the NetCityz product offering the required extensions (or ordering a customized CD), installing the CD, and answering a few simple questions.

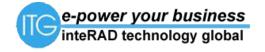### *Delivering Services to Customers*

While *Netcityz* will undoubtedly prove popular for hosting a single enterprise website, most ISPs seek to provide web hosting and/or email services to customers.

In a traditional environment, the ISP customer comes and wants to host domain "exampledomain.com". The domain is created centrally by just a few clicks, but a lot of 'behind the scenes' management is required, including setting up DNS, setting up the virtual server for mail and a virtual web server. The customer is issued one ftp username to access his/her web/ftp server. Any number of users can be created within the domain for email access. Users within the domain may or may not want web space.

You need to set up systems for opening customer accounts, assigning directories to customers, delegating domain names, and setting up email addresses.

The actual configuration of all of the necessary services is outside the scope of this document. Suffice to say that each service comes with its own set of instructions, and most are quite technically complex. Additionally, there are compatibility considerations which might imply a need to understand exactly how a particular configuration setting when installing one package impacts on other packages that may be present, or need to be installed later.

Again, all of these steps are eliminated by installing *NetCityz*. Even the actual site creation process and

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management of user sites is automated if the Web Publishing Platform extension is selected.

The Motivation Behind NetCityz

While its true that considerable progress has been made simplifying the software used to provide the necessary services, I recall that the initial setup of our first ISP six years ago took a skilled technician about three weeks to complete, and was not without considerable frustration.

What was more frustrating, however, was the amount of time spent repairing and reconfiguring after outages. Again, I have to acknowledge that some of our problems resulted from the quality of service from our Telco, and from a router we purchased which proved to have compatibility problems. The trouble is, you often can't determine in advance of a purchase just what sort of compatibility issues a particular piece of hardware might imply, because the choices in hardware and software are so wide and the configurations different ISPs choose vary extensively.

Hardware failures are an unavoidable fact of life for any ISP, and imply hours of reconfiguration work to restore service.

When a virus or trojan penetrates your firewall, the result is likely to be corrupted configuration files. With the number of configuration files that can exist on a single server to enable all the wanted services, detecting and fixing these errors can be a very tedious and time consuming task. It wasn't uncommon, in the early days of running out ISP, to call technicians back at noon on a Saturday or Sunday and be still pacing the floor at 11 p.m., counting wages at penalty rates and listening to explanations of how this was only an "emergency fix", and it might take several days next week to get everything working perfectly again.

It was during those late night sessions that the idea for *NetCityz* was conceived.

The goal was to automate the process of restoring operations after a server crash, eliminating the need for technical expertise and removing the cost implications in maintaining servers.

Cost and Benefit Comparison

In fact, the solution went further. By implementing the entire, fully integrated operating system and web server solution on a single bootable CD, *NetCityz* added a level of security never before achievable. Since the CD is obviously write-proof,

viruses and trojans are unable to penetrate. An intruder may succeed in corrupting configuration files in memory, thus causing a server to crash. Simply rebooting the computer, however, restores operations to pre-intrusion status immediately.

In the event of a crash, the restore process typically takes less than 5 minutes, and requires no technical expertise. A full installation on a new server requires minimal expertise, automating parameter entry with a friendly graphical interface. The complete process takes 20 minutes or less. On average, a new ISP can have a server ready to accept customer accounts in less than an hour from connecting the internal network and installing the upstream provider connection.
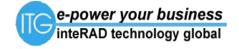
All the relevant services and daemons are up and running when you install your server CD. The CD fully automates configuration of IP address, domain names, file storage locations, etc.
For more individual aspects of the box configuration, like setting up user and mailbox accounts, detailed, easy-to-follow instructions are provide in on line manuals.

The standard *Netcityz* installation includes:

- mail server
- web relay
- firewall
- SMB file store
- Apache support for static HTML web sites
- Perl support
- FTP support

Optional extensions include:
- PHP, FrontPage and other popular extensions
- Intuitive open-architecture website building/content management solution, delivering full site-building and management automation, while integrating seamlessly with other site-building methods and technologies.
- Secure, fully automated e-commerce platform, complete with integrated shopping cart and choice of Gateway connectors, and fully automated management. This platform supports automatically created, individually branded e-stores located at each user's nominated domain and each directing payment to the owner's private bank account.
- Custom development services to tailor the solution to specific personal needs – including building customized intranet solutions, web communities, portals, directories, digital malls, on-line clubs, etc.

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Costs

As stated earlier, a Windows server will typically impose costs almost double those of a Linux server.

The *NetCityz* solution further reduces costs by eliminating the need for an expensive router and firewall, while delivering superior security.

The software will be priced for low risk, mass market take up according to formula e which relates usage costs to clear cost-saving benefits identified in the user environment. Prices will vary according to extensions selected and usage application.

NetCityz requires:

- Business grade Internet connection is recommended. Suppliers of such connections usually supply a suitable router. If not, a suitable router may be required. Such routers are typically in the $330 to $400 range.
- Pentium III or IV computer
- 512MB RAM
- 50+ CD drive

Theoretically, this infrastructure will host up to 500 typical small business or home user sites, although the recommendation is to add additional servers and upgrade the connection at about the 200 site breakpoint.

The major cost saving benefit, of course, is time. For users who rely on salaried or contract technicians to maintain a system, the solution offers the potential to save thousands of dollars per annum in technical management costs. For those who are able to maintain their own systems, this saving means valuable time is freed for more productive business building tasks.

Down time losses are also dramatically reduced, and in a commercial hosting environment that means improved customer service and improved branding, leading to higher revenues and profits.

Basing the solution on the robust Debian Linux operating system delivers reliability and optimum performance, while enabling integration with the widest range of Microsoft and Linux-based software solutions.

The solution is completely scalable to power the smallest home network through to a full scale Internet Service Business. Importantly, the developers have implemented a totally modular architecture which is easily extensible and ensures smooth integration of all the software and services a user might need to manage their business with ease.

Bullet-proof security

In an on-line world, security is becoming the single most significant concern for computer users. For many, connecting implies disturbing risks to personal privacy, business intellectual property assets and business competitiveness by placing vital information at risk. Concern over the safety of on-line payment and banking systems is increasing as incidents of fraud continue. Businesses risk profitability by accepting the risks of lost productivity and repair costs associated with system failures.

The most important consideration for any business considering engaging in on-line business must be security.

Trojans work their mischief by invading a system, then writing to system configuration files so that services malfunction.
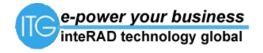
The problem with the traditional approach to server configuration is that, once those illegal writes are performed, you have to locate the errors among dozens of configuration files, and perform extensive corrective work.

The *NetCityz* architecture removes the potential for configuration damage by eliminating the storage of configuration files on hard disks. With the files stored on CD and transferred wholly into memory on system startup, any illegal write can only affect files currently in RAM. The CD is write-protected, so the configuration files are always correct.

If the trojan succeeds in damaging the configuration and causing a system crash, a simple reboot operation restores the correct files from the CD instantly, and normal operations are restored in minutes — with no technical expertise required.

Users running Windows applications may choose to install virus detection software for added convenience, but the need for virus protection is largely eliminated. A virus penetrating the system cannot cause system damage, and a simple system reboot will repair any damage caused.

For complete security, a sensible data backup program should, of course, be implemented.

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NetCityz Options and Uses

NetCityz was designed with the small commercial web host in mind, and enables hosting of hundreds of sites on a single white box with a basic business grade connection. While it is recommended that a second server be installed at the 200 average size small business site breakpoint, it is technically feasible to host 500 sites on a single server, depending on traffic loads.

Many business operators will appreciate the potential to move enterprise sites in house, enabling improved security and control.

The capacity to host hundreds of sites for the cost of a connection, combined with reduced prices for domain names, implies the ability for businesses to move from a single business web site to multi-domain portals, offering a wider range of customer stakeholder services, and enabling new sites to be easily and rapidly created for market research and testing, product-focused marketing, special promotions, and demographically targeted messaging.

Beyond the standard public web site, scope exists for restricted access external sites to enable remote project management, publication of technical and legal reference documents, team communication and socialization.

Powerful content management and website building options realize the dream of immediacy while permitting e-publishing activity to be wholly managed by non-technical content developers. The consequential productivity and efficiency gains in administrative activities defy estimation.

An automated e-commerce solution using a federated management system implies exciting benefits for distribution chains, multi-branch operations, franchises, and multi-level marketing groups. The e-commerce component also enables "virtual shopping centers" — a concept that offers the potential to transform ineffective SMB websites into dynamic marketing tools by enabling the same managed services approach that has proved so effective for supporting retailers in physical malls.

For charities, churches, not for profit hobby, sporting and community groups, the potential exists to slash administrative costs and dramatically improve member services using a communication medium that delivers immediacy combined with management simplicity.

Even educational facilities and mutli-occupancy buildings will find applications for the technology, enabling socialization and automating the transmission of safety information, facilities availability and usage information, legal and policy information, and events notifications.

Technology Impact

The ability to power up an in-house server on a low cost connection, e-publish with the ease of typing an email, and enable fully operational richly featured e-stores, ready for trading in minutes, implies major changes in the way we use World Wide Web technology.

It is completely accurate to suggest that a "virtual mall operator", "e-mediary" or "infomediary" could set up a server to securely host 200 stores, develop dozens of individual web sites with fully functional e-stores attached, and stage a public launch – all within just days of installing an ADSL or wireless connection, without typing a single cryptic batch or HTML command or line or code of any kind. The potential savings are likely to be six figure sums!
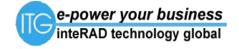
Dramatic cost reductions and reduced technical skill requirements enable the operation of virtual communities serving geographically or demographically related and common interest groups – restoring the socialization conditions of the pre-Internet world and reducing the dominance of multi-national corporates.

Small entrepreneurs will have their power to effectively reach selected target markets with a focused message restored.

The Web shopper will enjoy the choice of pursuing low prices and broad selection through impersonal business relationships with dominant remote suppliers, or enjoying the quieter atmosphere and familiarity benefits of smaller communities and niche-market focused suppliers.

InteRAD's goal is the empowerment of individuals and small communities by reducing the cost of accessing technology benefits and removing "FUD" (fear, uncertainty and doubt). The company will support its offering with almost unlimited customization options and generous support programs.

With the barriers of cost and skill resources removed, inteRAD believes new Web and communications technology will drive yet another social and workplace revolution, destined to change forever the way work and play.

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