Hacking

(Access to other peoples systems made simple – & some extra database lore).

Introduction

The author is not responsible for any abuse of this information. It is intended for educational use only. You may be quite shocked at how vulnerable you are! As an afterthought I added a section on database access due to a number of requests.

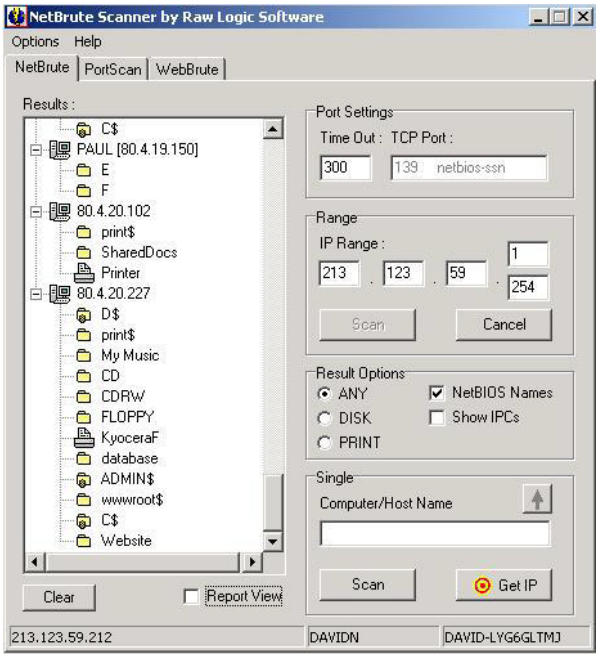
The majority of successful attacks on computer systems via the Internet can be traced to exploitation of security flaws in software and operating systems. These few software vulnerabilities account for the majority of successful attacks, simply because attackers are opportunistic – taking the easiest and most convenient route. They exploit the best-known flaws with the most effective and widely available attack tools. Most software, including operating systems and applications, comes with installation scripts or installation programs. The goal of these installation programs is to get the systems installed as quickly as possible, with the most useful functions enabled, with the least amount of work being performed by the administrator. To accomplish this goal, the scripts typically install more components than most users need. The vendor philosophy is that it is better to enable functions that are not needed, than to make the user install additional functions when they are needed. This approach, although convenient for the user, creates many of the most dangerous security vulnerabilities because users do not actively maintain and patch software components they don't use. Furthermore, many users fail to realize what is actually installed, leaving dangerous samples on a system simply because users do not know they are there. Those unpatched services provide paths for attackers to take over computers.

For operating systems, default installations nearly always include extraneous services and corresponding open ports. Attackers break into systems via these ports. In most cases the fewer ports you have open, the fewer avenues an attacker can use to compromise your network. For applications, default installations usually include unneeded sample programs or scripts. One of the most serious vulnerabilities with web servers is sample scripts; attackers use these scripts to compromise the system or gain information about it. In most cases, the system administrator whose system is compromised did not realize that the sample scripts were installed. Sample scripts are a problem because they usually do not go through the same quality control process as other software. In fact they are shockingly poorly written in many cases. Error checking is often forgotten and the sample scripts offer a fertile ground for buffer overflow attacks.

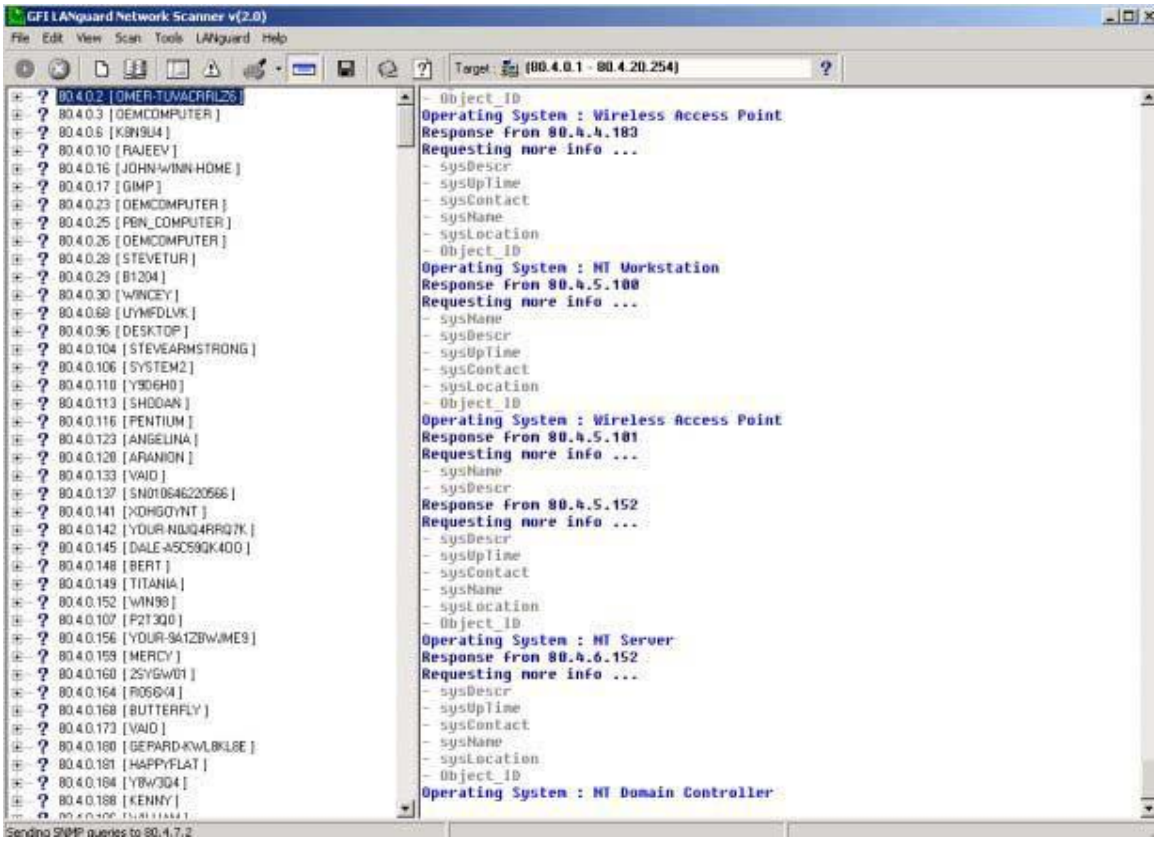
The simplest means to gain access to a system is by simple file and printer sharing. This is used to allow others on say, a home local area network share files, printers, and internet connections. If the computer having file and printer sharing enabled, this in fact allows these resources to be shared, and on offer, to the entire internet! This is largely due to the fact that Netbios was originally intended for use on local area networks (LAN's), where trusted sharing of resources made sense for many reasons. It was never intended to 'go global'.

First, search using a Netbios scanner, for a system with sharing enabled. A program such as Netbrute, by Raw Logic Software, is ideal. These programs can help the would-be hacker, as well as the network administrator. Run the scan over a subnet at a time, for example an IP address range from 80.1.1.1 to 80.1.1.254. Choose a system which has, preferably, it's whole hard disk

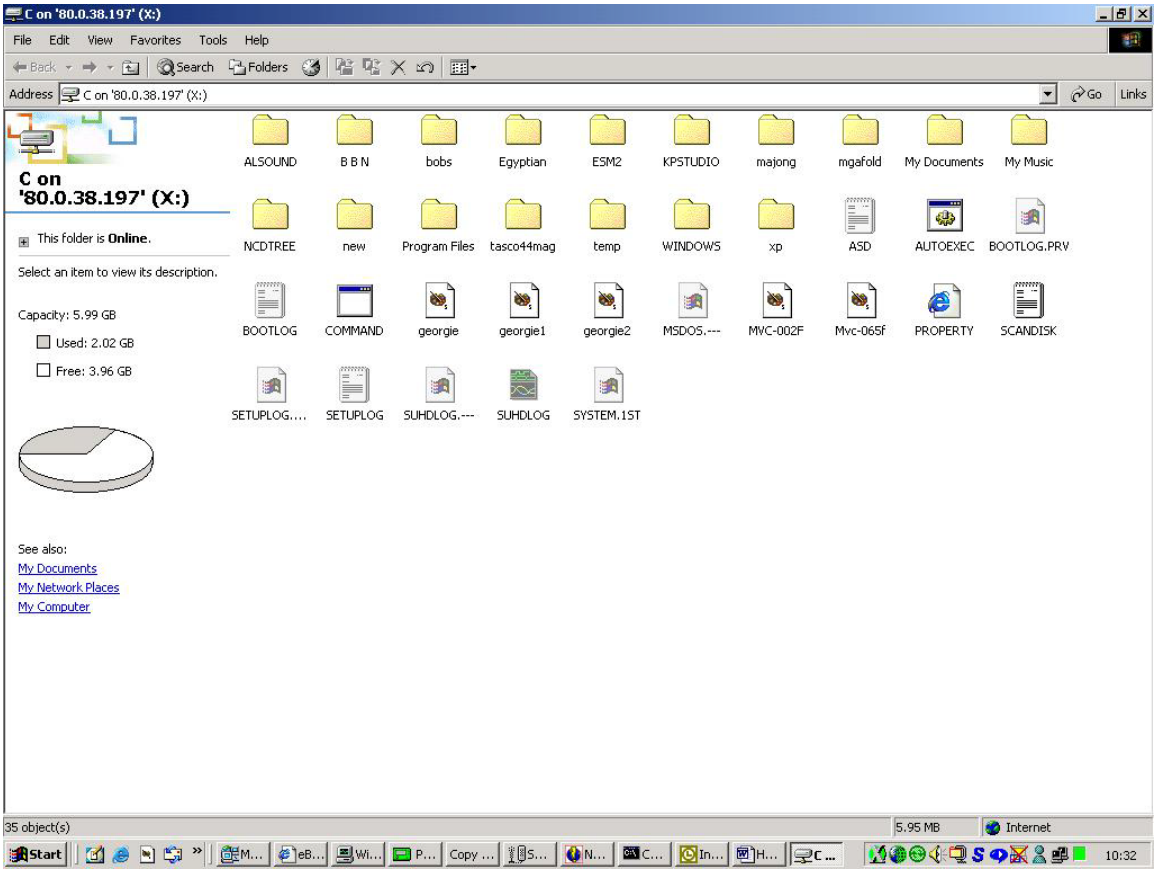
shared (You'd be amazed at some peoples stupidity!!!), this shows up as a result such as \\80.5.7.2\C or similar. Simply copy & paste this link into the address bar of Windows Explorer, and hit enter! This is a screenshot of Netbrute in operation:



For more comprehensive information, use a utility such as Languard Network Scanner. This returns a wealth of information such as domain names, login names, and more. Here is a shot of this in use:



Need I say more? If you find a system where the root directory of C: is shared, then on Windows 9.X systems, you'll be able to access the whole of the hard drive. On Windows NT/2000 systems, you will have only access as according to NTFS file access permissions. Here is a screenshot of Windows Explorer pointed at the root directory:



You can even map it to a network drive (use tools > map network drive), it's as easy as that!

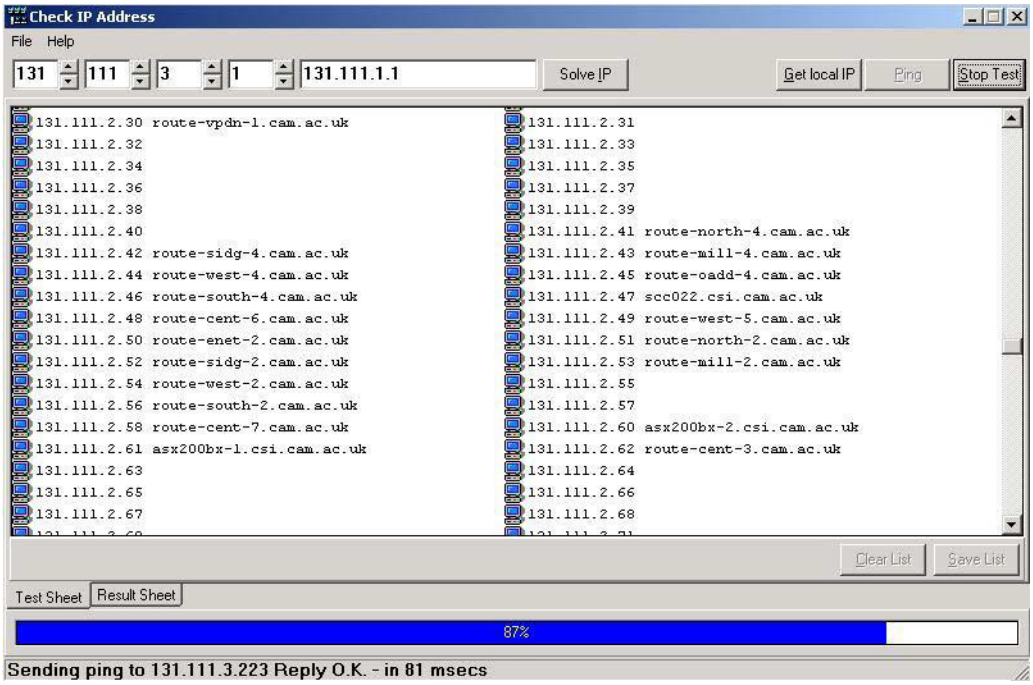
For best results, I recommend choosing systems with 'better than modem' connections. If you don't know where to start, try your own IP address. To get this, do the following:

- For Windows 9.X, go to start > Run and type 'Winipcfg' to get your IP address.
- For Windows NT/2000, got to start > programs > accessories > commend prompt, and type 'ipconfig'.

This will return your IP address. If you are using a dialup connection, you will need to connect first. For 'always on' cable connection, omit this step. Then run your scan over the subnet; e.g. if your IP address is 164.99.34.212 then try a scan from 164.99.34.1 to 164.99.34.254. This should be enough to get you started. Have fun…

IP Scanning

This simple scan simply pings a range of IP addresses to find which machines are alive. Note that more sophisticated scanners will use other protocols (such as an SNMP sweep) to do the same thing. This is a very simple technique which requires little explanation. It is however, useful for the domain name to be returned also.



Port Scanning

This section introduces many of the techniques used to determine what ports (or similar protocol abstraction) of a host are listening for connections. These ports represent potential communication channels. Mapping their existence facilitates the exchange of information with the host, and thus it is quite useful for anyone wishing to explore their networked environment, including hackers. Despite what you have heard from the media, the Internet is NOT exclusively reliant on TCP port 80, used by hypertext transfer protocol (HTTP). Anyone who relies exclusively on the WWW for information gathering is likely to gain the same level of proficiency as your average casual surfer. This section is also meant to serve as an introduction to the art of port scanning, in which a host system can be persuaded to yield up it's secrets. To accomplish this, you need to obtain a port scanner. There are many available both for free or for a small fee. It should have all these features:

- dynamic delay time calculations: Some scanners require that you supply a delay time between sending packets. Well how should I know what to use? You can always ping them, but that is a pain, and plus the response time of many hosts changes dramatically when they are being flooded with requests. For root users, the primary technique for finding an initial delay is to time the internal "ping" function. For non-root users, it times an attempted connect() to

a closed port on the target. It can also pick a reasonable default value. Again, people who want to specify a delay themselves can do so with -w (wait), but you shouldn't have to.

- Retransmission: Some scanners just send out all the query packets, and collect the responses. But this can lead to false positives or negatives in the case where packets are dropped. This is especially important for "negative" style scans like UDP and FIN, where what you are looking for is a port that does NOT respond.
- Parallel port scanning: Some scanners simply scan ports linearly, one at a time, until they do all 65535. This actually works for TCP on a very fast local network, but the speed of this is not

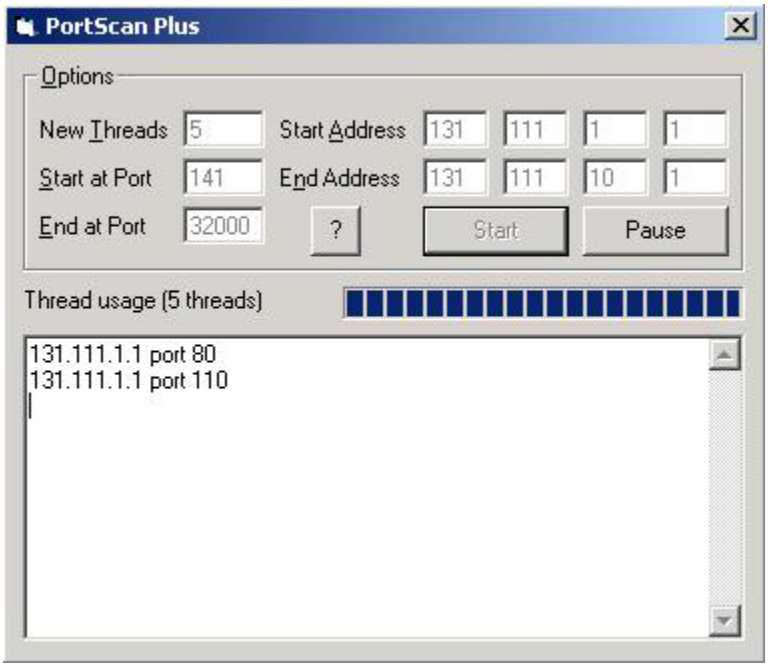
at all acceptable on a wide area network like the Internet. It is best to use non-blocking i/o and parallel scanning in all TCP and UDP modes. Flexible port specification: You don't always want to scan all 65535 ports! Also, the scanners which only allow you to scan ports 1 - N often fall short of my need. The scanner should allow you to specify an arbitrary number of ports and ranges for scanning. For example, '21-25,80-113' is often useful if you are only probing the most frequently running services.

- Flexible target specification: You may often want to scan more then one host, and you certainly don't want to list every single host on a large network! It is useful to scan, say a subnet at once, e.g. 131.111.11.0 – 131.111.11.254.
- Detection of down hosts: Some scanners allow you to scan large networks, but they waste a huge amount of time scanning 65535 ports of a dead host! Annoying! You are advised to choose a scanner which allows timeout intervals to be adjusted.
- Detection of your IP address: For some reason, a lot of scanners ask you to type in your IP address as one of the parameters. You don't want to have to 'ifconfig' and figure out your current IP address every time you connect. Of course, this is better then the scanners I've seen which require recompilation every time you change your address! If you are using a cable 'always on' connection, you may find that the IP address remains constant, as in my own case.

There are actually 65536 ports in all; however by convention services with which we are most familiar tend to use the lower numbers. Here are a few:

FTP	21
Telnet	23
SMTP	25
HTTP	80
POP3	110

Although the services can be configured to use other ports, this is very unusual. Ports above 1024 tend to be used by the operating system. Essentially a port scanner sends packets of data on each port in tern, and listens for replies to determine what services are running. A detailed list is available at the end of the document. This is an example of a simple port scanner in use:



Network Topology Views

This may be useful on occasion. It provides a graphical view of the resources on your network. For example, it may show which systems are behind a firewall, and which routers are on-line.

A 'network viewer'.

Packet Sniffing

A packet sniffer or protocol analyser is a wire-tap device that plugs into computer networks and eavesdrops on the network traffic. Like a telephone wiretap allows one to listen in on other people's conversations, a "sniffing" program lets someone listen in on computer conversations. However, computer conversations consist of apparently random binary data. Therefore, network wiretap programs also come with a feature known as "protocol analysis", which allow them to "decode" the computer traffic and make sense of it. Sniffing also has one advantage over telephone wiretaps: many networks use "shared media". This means that you don't need to break into a wiring closet to install your wiretap, you can do it from almost any network connection to eavesdrop on your neighbours. This is called a "promiscuous mode" sniffer. However, this "shared" technology is moving quickly toward "switched" technology where this will no longer be possible, which means you will have to actually tap into the wire.

There is no single point on the Internet where it is possible to 'see' all of the traffic. The connectivity of the Internet looks similar a fisherman's net. Traffic flows through a mesh, and no single point will see it all! The Internet was built to withstand a nuclear attack—and to survive any "single point of failure". This likewise prevents any single point of packet sniffing. Consider this situation: you have two machines in your own office talking to each other, and both are on the Internet. They take a direct route of communication, and the traffic never goes across the outside public portion of the Internet. Any communication anywhere in the net follows a similar "least-cost-path" principle.

Ethernet was built around a "shared" principle: all machines on a local network share the same wire. This implies that all machines are able to "see" all the traffic on the same wire. Therefore,

Ethernet hardware is built with a “filter” that ignores all traffic that doesn’t belong to it. It does this by ignoring all frames whose MAC address doesn’t match their own. A wiretap program effectively turns off this filter, putting the Ethernet hardware into “promiscuous mode”. Thus, Mark can see all the traffic between Alice and Bob, as long as they are on the same Ethernet wire.

Since many machines may share a single Ethernet wire, each must have an individual identifier. This doesn’t happen with dial-up modems, because it is assumed that any data you send to the modem is destined for the other side of the phone line. But when you send data out onto an Ethernet wire, you have to be clear which machine you intend to send the data to. Sure, in many cases today there are only two machines talking to each other, but you have to remember that Ethernet was designed for thousands of machines to share the same wire. This is accomplished by putting a unique 12-digit hex number in every piece of Ethernet hardware. To really understand why this is so important, you might want to review the information in section 5.4 below. Ethernet was designed to carry other traffic than just TCP/IP, and TCP/IP was designed to run over other wires (such as dial-up lines, which use no Ethernet). For example, many home users install “NetBEUI” for File and Print Sharing because it is unrelated to TCP/IP, and therefore hackers from across the Internet can’t get at their hard-drives.

Raw transmission and reception on Ethernet is governed by the Ethernet equipment. You just can’t send data raw over the wire, you must first do something to it that Ethernet understands. In much the same way, you can’t stick a letter in a mailbox, you must first wrap it in an envelope with an address and stamp.

Following a is a brief explanation how this works:

Alice has IP address: 10.0.0.23
Bob has IP address: 192.168.100.54
In order to talk to Bob, Alice needs to create an IP packet of the form 10.0.0.23-->192.168.100.54 . As the packet traverses the Internet, it will be passed from router-to-router. Therefore, Alice must first hand off the packet to the first router. Each router along the way will examine the destination IP address (192.168.100.54) and decide the correct path it should take.

All Alice knows about is the local connection to the first router, and Bob’s eventual IP address. Alice knows nothing about the structure of the Internet and the route that packet will take. Alice must talk to the router in order to send the packet. She uses the Ethernet to do so. An Ethernet frame looks like the following:
What this means is that the TCP/IP stack in Alice’s machine might create a packet that is 100 bytes long (let’s say 20 bytes for the IP info, 20 bytes for the TCP info, and 60 bytes of data). The TCP/IP stack then sends it to the Ethernet module, which puts 14 bytes on the front for the destination MAC address, source MAC address, and the ethertype 0x0800 to indicate that the other end’s TCP/IP stack should process the frame. It also attaches 4-bytes on the end with a checksum/CRC (a validator to check whether the frame gets corrupted as it goes across the wire). The adapter then sends the bits out onto the wire. All hardware adapters on the wire see the frame, including the ROUTER’s adapter, the packet sniffer, and any other machines. Proper adapters, however, have a hardware chip that compares the frame’s “destination MAC” with its own MAC address. If they don’t match, then it discards the frame. This is done at the hardware level, so the machine the adapter is attached to is completely unaware of this process.

When the ROUTER Ethernet adapter sees this frame, it reads it off the wire and removes the leading 14-bytes and the trailing 4-bytes. It looks at the 0x0800 ethertype and decides to send it to the TCP/IP stack for processing (which will presumably forward it to the next router in the chain toward the destination). In the above scenario, only the ROUTER machine is supposed to see the Ethernet frame, and all other machines are supposed to ignore it. The wiretap, however, breaks the rules and copies the frame off the network, too.

To see your own Ethernet address, do the following;

Win9x: Run the program “winipcfg.exe”. It will tell you.

WinNT/2000: Run the program “ipconfig /all” from the command-line. It will show the MAC address for your adapters. This is an example result:

Windows NT IP Configuration
Host Name . . . . . : sample.robertgraham.com
DNS Servers . . . . . : 192.0.2.254
Node Type . . . . . : Hybrid
NetBIOS Scope ID. . . . . :

IP Routing Enabled. . . . . : Yes
WINS Proxy Enabled. . . . . : No
NetBIOS Resolution Uses DNS : No
Ethernet adapter SC12001:

Description . . . . . : DEC DC21140 PCI Fast Ethernet Adapter

Physical Address. . . . . : 00-40-05-A5-4F-9D
DHCP Enabled. . . . . : No
IP Address. . . . . : 192.0.2.160
Subnet Mask . . . . . : 255.255.255.0
Default Gateway . . . . . : 192.0.2.1
Primary WINS Server . . . . : 192.0.2.253
Linux
Run the program “ifconfig”. Here is a sample result:

eth0 Link encap:Ethernet HWaddr 08:00:17:0A:36:3E
inet addr:192.0.2.161 Bcast:192.0.2.255 Mask:255.255.255.0
UP BROADCAST RUNNING MULTICAST MTU:1500 Metric:1
RX packets:1137249 errors:0 dropped:0 overruns:0
TX packets:994976 errors:0 dropped:0 overruns:0

Interrupt:5 Base address:0x300
Solaris: Use the “arp” or “netstat -p” command, it will often list the local interface among the ARP entries.

This is a sample packet before decoding:

```
000   00 00 BA 5E BA 11 00 A0 C9 B0 5E BD 08 00   45 00   ...^.....^...E.
010   05 DC 1D E4 40 00 7F 06 C2 6D 0A 00 00 02 0A 00   ....@....m......
020   01 C9          00 50 07 75 05 D0 00 C0 04 AE 7D F5 50 10   ...P.u......}.P.
030   70 79 8F 27 00 00 48 54 54 50 2F 31 2E 31 20 32   py.'..HTTP/1.1.2
040   30 30 20 4F 4B 0D 0A 56 69 61 3A 20 31 2E 30 20   00.OK..Via:.1.0.
050   53 54 52 49 44 45 52 0D 0A 50 72 6F 78 79 2D 43   STRIDER..Proxy-C
060   6F 6E 6E 65 63 74 69 6F 6E 3A 20 4B 65 65 70 2D   onnection:.Keep-
070   41 6C 69 76 65 0D 0A 43 6F 6E 74 65 6E 74 2D 4C   Alive..Content-L
080   65 6E 67 74 68 3A 20 32 39 36 37 34 0D 0A 43 6F   ength:.29674..Co
090   6E 74 65 6E 74 2D 54 79 70 65 3A 20 74 65 78 74   ntent-Type:.text
0A0   2F 68 74 6D 6C 0D 0A 53 65 72 76 65 72 3A 20 4D   /html..Server:.M
0B0   69 63 72 6F 73 6F 66 74 2D 49 49 53 2F 34 2E 30   icrosoft-IIS/4.0
0C0   0D 0A 44 61 74 65 3A 20 53 75 6E 2C 20 32 35 20   ..Date:.Sun,.25.
0D0   4A 75 6C 20 31 39 39 39 20 32 31 3A 34 35 3A 35   Jul.1999.21:45:5
0E0   31 20 47 4D 54 0D 0A 41 63 63 65 70 74 2D 52 61   1.GMT..Accept-Ra
0F0   6E 67 65 73 3A 20 62 79 74 65 73 0D 0A 4C 61 73   nges:.bytes..Las
100   74 2D 4D 6F 64 69 66 69 65 64 3A 20 4D 6F 6E 2C   t-Modified:.Mon,
110   20 31 39 20 4A 75 6C 20 31 39 39 39 20 30 37 3A   .19.Jul.1999.07:
120   33 39 3A 32 36 20 47 4D 54 0D 0A 45 54 61 67 3A   39:26.GMT..ETag:
130   20 22 30 38 62 37 38 64 33 62 39 64 31 62 65 31   ."08b78d3b9d1be1
140   3A 61 34 61 22 0D 0A 0D 0A   3C 74 69 74 6C 65 3E   :a4a"....<title>
150   53 6E 69 66 66 69 6E 67 20 28 6E 65 74 77 6F 72   Sniffing.(networ
160   6B 20 77 69 72 65 74 61 70 2C 20 73 6E 69 66 66   k.wiretap,.sniff
170   65 72 29 20 46 41 51 3C 2F 74 69 74 6C 65 3E 0D   er).FAQ</title>.
180   0A 0D 0A 3C 68 31 3E 53 6E 69 66 66 69 6E 67 20   ...<h1>Sniffing.
190   28 6E 65 74 77 6F 72 6B 20 77 69 72 65 74 61 70   (network.wiretap
1A0   2C 20 73 6E 69 66 66 65 72 29 20 46 41 51 3C 2F   ,.sniffer).FAQ</
1B0   68 31 3E 0D 0A 0D 0A 54 68 69 73 20 64 6F 63 75   h1>....This.docu
1C0   6D 65 6E 74 20 61 6E 73 77 65 72 73 20 71 75 65   ment.answers.que
1D0   73 74 69 6F 6E 73 20 61 62 6F 75 74 20 74 61 70   stions.about.tap
1E0   70 69 6E 67 20 69 6E 74 6F 20 0D 0A 63 6F 6D 70   ping.into...comp
1F0   75 74 65 72 20 6E 65 74 77 6F 72 6B 73 20 61 6E   uter.networks.an
```

This is the standard “hex dump” representation of a network packet, before being decoded. A hex dump has three columns: the offset of each line, the hexadecimal data, and the ASCII equivalent. This packet contains a 14-byte Ethernet header, a 20-byte IP header, a 20-byte TCP header, an HTTP header ending in two line-feeds (0D 0A 0D 0A) and then the data. The reason both hex and ASCII are shown is that sometimes ones is easier to read than the other. For example, at the top of the packet, the ASCII looks useless, but the hex is readable, from which you can tell, for example, that my MAC address is 00-00-BA-5E-BA-11. Each packet contains a 14-byte Ethernet header, a 20-byte IP header, a 20-byte TCP header, an HTTP header ending in two line-feeds (0D 0A 0D 0A) and then the data.

I need to explain the word ‘hexadecimal’. The word “decimal” has the root “dec”, meaning “10”. This means that there are 10 digits in this numbering system:

0 1 2 3 4 5 6 7 8 9

The word “hexadecimal” has the roots “hex” meaning 6 and “dec” meaning 10; add them together and you get 16. This means there are sixteen digits in this numbering system: 0 1 2 3 4 5 6 7 8 9 A B C D E F

The is useful because all data is stored by a computer as “bits” (binary-digits, meaning two digits: 0 1), but all bits are grouped into 8-bit units known as “bytes” or “octets”, which in theory have 256 digits. Bits are two small to view data, because all we would see is a stream like 00101010101000010101010110101101101011110110, which is unreadable. Similarly, using 256 digits would be impossible: who can memorize that many different digits? Hexadecimal breaks a “byte” down into a 4-bit “nibble”, which has 16-combinations (256 = 16*16). This allows us to represent each bytes as two hexadecimal digits. Hexadecimal allows technical people to visualize

the underlying binary data. This is an explanation of the hexadecimal numbering system:

0000 = 0 0001 = 1 0010 = 2 0011 = 3
0100 = 4 0101 = 5 0110 = 6 0111 = 7
1000 = 8 1001 = 9 1010 = A 1011 = B
1100 = C 1101 = D 1110 = E 1111 = F

In other words, when you encounter the hexadecimal digit "B", you should immediately visualize the bit pattern "1011" in your head. It is much like memorizing multiplication tables as a kid, memorizing this table will serve much the same purpose. Hexadecimal is often preceded by a special character(s). For example, when you see the number "12", is this "twelve" (decimal) or "eighteen" (hexadecimal)? If it is hex, it is often written as either "0x12", "x12", or "$12". The former is the preferred version, since that is how many programming languages represent it. Naturally, this isn't needed for hex dumps because the fact we are showing hex is pretty much assumed. Computers represent everything as numbers. This means the text your are reading right now is represented as numbers within the computer. ASCII is one such representation. In ASCII, the letter 'A' is represented by the number 65, or in hex, 0x41. The letter 'B" is represented by the number 66/0x42. And the process continues for all characters, numbers, punctuation, and so forth. If you look at the normal (English) keyboard you will count 32 punctuation characters, 10 decimal digits, 26 letters, and 26 more letters when you take into account UPPER/lower case. This comes to 94 different characters. In binary, you need 7-bits to represent that number of combinations. This maps nicely onto the standard 8-bit bytes used in computers, with room left over. In hex dumps, note that the ASCII columns contains lots of periods. A byte has 256 combinations, but we can only view 94 of them. Any character that is not one of these 94 visible characters is shown as a period.

Anyhow, if you want to try packet sniffing, I hope I have now provided the information you need to get started. You can download a packet sniffer free from the web as either shareware or freeware. Give it a go! By now, you must be feeling that there is a good chance that your boss may well have been snooping on your use of the corporate LAN and/or the internet all along! Is there no such thing as privacy at work nowadays? If you have a score to settle, the next section is for you…

Statistical Databases

This may seem rather a departure from the 'domestic' hacking scene. But on reflection of some queries I have recently received relating to corporate databases, particularly relating to salary and employment details, I decided to give this topic a mention.

Have you ever wanted to somehow, obtain from your employer's database, details relating to the personnel department? In this dreadful world of job insecurity and appraisal schemes, the author has just cause to explain a possible means to learn employer's secrets.

A statistical database is, in it's simplicity, a store of information relating to the infrastructure of entire organisations. This includes personal and employee details. These systems are implemented by means of Microsoft Access, MYSQL and other similar software, but what they all have in common is that one fact must be stored in one place. This is vital to ensure that queries return unique results. Please note that, in order to use this information successfully, a working knowledge of SQL (Structured Query Language) and relational algebra, is assumed. Some operand details are provided; however please note that this is not a SQL reference manual! This is a huge topic. I am simply suggesting possible means by which they may be manipulated in order to yield up details to which the database administrator has forbidden you access. The methods of trying to bypass access restrictions either may or may not work on all systems; the author merely

states that they have been successfully tried with success on *some* experimental databases.

Hacking a Statistical Database

'Views' are used by a database administrator in order to hide certain data from those who do not need access to it according to their job description. For example, take this simple database for a small company having 10 employees:

Fname	Lname	Sex	dependents	occupation	Salary	Tax	audit
John	Harris	M 3		Programmer 25k		5k 3	
Lisa	White F	2		Receptionist 15k		3k 0	
Alison	Baker	F 0		Programmer	25k	5k	1
Emma	Foster	F 2		Secretary	13k	2.5k 1	
Steve	Smith	M 2		Manager	30k	6k 0	
Ann	Reid	F 1		Clerk	25k	5.5k 0	
Micheal	Roberts	M	0	Secretary	12k	2k	0
Tom	Reynolds M	3		Porter	11k	2k 0	
Pauline	Blackman F		4	Programmer	18k	3.5k 1	
Sandra	Moore	F	1	Programmer	21k	4k	1

Suppose you wanted to find out John Harris's salary. However, you do not have access to the salary and tax columns, as your administrator has excluded you from this view, as company policy states that only the personel department need access to this data. The key is not accessible to users. However, anyone with a limited knowledge of relational algebra can still get the information they seek…

We must arm ourselves with what we do know about John. We know that he is male and is a programmer. Without any protection other than the view set by the database administrator, these queries will flush out his salary:

SELECT COUNT (*) FROM Stats

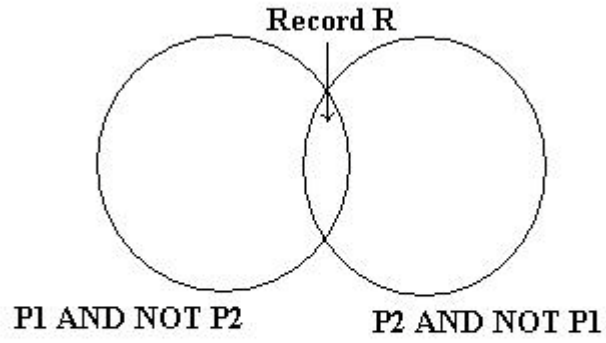
WHERE sex = 'M' AND Occupation = 'Programmer'
Response 1
We have a single male programmer!
SELECT Sum(salary) Sum(tax) FROM Stats
WHERE Sex = 'M' AND occupation = 'Programmer'

Response 25k, 5k
We have found John's salary out. This single tuple attack is unlikely to work as, for security the administrator may have ruled that a query must say, more than one tuple. Therefore a single subject cannot be weeded out as before. However the multi-tuple manipulation can counter this as follows.

SELECT COUNT (*) FROM Stats
Response 10
SELECT COUNT (*) FROM Stats
WHERE NOT (sex = 'M' AND occupation = 'Programmer'
Response 9 (10 –1 = 9)
SELECT Sum(salary) Sum(tax) FROM Stats
Response 195k, 38.5k
SELECT Sum(salary) Sum(tax) FROM Stats
WHERE NOT Sex = 'M' AND occupation = 'Programmer'
Response 170k, 33.5k
So 195 – 170 = 25, 38.5 – 33.5 =5
Answer = 25k, 5k
We have still got Johns salary! As the response in each case contained more than one tuple, it passed as an admissible query!

The individual tracker approach

This method utilises predicates about John to construct queries.
SELECT COUNT (*) FROM Stats
WHERE sex = 'M'
Response 4
So there exist 4 males on the database.
SELECT COUNT (*) FROM Stats
WHERE sex = 'M' AND NOT (occupation = 'programmer')
Response 3
So there is only 1 male programmer.
SELECT Sum(salary) Sum(tax) FROM Stats
WHERE Sex = 'M'
Response 78k, 15k
SELECT Sum(salary) Sum(tax) FROM Stats
WHERE Sex = 'M' AND NOT (occupation = 'programmer')
Response 53k, 10k
So 78-53=25 and 15-10=5
Result 25k,5k
So as before, we have John's salary. If we have a predicate about a specific record, i.e. John is male AND a programmer, we can formulate queries to obtain the results we wish to obtain. This can be summed up as P1 AND P2. The predicate P1 AND NOT P2 can be used as a tracker for that individual record.



(Simple set Theory)

Hardware Tricks

For the hacker with some knowledge of computer hardware and general electronics, and who is prepared to mess about with circuit diagrams, a soldering iron and perhaps a voltmeter, logic probe or oscilloscope, still further possibilities open up. One of the most useful bits of kit consists of a small cheap radio receiver (MW/AM band), a microphone and a tape recorder. Radios in the vicinity of computers, modems and telephone lines can readily pick up the chirp chirp of digital communications without the need of carrying out a physical phone 'tap'.Alternatively, an inductive loop with a small low-gain amplifier in the vicinity of a telephone or line will give you a recording you can analyse later at your leisure.

By identifying the pairs of tones being used, you can separate the caller and the host. By feeding the recorded tones onto an oscilloscope display you can freeze bits, 'characters' and 'words'; you can strip off the start and stop bits and, with the aid of an ASCII-to-binary table, examine what is happening. With experience it is entirely possible to identify a wide range of protocols simply from the 'look' of an oscilloscope. A cruder technique is simply to record and playback sign-on sequences; the limitation is that, even if you manage to log on, you may not know what to do afterwards. Listening on phone lines is of course a technique also used by some sophisticated robbers. In 1982 the Lloyds Bank Holborn branch was raided; the alarm did not ring because the thieves had previously recorded the 'all-clear' signal from the phone line and then, duringthe break-in, replayed the recording up the line to the alarm monitoring apparatus. Sometimes the hacker must devise ad hoc bits of hardware trickery in order to achieve his ends. Access has been obtained to a well-known financial prices service largely by stringing together a series of simple hardware skills. The service is available mostly on leased lines, as the normal vagaries of dial-up would be too unreliable for the City folk who are the principal customers.

However, each terminal also has an associated dial-up facility, in case the leased line should go down; and in addition, the same terminals can have access to Prestel. Thus the hacker thought that it should be possible to access the service with ordinary viewdata equipment instead of the special units supplied along with the annual subscription. Obtaining the phone number was relatively easy: it was simply a matter of selecting manual dial-up from the appropriate menu, and listening to the pulses as they went through the regular phone.

The next step was to obtain a password. The owners of the terminal to which the hacker had access did not know their ID; they had no need to know it because it was programmed into the terminal and sent automatically. The hacker could have put micro 'back-to-front' across the line and sent a ENQ to see if an ID would be sent back. Instead he tried something less obvious.

The terminal was known to be programmable, provided one knew how and had the right type of keyboard. Engineers belonging to the service had been seen doing just that. How could the hacker acquire 'engineer' status? He produced the following hypothesis: the keyboard used by the service's customers was a simple affair, lacking many of the obvious keys used by normal terminals; the terminal itself was manufactured by the same company that produced a range of editing terminals for viewdata operators and publishers. Perhaps if one obtained a manual for the editing terminal, important clues might appear. A suitable photocopy was obtained and, lo and behold, there were instructions for altering terminal IDs, setting auto-diallers and so on.

Linux & Unix for beginners

Unix has become the primo operating system of the Internet. In fact, Unix is the most widely used operating system in the world among computers with more power than PCs. True, Windows NT is coming up fast as a common Internet operating system. But today Unix in all its flavours still is the operating system to know in order to be a truly elite hacker. So far we have assumed that you have been hacking using a shell account that you get through your Internet Service Provider (ISP). A shell account allows you to give Unix commands on one of your ISP's computers. But you don't need to depend on your ISP for a machine that lets you play with Unix. You can run Unix on your own computer and with a SLIP or PPP connection be directly connected to the Internet.

Note: Serial Line Internet Protocol (SLIP) and Point-to-Point Protocol (PPP) connections give you a temporary Internet Protocol (IP) address that allows you to be hooked directly to the Internet. You have to use either SLIP or PPP connections to get to use a Web browser that gives you pictures instead on text only. So if you can see pictures on the Web, you already have one of these available to you. The advantage of using one of these direct connections for your hacking activities is that you will not leave behind a shell log file for your ISP's sysadmin to study. Even if you are not breaking the law, a shell log file that shows you doing lots of hacking can be enough for some sysadmins to summarily close your account.

What is the best kind of computer to run Unix on? Unless you are a wealthy hacker who thinks nothing of buying a Sun SPARC workstation, you'll probably do best with some sort of PC. There are almost countless variants of Unix that run on PCs, and a few for Macs. Most of them are free for download, or inexpensively available on CD-ROMs. The three most common variations of Unix that run on PCs are Sun's Solaris, FreeBSD and Linux. Solaris costs around $700. Enough said. FreeBSD is very good indeed.

Linux, however, has the advantage of being available in many variants (so you can have fun mixing and matching programs from different Linux offerings). Most importantly, Linux is supported by many manuals, news groups, mail lists and Web sites. out.

Historical note: Linux was created in 1991 by a group led by Linus Torvalds of the University of Helsinki. Linux is copyrighted under the GNU General Public License. Under this agreement, Linux may be redistributed to anyone along with the source code. Anyone

can sell any variant of Linux and modify it and repackage it. But even if someone modifies the source code he or she may not claim copyright for anything created from Linux. Anyone who sells a modified version of Linux must provide source code to the buyers and allow them to reuse it in their commercial products without charging licensing fees. This arrangement is known as a "copyleft." Under this arrangement the original creators of Linux receive no licensing or shareware fees. Linus Torvalds and the many others who have contributed to Linux have done so from the joy of programming and a sense of community with all of us who will hopefully use Linux in the spirit of good guy hacking. Viva Linux! Viva Torvalds! Linux consists of the operating system itself (called the "kernel") plus a set of associated programs.

The kernel, like all types of Unix, is a multitasking, multi-user operating system. Although it uses a different file structure, and hence is not directly compatible with DOS and Windows, it is so flexible that many DOS and Windows programs can be run while in Linux. So a power user will probably want to boot up in Linux and then be able to run DOS and Windows programs from Linux. Associated programs that come with most Linux distributions may include:

* a shell program (Bourne Again Shell -- BASH -- is most common);
* compilers for programming languages such as Fortran-77 (my favorite!), C, C++, Pascal, LISP, Modula-2, Ada, Basic (the best language for a beginner), and Smalltalk.;
* X (sometimes called X-windows), a graphical user interface
* utility programs such as the email reader Pine (my favorite) and Elm

Top ten reasons to install Linux on your PC:

1.When Linux is outlawed, only outlaws will own Linux.

2. When installing Linux, it is so much fun to run fdisk without backing up first.

3.The flames you get from asking questions on Linux newsgroups are of a higher quality than the flames you get for posting to alt.sex.bestiality.

4.No matter what flavor of Linux you install, you'll find out tomorrow there was a far more 3l1te ersion you should have gotten instead.

5.People who use Free BSD or Solaris will not make fun of you. They will offer their sympathy instead.

6.At the next Def Con you'll be able to say stuph like "so then I su-ed to his account and grepped all his files for 'kissyface'." Oops, grepping other people's files is a no-no, forget I ever suggested it.

7.Port surf in privacy.

8.One word: exploits.

9.Installing Linux on your office PC is like being a postal worker and bringing an Uzi to work.

10.But - - if you install Linux on your office computer, you boss won't have a clue what that means.

What types of Linux work best? It depends on what you really want. Redhat Linux is famed for being the easiest to install. The Walnut Creek Linux 3.0 CD-ROM set is also really easy to install -- for Linux, that is! My approach has been to get lots of Linux versions and mix and match the best from each distribution. I like the Walnut Creek version best because with my brand X hardware, its autodetection feature was a life-saver.

INSTALLING LINUX is not for the faint of heart! Several tips for surviving installation are:

1) Although you in theory can run Linux on a 286 with 4 MB RAM and two floppy drives, it is *much* easier with a 486 or above with 8 MB RAM, a CD-ROM, and at least 200 MB free hard disk space.

2) Know as much as possible about what type of mother board, modem, hard disk, CD-

ROM, and video card you have. If you have any documentation for these, have them on hand to reference during installation.
3) It works better to use hardware that is name-brand and somewhat out-of-date on your computer. Because Linux is freeware, it doesn't offer device drivers for all the latest hardware. And if your hardware is like mine -- lots of Brand X and El Cheapo stuph, you can take a long time experimenting with what drivers will work.
4) Before beginning installation, back up your hard disk(s)! In theory you can install Linux without harming your DOS/Windows files. But we are all human, especially if following the advice of point 7).
5) Get more than one Linux distribution. The first time I successfully installed Linux, I finally hit on something that worked by using the boot disk from one distribution with the CD-ROM for another. In any case, each Linux distribution had different utility programs, operating system emulators, compilers and more. Add them all to your system and you will be set up to become beyond elite.
6) Buy a book or two or three on Linux. I didn't like any of them! But they are better than nothing. Most books on Linux come with one or two CD-ROMs that can be used to install Linux. But I found that what was in the books did not exactly coincide with what was on the CD-ROMs.
7) I recommend drinking while installing. It may not make debugging go any faster, but at least you won't care how hard it is.
Now I can almost guarantee that even following all these 6 pieces of advice, you will still have problems installing Linux. Oh, do I have 7 advisories up there? Forget number 7. But be of good cheer. Since everyone else also suffers mightily when installing and using Linux, the Internet has an incredible wealth of resources for the Linux -challenged.
If you are allergic to getting flamed, you can start out with Linux support Web sites. The best I have found is http://sunsite.unc.edu:/pub/Linux/. It includes the Linux Frequently Asked Questions list (FAQ), available from sunsite.unc.edu:/pub/Linux/docs/FAQ.

In the directory /pub/Linux/docs on sunsite.unc.edu you'll find a number of other documents about Linux, including the Linux INFO-SHEET and META-FAQ,
The Linux HOWTO archive is on the sunsite.unc.edu Web site at: /pub/Linux/docs/HOWTO. The directory /pub/Linux/docs/LDP contains the current set of LDP manuals. You can get ``Linux Installation and Getting Started'' from sunsite.unc.edu in /pub/Linux/docs/LDP/install-guide. The README file there describes how you can order a printed copy of the book of the same name (about 180 pages).
Now if you don't mind getting flamed, you may want to post questions to the amazing number of Usenet news groups that cover Linux. These include:

comp.os.linux.advocacy Benefits of Linux compared
comp.os.linux.development.system Linux kernels, device drivers
comp.os.linux.x Linux X Window System servers
comp.os.linux.development.apps Writing Linux applications
comp.os.linux.hardware Hardware compatibility
comp.os.linux.setup Linux installation
comp.os.linux.networking Networking and communications
comp.os.linux.answers FAQs, How-To's, READMEs, etc.
linux.redhat.misc
alt.os.linux Use comp.os.linux.* instead
alt.uu.comp.os.linux.questions Usenet University helps you
comp.os.linux.announce Announcements important to Linux

comp.os.linux.misc Linux-specific topics Want your Linux free? Tobin Fricke has pointed out that "free copies of Linux CD-ROMs are available the Linux Support & CD Givaway web site at http://emile.math.ucsb.edu:8000/giveaway.html. This is a project where people donate Linux CD's that they don't need any more. The project was seeded by Linux Systems Labs, who donated 800 Linux CDs initially! Please remember to donate your Linux CD's when you are done with them. If you live near a computer swap meet, Fry's, Microcenter, or other such place, look for Linux CD's there. They are usually under $20, which is an excellent investment. I personally like the Linux Developer's Resource by Infomagic, which is now up to a seven CD set, I believe, which includes all major Linux distributions (Slackware, Redhat, Debian, Linux for DEC Alpha to name a few)plus mirrors of tsx11.mit.edu and sunsite.unc.edu/pub/linux plus much more. You should also visit the WONDERFUL linux page at http://sunsite.unc.edu/linux, which has tons of information, as well as the http://www.linux.org/. You might also want to check out http://www.redhat.com/ and http://www.caldera.com/ for more information on commercial versions of linux (which are still freely available under GNU)."

What about Linux security? Yes, Linux, like every operating system, is imperfect. Eminently hackable, if you really want to know. So if you want to find out how to secure your Linux system, or if you should come across one of the many ISPs that use Linux and want to go exploring (oops, forget I wrote that), here's where you can go for info: ftp://info.cert.org/pub/cert_advisories/CA-94:01.network.monitoring.attacks ftp://info.cert.org/pub/tech_tips/root_compromise http://bach.cis.temple.edu/linux/linux-security/ http://www.geek-girl.com/bugtraq/ There is also help for Linux users on Internet Relay Chat (IRC). Ben (cyberkid@usa.net) hosts a channel called #LinuxHelp on the Undernet IRC server.

Brief SQL Reference

To get all columns of a table without typing all column names, use: SELECT * FROM TableName; To get the total number of tuples (rows): SELECT Count(*); FROM EMPLOYEE To get the total number of female employees in reception: SELECT Count (*) FROM EMPLOYEE WHERE sex = ‘m’ AND Department = ‘reception’;

Relational Operators

There are six Relational Operators in SQL, and after introducing them, we’ll see how they’re used: = Equal <> or != Not Equal < Less Than > Greater Than <= Less Than or Equal To >= Greater Than or Equal To

For example, if you wanted to see the EMPLOYEE ID NO’s of those making at least, or over $50,000, use the following:

SELECT EMPLOYEEIDNO FROM EMPLOYEESTATISTICSTABLE WHERE SALARY >= 50000;

Notice that the >= (greater than or equal to) sign is used, as we wanted to see those who made greater than $50,000, or equal to $50,000, listed together.

The *WHERE* description, SALARY >= 50000, is known as a *condition* (an operation which evaluates to True or False). The same can be done for text columns:

SELECT EMPLOYEEIDNO FROM EMPLOYEE STATISTICSTABLE WHERE POSITION = ‘Manager’;

This displays the ID Numbers of all Managers.

More Complex Conditions: Compound Conditions / Logical Operators

The *AND* operator joins two or more conditions, and displays a row only if that row’s data satisfies **ALL** conditions listed (i.e. all conditions hold true). For example, to display all staff making over $40,000, use:

SELECT EMPLOYEIDNO

FROM EMPLOYEESTATISTICSTABLE
WHERE SALARY > 40000 AND POSITION = ‘Staff’;

The *OR* operator joins two or more conditions, but returns a row if **ANY** of the conditions listed hold true. To see all those who make less than $40,000 or have less than $10,000 in benefits, listed together, use the following query:

SELECT EMPLOYEEIDNO FROM EMPLOYEESTATISTICSTABLE WHERE SALARY < 40000 OR BENEFITS < 10000

AND & OR can be combined, for example:

SELECT EMPLOYEEIDNO

FROM EMPLOYEESTATISTICSTABLE
WHERE POSITION = ‘Manager’ AND SALARY > 60000 OR BENEFITS > 12000;

First, SQL finds the rows where the salary is greater than $60,000 and the position column is equal to Manager, then taking this new list of rows, SQL then sees if any of these rows satisfies the previous AND condition or the condition that the Benefits column is greater than $12,000. Subsequently, SQL only displays this second new list of rows, keeping in mind that anyone with Benefits over $12,000 will be included as the OR operator includes a row if either resulting condition is True. Also note that the AND operation is done first. This is a law of Boolean algerbra. This is analogous to

the principle of mathematics which state that ‘multiplication and division take precedence over addition and subtraction’.
To perform OR’s before AND’s, like if you wanted to see a list of employees making a large salary (>$50,000) or have a large benefit package (>$10,000), and that happen to be a manager, use parentheses:

SELECT EMPLOYEEIDNO

FROM EMPLOYEESTATISTICSTABLE
WHERE POSITION = ‘Manager’ AND (SALARY > 50000 OR BENEFIT > 10000);

IN & BETWEEN

An easier method of using compound conditions uses *IN* or *BETWEEN*. For example, if you wanted to list all managers and staff:

SELECT EMPLOYEEIDNO FROM EMPLOYEESTATISTICSTABLE WHERE POSITION IN ('Manager', 'Staff'); or to list those making greater than or equal to $30,000, but less than or equal to $50,000, use:

SELECT EMPLOYEEIDNO FROM EMPLOYEESTATISTICSTABLE WHERE SALARY BETWEEN 30000 AND 50000;

To list everyone not in this range, try:

SELECT EMPLOYEEIDNO FROM EMPLOYEESTATISTICSTABLE WHERE SALARY NOT BETWEEN 30000 AND 50000; Similarly, NOT IN lists all rows excluded from the *IN* list. Additionally, NOT's can be thrown in with AND's & OR's, except that NOT is a unary operator (evaluates one condition, reversing its value, whereas, AND's & OR's evaluate two conditions), and that all NOT's are performed before any AND's or OR's.

SQL Order of Logical Operations (each operates from left to right) 1. NOT 2. AND 3. OR

Using *LIKE*

If you wanted to see all people whose last names started with "L"; try: SELECT EMPLOYEEIDNO FROM EMPLOYEESTATISTICSTABLE WHERE LASTNAME LIKE 'L%'; The percent sign (%) is used to represent any possible character (number, letter, or punctuation) or set of characters that might appear after the "L". To find those people with LastName's ending in "L", use '%L', or if you wanted the "L" in the middle of the word, try '%L%'. The '%' can be used for any characters in the same position relative to the given characters. NOT LIKE displays rows not fitting the given description. Other possiblities of using LIKE, or any of these discussed conditionals, are available, though it depends on what DBMS you are using; as usual, consult a manual for the available features on your system, or just to make sure that what you are trying to do is available and allowed. This disclaimer holds for the features of SQL that will be discussed below. This section is just to give you an idea of the possibilities of queries that can be written in SQL.

Joins

In this section, we will only discuss *inner* joins, and *equijoins*, as in general, they are the most useful. For more information, refer to an SQL manual.

Good database design suggests that each table lists data only about a single *entity*, and detailed information can be obtained in a relational database, by using additional tables, and by using a *join*.

First, take a look at these example tables:

AntiqueOwners

OwnerID OwnerLastName OwnerFirstName 01 Jones Bill 02 Smith Bob 15 Lawson Patricia 21 Akins Jane 50 Fowler Sam

Orders

OwnerID ItemDesired 02 Table 02 Desk 21 Chair 15 Mirror

Antiques

SellerID BuyerID Item 01 50 Bed 02 15 Table 15 02 Chair 21 50 Mirror 50 01 Desk 01 21 Cabinet 02 21 Coffee Table 15 50 Chair 01 15 Jewelry Box 02 21 Pottery 21 02 Bookcase 50 01 Plant Stand

Keys

First, let's discuss the concept of *keys*. A *primary key* is a column or set of columns that uniquely identifies the rest of the data in any given row. For example, in the AntiqueOwners table, the OwnerID column uniquely identifies that row. This means two things: no two rows can have the same OwnerID, and, even if two owners have the same first and last names, the OwnerID column ensures that the two owners will not be confused with each other, because the unique OwnerID column will be used throughout the database to track the owners, rather than the names.

A *foreign key* is a column in a table where that column is a primary key of another table, which means that any data in a foreign key column must have corresponding data in the other table where that column is the primary key. In DBMS-speak, this correspondence is known as *referential integrity*. For example, in the Antiques table, both the BuyerID and SellerID are foreign keys to the primary key of the AntiqueOwners table (OwnerID; for purposes of argument, one has to be an Antique Owner before one can buy or sell any items), as, in both tables, the ID rows are used to identify the owners or buyers and sellers, and that the OwnerID is the primary key of the AntiqueOwners table. In other words, all of this "ID" data is used to refer to the owners, buyers, or sellers of antiques, themselves, without having to use the actual names.

Performing a Join

The purpose of these *keys* is so that data can be related across tables, without having to repeat data in every table— this is the power of relational databases. For example, you can find the names of those who bought a chair without having to list the full name of the buyer in the Antiques table...you can get the name by relating those who bought a chair with the names in the AntiqueOwners table through the use of the OwnerID, which *relates* the data in the two tables. To find the names of those who bought a chair, use the following query:

SELECT OWNERLASTNAME, OWNERFIRSTNAME

FROM ANTIQUEOWNERS, ANTIQUES

WHERE BUYERID = OWNERID AND ITEM = 'Chair';

Note the following about this query...notice that both tables involved in the relation are listed in the FROM clause of the statement. In the WHERE clause, first notice that the ITEM = 'Chair' part restricts the listing to those who have bought (and in this example, thereby owns) a chair. Secondly, notice how the ID columns are related from one table to the next by use of the BUYERID = OWNERID clause. Only where ID's match across tables and the item purchased is a chair (because of the AND), will the names from the AntiqueOwners table be listed. Because the joining condition used an equal sign, this join is called an *equijoin*. The result of this query is two names: Smith, Bob & Fowler, Sam.

Dot notation refers to prefixing the table names to column names, to avoid ambiguity, as follows:

SELECT ANTIQUEOWNERS.OWNERLASTNAME, ANTIQUEOWNERS.OWNERFIRSTNAME

FROM ANTIQUEOWNERS, ANTIQUES
WHERE ANTIQUES.BUYERID = ANTIQUEOWNERS.OWNERID AND ANTIQUES.ITEM = 'Chair';

As the column names are different in each table, however, this wasn't necessary.

***DISTINCT* and Eliminating Duplicates**

Let's say that you want to list the ID and names of **only** those people who have sold an antique. Obviously, you want a list where each seller is only listed once—you don't want to know how many antiques a person sold, just the fact that this person sold one (for counts, see the Aggregate Function section below). This means that you will need to tell SQL to eliminate duplicate sales rows, and just list each person only once. To do this, use the *DISTINCT* keyword.

First, we will need an equijoin to the AntiqueOwners table to get the detail data of the person's LastName and FirstName. However, keep in mind that since the SellerID column in the Antiques table is a foreign key to the AntiqueOwners table, a seller will only be listed if there is a row in the AntiqueOwners table listing the ID and names. We also want to eliminate multiple occurences of the SellerID in our listing, so we use *DISTINCT* **on the column where the repeats may occur.**

To throw in one more twist, we will also want the list alphabetized by LastName, then by FirstName (on a LastName tie). Thus, we will use the *ORDER BY* clause:

SELECT DISTINCT SELLERID, OWNERLASTNAME, OWNERFIRSTNAME FROM ANTIQUES, ANTIQUEOWNERS WHERE SELLERID = OWNERID ORDER BY OWNERLASTNAME, OWNERFIRSTNAME;

In this example, since everyone has sold an item, we will get a listing of all of the owners, in alphabetical order by last name. For future reference (and in case anyone asks), this type of join is considered to be in the category of *inner joins.* Please note that by no means is this a complete reference!!! It is, however, a guide to the queries you will need to know in order to (hopefully) extract the data you seek. Have fun…

The 'Ping of Death'

Essentially, it is possible to crash, reboot or otherwise kill a large number of systems by sending a ping of a certain size from a remote machine. This is a serious problem, mainly because this can be reproduced very easily, and from a remote machine. The attacker needs to know nothing about the machine other than its IP address. Be afraid.

It's very easy to exploit - basically, some systems don't like being pinged with a packet greater than 65536 bytes (as opposed to the default 64 bytes).

An IP datagram of 65536 bytes is illegal, but possible to create owing to the way the packet is fragmented (broken into chunks for transmission). When the fragments are reassembled at the other end into a complete packet, it overflows the buffer on some systems, causing a reboot, panic

or hang, but sometimes even having no effect at all.

Most implementations of ping won't allow an invalid datagram like this to be sent. Among the exceptions are Windows '95 and NT, although they are certainly not the only ones...

IP packets as per RFC-791 can be up to 65,535 (2^16-1) octets long, which includes the header length (typically 20 octets if no IP options are specified. An ICMP ECHO request "lives" inside the IP packet, consisting of eight octets of ICMP header information (RFC-792) followed by the number of data octets in the "ping" request. Hence the maximum allowable size of the data area is 65535 - 20 - 8 = 65507 octets.

Note that it is possible to send an illegal echo packet with more than 65507 octets of data due to the way the fragmentation is performed. The fragmentation relies on an offset value in each fragment to determine where the individual fragment goes upon reassembly. Thus on the last fragment, it is possible to combine a valid offset with a suitable fragment size such that (offset + size) > 65535. Since typical

machines don't process the packet until they have all fragments and have tried to reassemble it, there is the possibility for overflow of 16 bit internal variables, which can lead to system crashes, reboots, kernel dumps and the like. The problem can be exploited by anything that sends an IP datagram - probably the most fundamental building block of the net. Not only ICMP echo, but TCP, UDP and (apparently) even new style IPX can be used to hit machines where it hurts. This bug is extremely easy to exploit. Users are already trying it out "just to see if it works"!

Port Numbers and Services

This data is from Internet Assigned Numbers Authority (IANA). IANA maintains the Assigned Numbers RFC. The entries in this file are in the same format as found in a standard Berkeley UNIX /etc/services file. There are also links between the protocol and services names, and their respective RFCs (their standard documentation). This file has two sections:

Well known Port Numbers: port numbers that IANA assigns Registered Port Numbers: port numbers that IANA does not assign. This provides a list of which ports are used my which services. There really is more to the net than HTTP alone!

WELL KNOWN PORT NUMBERS

The Well Known Ports are controlled and assigned by the IANA and on most systems can only be used by system (or root) processes or by programs executed by privileged users. Ports are used in the TCP [RFC793] to name the ends of logical connections which carry long term conversations. For the purpose of providing services to unknown callers, a service contact port is defined. This list specifies the port used by the server process as its contact port. The contact port is sometimes called the "well-known port".

To the extent possible, these same port assignments are used with the UDP [RFC768].

The assigned ports use a small portion of the possible port numbers. For many years the assigned ports were in the range 0-255. Recently, the range for assigned ports managed by the IANA has been expanded to the range 0-1023.

[Go back to top of file]

Port Assignments:

Keyword	Decimal	Description	References
	0/tcp	Reserved	
	0/udp	Reserved	
#		Jon Postel <postel@isi.edu>	
tcpmux	1/tcp	TCP Port Service Multiplexer	
tcpmux	1/udp	TCP Port Service Multiplexer	
#		Mark Lottor <MKL@nisc.sri.com>	
compressnet	2/tcp	Management Utility	
compressnet	2/udp	Management Utility	
compressnet	3/tcp	Compression Process	
compressnet	3/udp	Compression Process	
#		Bernie Volz <VOLZ@PROCESS.COM>	
#	4/tcp	Unassigned	
#	4/udp	Unassigned	
rje	5/tcp	Remote Job Entry	
rje	5/udp	Remote Job Entry	
#		Jon Postel <postel@isi.edu>	
#	6/tcp	Unassigned	
#	6/udp	Unassigned	
echo			
echo	7/tcp	Echo	
echo	7/udp	Echo	
#		Jon Postel <postel@isi.edu>	
#	8/tcp	Unassigned	
#	8/udp	Unassigned	
discard			
discard	9/tcp	Discard	
discard	9/udp	Discard	
#		Jon Postel <postel@isi.edu>	
#	10/tcp	Unassigned	
#	10/udp	Unassigned	
systat	11/tcp	Active Users	
systat	11/udp	Active Users	
#		Jon Postel <postel@isi.edu>	
#	12/tcp	Unassigned	
#	12/udp	Unassigned	
daytime			
daytime	13/tcp	Daytime	
daytime	13/udp	Daytime	
#		Jon Postel <postel@isi.edu>	
#	14/tcp	Unassigned	
#	14/udp	Unassigned	
#	15/tcp	Unassigned [was netstat]	
#	15/udp	Unassigned	
#	16/tcp	Unassigned	

```
#                   16/udp      Unassigned
qotd                17/tcp      Quote of the Day
qotd                17/udp      Quote of the Day
#                               Jon Postel <postel@isi.edu>
msp                 18/tcp      Message Send Protocol
msp                 18/udp      Message Send Protocol
#                               Rina Nethaniel <---none--->

chargen
chargen             19/tcp      Character Generator
chargen             19/udp      Character Generator

ftp (data and control)
ftp-data            20/tcp      File Transfer [Default Data]
ftp-data            20/udp      File Transfer [Default Data]
ftp                 21/tcp      File Transfer [Control]
ftp                 21/udp      File Transfer [Control]
#                               Jon Postel <postel@isi.edu>
ssh                 22/tcp      SSH Remote Login Protocol
ssh                 22/udp      SSH Remote Login Protocol
#                               Tatu Ylonen <ylo@cs.hut.fi>
telnet              23/tcp      Telnet
telnet              23/udp      Telnet
#                               Jon Postel <postel@isi.edu>
                    24/tcp      any private mail system
                    24/udp      any private mail system
#                               Rick Adams <rick@UUNET.UU.NET>
smtp                25/tcp      Simple Mail Transfer
smtp                25/udp      Simple Mail Transfer
#                               Jon Postel <postel@isi.edu>
#                   26/tcp      Unassigned
#                   26/udp      Unassigned
nsw-fe              27/tcp      NSW User System FE
nsw-fe              27/udp      NSW User System FE
#                               Robert Thomas <BThomas@F.BBN.COM>
#                   28/tcp      Unassigned
#                   28/udp      Unassigned
msg-icp             29/tcp      MSG ICP
msg-icp             29/udp      MSG ICP
#                               Robert Thomas <BThomas@F.BBN.COM>
#                   30/tcp      Unassigned
#                   30/udp      Unassigned
msg-auth            31/tcp      MSG Authentication
msg-auth            31/udp      MSG Authentication
#                               Robert Thomas <BThomas@F.BBN.COM>
#                   32/tcp      Unassigned
#                   32/udp      Unassigned
dsp                 33/tcp      Display Support Protocol
dsp                 33/udp      Display Support Protocol
#                               Ed Cain <cain@edn-unix.dca.mil>
#                   34/tcp      Unassigned
```

```
#               34/udp      Unassigned
                35/tcp      any private printer server
                35/udp      any private printer server
#                           Jon Postel <postel@isi.edu>
#               36/tcp      Unassigned
#               36/udp      Unassigned
time            37/tcp      Time
time            37/udp      Time
#                       Jon Postel <postel@isi.edu>
rap             38/tcp      Route Access Protocol
rap             38/udp      Route Access Protocol
#                           Robert Ullmann <ariel@world.std.com>
rlp             39/tcp      Resource Location Protocol
rlp             39/udp      Resource Location Protocol
#                           Mike Accetta <MIKE.ACCETTA@CMU-CS-A.EDU>
#               40/tcp      Unassigned
#               40/udp      Unassigned
graphics        41/tcp      Graphics
graphics        41/udp      Graphics
nameserver      42/tcp      Host Name Server
nameserver      42/udp      Host Name Server
nicname         43/tcp      Who Is
nicname         43/udp      Who Is
mpm-flags       44/tcp      MPM FLAGS Protocol
mpm-flags       44/udp      MPM FLAGS Protocol
mpm             45/tcp      Message Processing Module [recv]
mpm             45/udp      Message Processing Module [recv]
mpm-snd         46/tcp      MPM [default send]
mpm-snd         46/udp      MPM [default send]
#                           Jon Postel <postel@isi.edu>
ni-ftp          47/tcp      NI FTP
ni-ftp          47/udp      NI FTP
#                           Steve Kille <S.Kille@isode.com>
auditd          48/tcp      Digital Audit Daemon
auditd          48/udp      Digital Audit Daemon
#                           Larry Scott <scott@zk3.dec.com>
bbn-login       49/tcp      Login Host Protocol (TACACS)
bbn-login       49/udp      Login Host Protocol (TACACS)
#                           Pieter Ditmars <pditmars@BBN.COM>
re-mail-ck      50/tcp      Remote Mail Checking Protocol
re-mail-ck      50/udp      Remote Mail Checking Protocol
#                           Steve Dorner <s-dorner@UIUC.EDU>
la-maint        51/tcp      IMP Logical Address Maintenance
la-maint        51/udp      IMP Logical Address Maintenance
#                           Andy Malis <malis_a@timeplex.com>
xns-time        52/tcp      XNS Time Protocol
xns-time        52/udp      XNS Time Protocol
#                           Susie Armstrong <Armstrong.wbst128@XEROX>
domain          53/tcp      Domain Name Server
domain          53/udp      Domain Name Server
```

```
#                       Paul Mockapetris <PVM@ISI.EDU>
xns-ch          54/tcp      XNS Clearinghouse
xns-ch          54/udp      XNS Clearinghouse
#                       Susie Armstrong <Armstrong.wbst128@XEROX>
isi-gl          55/tcp      ISI Graphics Language
isi-gl          55/udp      ISI Graphics Language
xns-auth        56/tcp      XNS Authentication
xns-auth        56/udp      XNS Authentication
#                   Susie Armstrong <Armstrong.wbst128@XEROX>
                57/tcp      any private terminal access
                57/udp      any private terminal access
#                       Jon Postel <postel@isi.edu>
xns-mail        58/tcp      XNS Mail
xns-mail        58/udp      XNS Mail
#                   Susie Armstrong <Armstrong.wbst128@XEROX>
                59/tcp      any private file service
                59/udp      any private file service
#                       Jon Postel <postel@isi.edu>
                60/tcp      Unassigned
                60/udp      Unassigned
ni-mail         61/tcp      NI MAIL
ni-mail         61/udp      NI MAIL
#                       Steve Kille <S.Kille@isode.com>
acas            62/tcp      ACA Services
acas            62/udp      ACA Services
#                       E. Wald <ewald@via.enet.dec.com>
whois++         63/tcp      whois++
whois++         63/udp      whois++
#                       Rickard Schoultz <schoultz@sunet.se>
covia           64/tcp      Communications Integrator (CI)
covia           64/udp      Communications Integrator (CI)
#                       “Tundra” Tim Daneliuk
#                       <tundraix!tundra@clout.chi.il.us>
tacacs-ds       65/tcp      TACACS-Database Service
tacacs-ds       65/udp      TACACS-Database Service
#                       Kathy Huber <khuber@bbn.com>
sql*net         66/tcp      Oracle SQL*NET
sql*net         66/udp      Oracle SQL*NET
#                       Jack Haverty <jhaverty@ORACLE.COM>
bootps          67/tcp      Bootstrap Protocol Server
bootps          67/udp      Bootstrap Protocol Server
bootpc          68/tcp      Bootstrap Protocol Client
bootpc          68/udp      Bootstrap Protocol Client
#                       Bill Croft <Croft@SUMEX-AIM.STANFORD.EDU>
tftp            69/tcp      Trivial File Transfer
tftp            69/udp      Trivial File Transfer
#                       David Clark <ddc@LCS.MIT.EDU>
gopher          70/tcp      Gopher
gopher          70/udp      Gopher
#                       Mark McCahill <mpm@boombox.micro.umn.edu>
netrjs-1        71/tcp      Remote Job Service
```

```
netrjs-1          71/udp      Remote Job Service
netrjs-2          72/tcp      Remote Job Service
netrjs-2          72/udp      Remote Job Service
netrjs-3          73/tcp      Remote Job Service
netrjs-3          73/udp      Remote Job Service
netrjs-4          74/tcp      Remote Job Service
netrjs-4          74/udp      Remote Job Service
#                             Bob Braden <Braden@ISI.EDU>
                  75/tcp      any private dial out service
                  75/udp      any private dial out service
#                             Jon Postel <postel@isi.edu>
deos              76/tcp      Distributed External Object Store
deos              76/udp      Distributed External Object Store
#                             Robert Ullmann <ariel@world.std.com>
                  77/tcp      any private RJE service
                  77/udp      any private RJE service
#                             Jon Postel <postel@isi.edu>
vettcp            78/tcp      vettcp
vettcp            78/udp      vettcp
#                             Christopher Leong <leong@kolmod.mlo.dec.com>
finger            79/tcp      Finger
finger            79/udp      Finger
#                             David Zimmerman <dpz@RUTGERS.EDU>
http              80/tcp      World Wide Web HTTP
http              80/udp      World Wide Web HTTP
www-http          80/tcp      World Wide Web HTTP
www-http          80/udp      World Wide Web HTTP
#                             Tim Berners-Lee <timbl@W3.org>
hosts2-ns         81/tcp      HOSTS2 Name Server
hosts2-ns         81/udp      HOSTS2 Name Server
#                             Earl Killian <EAK@MORDOR.S1.GOV>
xfer              82/tcp      XFER Utility
xfer              82/udp      XFER Utility
#                             Thomas M. Smith <tmsmith@esc.syr.ge.com>
mit-ml-dev        83/tcp      MIT ML Device
mit-ml-dev        83/udp      MIT ML Device
#                             David Reed <--none--->
ctf               84/tcp      Common Trace Facility
ctf               84/udp      Common Trace Facility
#                             Hugh Thomas <thomas@oils.enet.dec.com>
mit-ml-dev        85/tcp      MIT ML Device
mit-ml-dev        85/udp      MIT ML Device
#                             David Reed <--none--->
mfcobol           86/tcp      Micro Focus Cobol
mfcobol           86/udp      Micro Focus Cobol
#                             Simon Edwards <--none--->
                  87/tcp      any private terminal link
                  87/udp      any private terminal link
#                             Jon Postel <postel@isi.edu>
kerberos          88/tcp      Kerberos
kerberos          88/udp      Kerberos
```

```
#                       B. Clifford Neuman <bcn@isi.edu>
su-mit-tg       89/tcp  SU/MIT Telnet Gateway
su-mit-tg       89/udp  SU/MIT Telnet Gateway
#                       Mark Crispin <MRC@PANDA.COM>
dnsix           90/tcp  DNSIX Securit Attribute Token Map
dnsix           90/udp  DNSIX Securit Attribute Token Map
#                       Charles Watt <watt@sware.com>
mit-dov         91/tcp  MIT Dover Spooler
mit-dov         91/udp  MIT Dover Spooler
#                       Eliot Moss <EBM@XX.LCS.MIT.EDU>
npp             92/tcp  Network Printing Protocol
npp             92/udp  Network Printing Protocol
#                       Louis Mamakos <louie@sayshell.umd.edu>
dcp             93/tcp  Device Control Protocol
dcp             93/udp  Device Control Protocol
#                       Daniel Tappan <Tappan@BBN.COM>
objcall         94/tcp  Tivoli Object Dispatcher
objcall         94/udp  Tivoli Object Dispatcher
#                       Tom Bereiter <--none--->
supdup          95/tcp  SUPDUP
supdup          95/udp  SUPDUP
#                       Mark Crispin <MRC@PANDA.COM>
dixie           96/tcp  DIXIE Protocol Specification
dixie           96/udp  DIXIE Protocol Specification
#                       Tim Howes <Tim.Howes@terminator.cc.umich.edu>
swift-rvf       97/tcp  Swift Remote Virtural File Protocol
swift-rvf       97/udp  Swift Remote Virtural File Protocol
#                       Maurice R. Turcotte
#                       <mailrus!uflorida!rm1!dnmrt%rmatl@uunet.UU.NET>

tacnews         98/tcp  TAC News
tacnews         98/udp  TAC News
#                       Jon Postel <postel@isi.edu>
metagram        99/tcp  Metagram Relay
metagram        99/udp  Metagram Relay
#                       Geoff Goodfellow <Geoff@FERNWOOD.MPK.CA.U>
newacct         100/tcp [unauthorized use]
hostname        101/tcp NIC Host Name Server
hostname        101/udp NIC Host Name Server
#                       Jon Postel <postel@isi.edu>
iso-tsap        102/tcp ISO-TSAP Class 0
iso-tsap        102/udp ISO-TSAP Class 0
#                       Marshall Rose <mrose@dbc.mtview.ca.us>
gppitnp         103/tcp Genesis Point-to-Point Trans Net
gppitnp         103/udp Genesis Point-to-Point Trans Net
acr-nema        104/tcp ACR-NEMA Digital Imag. & Comm.
300
acr-nema        104/udp ACR-NEMA Digital Imag. & Comm.
300
#                       Patrick McNamee <--none--->
```

```
csnet-ns          105/tcp     Mailbox Name Nameserver
csnet-ns          105/udp     Mailbox Name Nameserver
#                             Marvin Solomon <solomon@CS.WISC.EDU>
3com-tsmux        106/tcp     3COM-TSMUX
3com-tsmux        106/udp     3COM-TSMUX
#                             Jeremy Siegel <jzs@NSD.3Com.COM>
rtelnet           107/tcp     Remote Telnet Service
rtelnet           107/udp     Remote Telnet Service
#                             Jon Postel <postel@isi.edu>
snagas            108/tcp     SNA Gateway Access Server
snagas            108/udp     SNA Gateway Access Server
#                             Kevin Murphy <murphy@sevens.lkg.dec.com>
pop2              109/tcp     Post Office Protocol - Version 2
pop2              109/udp     Post Office Protocol - Version 2
#                             Joyce K. Reynolds <jkrey@isi.edu>
pop3              110/tcp     Post Office Protocol - Version 3
pop3              110/udp     Post Office Protocol - Version 3
#                             Marshall Rose <mrose@dbc.mtview.ca.us>
sunrpc            111/tcp     SUN Remote Procedure Call
sunrpc            111/udp     SUN Remote Procedure Call
#                             Chuck McManis <cmcmanis@sun.com>
mcidas            112/tcp     McIDAS Data Transmission Protocol
mcidas            112/udp     McIDAS Data Transmission Protocol
#                             Glenn Davis <davis@unidata.ucar.edu>
auth              113/tcp     Authentication Service
auth              113/udp     Authentication Service
#                             Mike St. Johns <stjohns@arpa.mil>
audionews         114/tcp     Audio News Multicast
audionews         114/udp     Audio News Multicast
#                             Martin Forssen <maf@dtek.chalmers.se>
sftp              115/tcp     Simple File Transfer Protocol
sftp              115/udp     Simple File Transfer Protocol
#                             Mark Lottor <MKL@nisc.sri.com>
ansanotify        116/tcp     ANSA REX Notify
ansanotify        116/udp     ANSA REX Notify
#                             Nicola J. Howarth <njh@ansa.co.uk>
uucp-path         117/tcp     UUCP Path Service
uucp-path         117/udp     UUCP Path Service
sqlserv           118/tcp     SQL Services
sqlserv           118/udp     SQL Services
#                             Larry Barnes <barnes@broke.enet.dec.com>
nntp              119/tcp     Network News Transfer Protocol
nntp              119/udp     Network News Transfer Protocol
#                             Phil Lapsley <phil@UCBARPA.BERKELEY.EDU>
cfdptkt           120/tcp     CFDPTKT
cfdptkt           120/udp     CFDPTKT
#                             John Ioannidis <ji@close.cs.columbia.ed>
erpc              121/tcp     Encore Expedited Remote Pro.Call
erpc              121/udp     Encore Expedited Remote Pro.Call
#                             Jack O'Neil <---none--->
smakynet          122/tcp     SMAKYNET
```

```
smakynet          122/udp     SMAKYNET
#                             Mike O'Dowd <odowd@ltisun8.epfl.ch>
ntp               123/tcp     Network Time Protocol
ntp               123/udp     Network Time Protocol
#                             Dave Mills <Mills@HUEY.UDEL.EDU>
ansatrader        124/tcp     ANSA REX Trader
ansatrader        124/udp     ANSA REX Trader
#                             Nicola J. Howarth <njh@ansa.co.uk>
locus-map         125/tcp     Locus PC-Interface Net Map Ser
locus-map         125/udp     Locus PC-Interface Net Map Ser
#                             Eric Peterson <lcc.eric@SEAS.UCLA.EDU>
unitary           126/tcp     Unisys Unitary Login
unitary           126/udp     Unisys Unitary Login
#                             <feil@kronos.nisd.cam.unisys.com>
locus-con         127/tcp     Locus PC-Interface Conn Server
locus-con         127/udp     Locus PC-Interface Conn Server
#                             Eric Peterson <lcc.eric@SEAS.UCLA.EDU>
gss-xlicen        128/tcp     GSS X License Verification
gss-xlicen        128/udp     GSS X License Verification
#                             John Light <johnl@gssc.gss.com>
pwdgen            129/tcp     Password Generator Protocol
pwdgen            129/udp     Password Generator Protocol
#                             Frank J. Wacho <WANCHO@WSMR-SIMTEL20.ARMY.MIL>
cisco-fna         130/tcp     cisco FNATIVE
cisco-fna         130/udp     cisco FNATIVE
cisco-tna         131/tcp     cisco TNATIVE
cisco-tna         131/udp     cisco TNATIVE
cisco-sys         132/tcp     cisco SYSMAINT
cisco-sys         132/udp     cisco SYSMAINT
statsrv           133/tcp     Statistics Service
statsrv           133/udp     Statistics Service
#                             Dave Mills <Mills@HUEY.UDEL.EDU>
ingres-net        134/tcp     INGRES-NET Service
ingres-net        134/udp     INGRES-NET Service
#                             Mike Berrow <---none--->
loc-srv           135/tcp     Location Service
loc-srv           135/udp     Location Service
#                             Joe Pato <apollo!pato@EDDIE.MIT.EDU>
profile           136/tcp     PROFILE Naming System
profile           136/udp     PROFILE Naming System
#                             Larry Peterson <llp@ARIZONA.EDU>
netbios-ns        137/tcp     NETBIOS Name Service
netbios-ns        137/udp     NETBIOS Name Service
netbios-dgm       138/tcp     NETBIOS Datagram Service
netbios-dgm       138/udp     NETBIOS Datagram Service
netbios-ssn       139/tcp     NETBIOS Session Service
netbios-ssn       139/udp     NETBIOS Session Service
#                             Jon Postel <postel@isi.edu>
emfis-data        140/tcp     EMFIS Data Service
emfis-data        140/udp     EMFIS Data Service
emfis-cntl        141/tcp     EMFIS Control Service
```

```
emfis-cntl      141/udp     EMFIS Control Service
#                           Gerd Beling <GBELING@ISI.EDU>
bl-idm          142/tcp     Britton-Lee IDM
bl-idm          142/udp     Britton-Lee IDM
#                           Susie Snitzer <---none--->
imap2           143/tcp     Interim Mail Access Protocol v2
imap2           143/udp     Interim Mail Access Protocol v2
#                           Mark Crispin <MRC@PANDA.COM>
news            144/tcp     NewS
news            144/udp     NewS
#                           James Gosling <JAG@SUN.COM>
uaac            145/tcp     UAAC Protocol
uaac            145/udp     UAAC Protocol
#               David A. Gomberg <gomberg@GATEWAY.MITRE.ORG>
iso-tp0         146/tcp     ISO-IP0
iso-tp0         146/udp     ISO-IP0
iso-ip          147/tcp     ISO-IP
iso-ip          147/udp     ISO-IP
#                           Marshall Rose <mrose@dbc.mtview.ca.us>
cronus          148/tcp     CRONUS-SUPPORT
cronus          148/udp     CRONUS-SUPPORT
#                           Jeffrey Buffun <jbuffum@APOLLO.COM>
aed-512         149/tcp     AED 512 Emulation Service

aed-512         149/udp     AED 512 Emulation Service

#               Albert G. Broscius <broscius@DSL.CIS.UPENN.EDU>
sql-net         150/tcp     SQL-NET
sql-net         150/udp     SQL-NET
#                           Martin Picard <<---none--->
hems            151/tcp     HEMS
hems            151/udp     HEMS
#                           Christopher Tengi <tengi@Princeton.EDU>
bftp            152/tcp     Background File Transfer Program
bftp            152/udp     Background File Transfer Program
#                           Annette DeSchon <DESCHON@ISI.EDU>
sgmp            153/tcp     SGMP
sgmp            153/udp     SGMP
#                           Marty Schoffstahl <schoff@NISC.NYSER.NET>
netsc-prod      154/tcp     NETSC
netsc-prod      154/udp     NETSC
netsc-dev       155/tcp     NETSC
netsc-dev       155/udp     NETSC
#                           Sergio Heker <heker@JVNCC.CSC.ORG>
sqlsrv          156/tcp     SQL Service
sqlsrv          156/udp     SQL Service
#                           Craig Rogers <Rogers@ISI.EDU>
knet-cmp        157/tcp     KNET/VM Command/Message Protocol
knet-cmp        157/udp     KNET/VM Command/Message Protocol
#                           Gary S. Malkin <GMALKIN@XYLOGICS.COM>
pcmail-srv      158/tcp     PCMail Server
```

```
pcmail-srv      158/udp     PCMail Server
#                           Mark L. Lambert <markl@PTT.LCS.MIT.EDU>
nss-routing     159/tcp     NSS-Routing
nss-routing     159/udp     NSS-Routing
#                           Yakov Rekhter <Yakov@IBM.COM>
sgmp-traps      160/tcp     SGMP-TRAPS
sgmp-traps      160/udp     SGMP-TRAPS
#                           Marty Schoffstahl <schoff@NISC.NYSER.NET>
snmp            161/tcp     SNMP
snmp            161/udp     SNMP
snmptrap        162/tcp     SNMPTRAP
snmptrap        162/udp     SNMPTRAP
#                           Marshall Rose <mrose@dbc.mtview.ca.us>
cmip-man        163/tcp     CMIP/TCP Manager
cmip-man        163/udp     CMIP/TCP Manager
cmip-agent      164/tcp     CMIP/TCP Agent
smip-agent      164/udp     CMIP/TCP Agent
#                           Amatzia Ben-Artzi <---none--->
xns-courier     165/tcp     Xerox
xns-courier     165/udp     Xerox
#                           Susie Armstrong <Armstrong.wbst128@XEROX.COM>
s-net           166/tcp     Sirius Systems
s-net           166/udp     Sirius Systems
#                           Brian Lloyd <---none--->
namp            167/tcp     NAMP
namp            167/udp     NAMP
#                           Marty Schoffstahl <schoff@NISC.NYSER.NET>
rsvd            168/tcp     RSVD
rsvd            168/udp     RSVD
#                           Neil Todd <mcvax!ist.co.uk!neil@UUNET.UU.NET>
send            169/tcp     SEND
send            169/udp     SEND
#                           William D. Wisner <wisner@HAYES.FAI.ALASKA.EDU>
print-srv       170/tcp     Network PostScript
print-srv       170/udp     Network PostScript
#                           Brian Reid <reid@DECWRL.DEC.COM>
multiplex       171/tcp     Network Innovations Multiplex
multiplex       171/udp     Network Innovations Multiplex
cl/1            172/tcp     Network Innovations CL/1
cl/1            172/udp     Network Innovations CL/1
#                           Kevin DeVault <<---none--->
xyplex-mux      173/tcp     Xyplex
xyplex-mux      173/udp     Xyplex
#                           Bob Stewart <STEWART@XYPLEX.COM>
mailq           174/tcp     MAILQ

mailq           174/udp     MAILQ

#                           Rayan Zachariassen <rayan@AI.TORONTO.EDU>
vmnet           175/tcp     VMNET
```

```
vmnet           175/udp    VMNET
#                          Christopher Tengi <tengi@Princeton.EDU>
genrad-mux      176/tcp    GENRAD-MUX
genrad-mux      176/udp    GENRAD-MUX
#                          Ron Thornton <thornton@qm7501.genrad.com>
xdmcp           177/tcp    X Display Manager Control Protocol

xdmcp           177/udp    X Display Manager Control Protocol

#                          Robert W. Scheifler <RWS@XX.LCS.MIT.EDU>
nextstep        178/tcp    NextStep Window Server
NextStep        178/udp    NextStep Window Server
#                          Leo Hourvitz <leo@NEXT.COM>
bgp             179/tcp    Border Gateway Protocol

bgp             179/udp    Border Gateway Protocol

#                          Kirk Lougheed <LOUGHEED@MATHOM.CISCO.COM>
ris             180/tcp    Intergraph

ris             180/udp    Intergraph

#                          Dave Buehmann <ingr!daveb@UUNET.UU.NET>
unify           181/tcp    Unify
unify           181/udp    Unify
#                          Vinod Singh <--none--->
audit           182/tcp    Unisys Audit SITP

audit           182/udp    Unisys Audit SITP

#                          Gil Greenbaum <gcole@nisd.cam.unisys.com>
ocbinder        183/tcp    OCBinder
ocbinder        183/udp    OCBinder
ocserver        184/tcp    OCServer
ocserver        184/udp    OCServer
#                          Jerrilynn Okamura <--none--->
remote-kis      185/tcp    Remote-KIS
remote-kis      185/udp    Remote-KIS
kis             186/tcp    KIS Protocol
kis             186/udp    KIS Protocol
#                          Ralph Droms <rdroms@NRI.RESTON.VA.US>
aci             187/tcp    Application Communication Interface
aci             187/udp    Application Communication Interface
#                          Rick Carlos <rick.ticipa.csc.ti.com>
mumps           188/tcp    Plus Five's MUMPS
mumps           188/udp    Plus Five's MUMPS
#                          Hokey Stenn <hokey@PLUS5.COM>
qft             189/tcp    Queued File Transport
qft             189/udp    Queued File Transport
#                          Wayne Schroeder <schroeder@SDS.SDSC.EDU>
gacp            190/tcp    Gateway Access Control Protocol
```

```
cacp            190/udp     Gateway Access Control Protocol
#                           C. Philip Wood <cpw@LANL.GOV>
prospero        191/tcp     Prospero Directory Service
prospero        191/udp     Prospero Directory Service
#                           B. Clifford Neuman <bcn@isi.edu>
osu-nms         192/tcp     OSU Network Monitoring System

osu-nms         192/udp     OSU Network Monitoring System

#               Doug Karl <KARL-D@OSU-20.IRCC.OHIO-STATE.EDU>
srmp            193/tcp     Spider Remote Monitoring Protocol
srmp            193/udp     Spider Remote Monitoring Protocol
#                           Ted J. Socolofsky <Teds@SPIDER.CO.UK>
irc             194/tcp     Internet Relay Chat Protocol

irc             194/udp     Internet Relay Chat Protocol

#                           Jarkko Oikarinen <jto@TOLSUN.OULU.FI>
dn6-nlm-aud     195/tcp     DNSIX Network Level Module Audit

dn6-nlm-aud     195/udp     DNSIX Network Level Module Audit

dn6-smm-red     196/tcp     DNSIX Session Mgt Module Audit Redir
dn6-smm-red     196/udp     DNSIX Session Mgt Module Audit Redir
#                           Lawrence Lebahn <DIA3@PAXRV-NES.NAVY.MIL>
dls             197/tcp     Directory Location Service
dls             197/udp     Directory Location Service
dls-mon         198/tcp     Directory Location Service Monitor
dls-mon         198/udp     Directory Location Service Monitor
#                           Scott Bellew <smb@cs.purdue.edu>
smux            199/tcp     SMUX
smux            199/udp     SMUX
#                           Marshall Rose <mrose@dbc.mtview.ca.us>
src             200/tcp     IBM System Resource Controller
src             200/udp     IBM System Resource Controller
#                           Gerald McBrearty <---none--->
at-rtmp         201/tcp     AppleTalk Routing Maintenance

at-rtmp         201/udp     AppleTalk Routing Maintenance

at-nbp          202/tcp     AppleTalk Name Binding

at-nbp          202/udp     AppleTalk Name Binding

at-3            203/tcp     AppleTalk Unused

at-3            203/udp     AppleTalk Unused

at-echo         204/tcp     AppleTalk Echo

at-echo         204/udp     AppleTalk Echo
```

```
at-5            205/tcp     AppleTalk Unused

at-5            205/udp     AppleTalk Unused

at-zis          206/tcp     AppleTalk Zone Information

at-zis          206/udp     AppleTalk Zone Information

at-7            207/tcp     AppleTalk Unused

at-7            207/udp     AppleTalk Unused

at-8            208/tcp     AppleTalk Unused

at-8            208/udp     AppleTalk Unused

#                           Rob Chandhok <chandhok@gnome.cs.cmu.edu>
tam             209/tcp     Trivial Authenticated Mail Protocol
tam             209/udp     Trivial Authenticated Mail Protocol
#                           Dan Bernstein <djb@silverton.berkeley.edu>
z39.50          210/tcp     ANSI Z39.50
z39.50          210/udp     ANSI Z39.50
#                           Mark Needleman
#                           <mhnur%uccmvsa.bitnet@cornell.cit.cornell.edu>

914c/g          211/tcp     Texas Instruments 914C/G Terminal
914c/g          211/udp     Texas Instruments 914C/G Terminal
#                           Bill Harrell <---none--->
anet            212/tcp     ATEXSSTR
anet            212/udp     ATEXSSTR
#                           Jim Taylor <taylor@heart.epps.kodak.com>
ipx             213/tcp     IPX

ipx             213/udp     IPX

#                           Don Provan <donp@xlnvax.novell.com>
vmpwscs         214/tcp     VM PWSCS
vmpwscs         214/udp     VM PWSCS
#                           Dan Shia <dset!shia@uunet.UU.NET>
softpc          215/tcp     Insignia Solutions
softpc          215/udp     Insignia Solutions
#                           Martyn Thomas <---none--->
atls            216/tcp     Access Technology License Server

atls            216/udp     Access Technology License Server

#                           Larry DeLuca <henrik@EDDIE.MIT.EDU>
dbase           217/tcp     dBASE Unix
dbase           217/udp     dBASE Unix
#                           Don Gibson
```

```
#               <sequent!aero!twinsun!ashtate.A-T.COM!dong@uunet.UU.NET>

mpp             218/tcp      Netix Message Posting Protocol
mpp             218/udp      Netix Message Posting Protocol
#                            Shannon Yeh <yeh@netix.com>
uarps           219/tcp      Unisys ARPs
uarps           219/udp      Unisys ARPs
#                            Ashok Marwaha <---none--->
imap3           220/tcp      Interactive Mail Access Protocol v3
imap3           220/udp      Interactive Mail Access Protocol v3
#                            James Rice <RICE@SUMEX-AIM.STANFORD.EDU>
fln-spx         221/tcp      Berkeley rlogind with SPX auth
fln-spx         221/udp      Berkeley rlogind with SPX auth
rsh-spx         222/tcp      Berkeley rshd with SPX auth
rsh-spx         222/udp      Berkeley rshd with SPX auth
cdc             223/tcp      Certificate Distribution Center
cdc             223/udp      Certificate Distribution Center
#               Kannan Alagappan <kannan@sejour.enet.dec.com>
#               224-241      Reserved
#                            Jon Postel <postel@isi.edu>
#               242/tcp      Unassigned
#               242/udp      Unassigned
sur-meas        243/tcp      Survey Measurement
sur-meas        243/udp      Survey Measurement
#                            Dave Clark <ddc@LCS.MIT.EDU>
#               244/tcp      Unassigned
#               244/udp      Unassigned
link            245/tcp      LINK
link            245/udp      LINK
dsp3270         246/tcp      Display Systems Protocol
dsp3270         246/udp      Display Systems Protocol
#                            Weldon J. Showalter <Gamma@MINTAKA.DCA.MIL>
#               247-255      Reserved
#                            Jon Postel <postel@isi.edu>
#               256-343      Unassigned
pdap            344/tcp      Prospero Data Access Protocol
pdap            344/udp      Prospero Data Access Protocol
#                            B. Clifford Neuman <bcn@isi.edu>
pawserv         345/tcp      Perf Analysis Workbench
pawserv         345/udp      Perf Analysis Workbench
zserv           346/tcp      Zebra server
zserv           346/udp      Zebra server
fatserv         347/tcp      Fatmen Server
fatserv         347/udp      Fatmen Server
csi-sgwp        348/tcp      Cabletron Management Protocol
csi-sgwp        348/udp      Cabletron Management Protocol
#               349-370      Unassigned
clearcase       371/tcp      Clearcase
clearcase       371/udp      Clearcase
#                            Dave LeBlang <leglang@atria.com>
ulistserv       372/tcp      Unix Listserv
```

```
ulistserv          372/udp      Unix Listserv
#                               Anastasios Kotsikonas <tasos@cs.bu.edu>
legent-1           373/tcp      Legent Corporation
legent-1           373/udp      Legent Corporation
legent-2           374/tcp      Legent Corporation
legent-2           374/udp      Legent Corporation
#                               Keith Boyce <---none--->
hassle             375/tcp      Hassle
hassle             375/udp      Hassle
#                               Reinhard Doelz <doelz@comp.bioz.unibas.ch>
nip                376/tcp      Amiga Envoy Network Inquiry Proto

nip                376/udp      Amiga Envoy Network Inquiry Proto
#                               Heinz Wrobel <heinz@iam.com>
#                               Dale L. Larson <dale@iam.com>
tnETOS             377/tcp      NEC Corporation
tnETOS             377/udp      NEC Corporation
dsETOS             378/tcp      NEC Corporation
dsETOS             378/udp      NEC Corporation
#                               Tomoo Fujita <tf@arc.bs1.fc.nec.co.jp>
is99c              379/tcp      TIA/EIA/IS-99 modem client
is99c              379/udp      TIA/EIA/IS-99 modem client
is99s              380/tcp      TIA/EIA/IS-99 modem server
is99s              380/udp      TIA/EIA/IS-99 modem server
#                               Frank Quick <fquick@qualcomm.com>
hp-collector       381/tcp      hp performance data collector
hp-collector       381/udp      hp performance data collector
hp-managed-node    382/tcp      hp performance data managed node
hp-managed-node    382/udp      hp performance data managed node
hp-alarm-mgr       383/tcp      hp performance data alarm manager
hp-alarm-mgr       383/udp      hp performance data alarm manager
#                               Frank Blakely <frankb@hpptc16.rose.hp.com>
arns               384/tcp      A Remote Network Server System
arns               384/udp      A Remote Network Server System
#                               David Hornsby <djh@munnari.OZ.AU>
ibm-app            385/tcp      IBM Application
ibm-app            385/tcp      IBM Application
#                               Lisa Tomita <---none--->
asa                386/tcp      ASA Message Router Object Def.
asa                386/udp      ASA Message Router Object Def.
#                               Steve Laitinen <laitinen@brutus.aa.ab.com>
aurp               387/tcp      Appletalk Update-Based Routing Pro.
aurp               387/udp      Appletalk Update-Based Routing Pro.
#                               Chris Ranch <cranch@novell.com>
unidata-ldm        388/tcp      Unidata LDM Version 4
unidata-ldm        388/udp      Unidata LDM Version 4
#                               Glenn Davis <davis@unidata.ucar.edu>
ldap               389/tcp      Lightweight Directory Access Protocol
ldap               389/udp      Lightweight Directory Access Protocol
#                               Tim Howes <Tim.Howes@terminator.cc.umich.edu>
uis                390/tcp      UIS
```

```
uis                390/udp     UIS
#                              Ed Barron <---none--->
synotics-relay     391/tcp     SynOptics SNMP Relay Port
synotics-relay     391/udp     SynOptics SNMP Relay Port
synotics-broker    392/tcp     SynOptics Port Broker Port
synotics-broker    392/udp     SynOptics Port Broker Port
#                              Illan Raab <iraab@synoptics.com>
dis                393/tcp     Data Interpretation System
dis                393/udp     Data Interpretation System
#                              Paul Stevens <pstevens@chinacat.Metaphor.COM>
embl-ndt           394/tcp     EMBL Nucleic Data Transfer
embl-ndt           394/udp     EMBL Nucleic Data Transfer
#                              Peter Gad <peter@bmc.uu.se>
netcp              395/tcp     NETscout Control Protocol
netcp              395/udp     NETscout Control Protocol
#                              Anil Singhal <---none--->
netware-ip         396/tcp     Novell Netware over IP
netware-ip         396/udp     Novell Netware over IP
mptn               397/tcp     Multi Protocol Trans. Net.
mptn               397/udp     Multi Protocol Trans. Net.
#                              Soumitra Sarkar <sarkar@vnet.ibm.com>
kryptolan          398/tcp     Kryptolan
kryptolan          398/udp     Kryptolan
#                              Peter de Laval <pdl@sectra.se>
iso-tsap-c2        399/tcp     ISO-TSAP Class 2
iso-tsap-c2        399/udp     ISO-TSAP Class 2
#                              Yanivk Pouffary <pouffary@yaec.enet.dec.com>
work-sol           400/tcp     Workstation Solutions
work-sol           400/udp     Workstation Solutions
#                              Jim Ward <jimw@worksta.com>
ups                401/tcp     Uninterruptible Power Supply
ups                401/udp     Uninterruptible Power Supply
#                              Guenther Seybold <gs@hrz.th-darmstadt.de>
genie              402/tcp     Genie Protocol
genie              402/udp     Genie Protocol
#                              Mark Hankin <---none--->
decap              403/tcp     decap
decap              403/udp     decap
nced               404/tcp     nced
nced               404/udp     nced
ncld               405/tcp     ncld
ncld               405/udp     ncld
#                              Richard Jones <---none--->
imsp               406/tcp     Interactive Mail Support Protocol
imsp               406/udp     Interactive Mail Support Protocol
#                              John Myers <jgm+@cmu.edu>
timbuktu           407/tcp     Timbuktu
timbuktu           407/udp     Timbuktu
#                              Marc Epard <marc@waygate.farallon.com>
prm-sm             408/tcp     Prospero Resource Manager Sys. Man.
prm-sm             408/udp     Prospero Resource Manager Sys. Man.
```

```
prm-nm             409/tcp     Prospero Resource Manager Node Man.
prm-nm             409/udp     Prospero Resource Manager Node Man.
#                              B. Clifford Neuman <bcn@isi.edu>
decladebug         410/tcp     DECLadebug Remote Debug Protocol
decladebug         410/udp     DECLadebug Remote Debug Protocol
#                              Anthony Berent <berent@rdgeng.enet.dec.com>
rmt                411/tcp     Remote MT Protocol
rmt                411/udp     Remote MT Protocol
#                              Peter Eriksson <pen@lysator.liu.se>
synoptics-trap     412/tcp     Trap Convention Port
synoptics-trap     412/udp     Trap Convention Port
#                              Illan Raab <iraab@synoptics.com>
smsp               413/tcp     SMSP
smsp               413/udp     SMSP
infoseek           414/tcp     InfoSeek
infoseek           414/udp     InfoSeek
#                              Steve Kirsch <stk@frame.com>
bnet               415/tcp     BNet
bnet               415/udp     BNet
#                              Jim Mertz <JMertz+RV09@rvdc.unisys.com>
silverplatter      416/tcp     Silverplatter
silverplatter      416/udp     Silverplatter
#                              Peter Ciuffetti <petec@silverplatter.com>
onmux              417/tcp     Onmux
onmux              417/udp     Onmux
#                              Stephen Hanna <hanna@world.std.com>
hyper-g            418/tcp     Hyper-G
hyper-g            418/udp     Hyper-G
#                              Frank Kappe <fkappe@iicm.tu-graz.ac.at>
ariel1             419/tcp     Ariel
ariel1             419/udp     Ariel
#                              Jonathan Lavigne <BL.JPL@RLG.Stanford.EDU>
smpte              420/tcp     SMPTE
smpte              420/udp     SMPTE
#                              Si Becker <71362.22@CompuServe.COM>
ariel2             421/tcp     Ariel
ariel2             421/udp     Ariel
ariel3             422/tcp     Ariel
ariel3             422/udp     Ariel
#                              Jonathan Lavigne   <BL.JPL@RLG.Stanford.EDU>
opc-job-start      423/tcp     IBM Operations Planning and Control
Start
opc-job-start      423/udp     IBM Operations Planning and Control
Start
opc-job-track      424/tcp     IBM Operations Planning and Control
Track
opc-job-track      424/udp     IBM Operations Planning and Control
Track
#                              Conny Larsson   <cocke@VNET.IBM.COM>
icad-el            425/tcp     ICAD
icad-el            425/udp     ICAD
```

```
#                Larry Stone <lcs@icad.com>
smartsdp         426/tcp     smartsdp
smartsdp         426/udp     smartsdp
#                            Alexander Dupuy <dupuy@smarts.com>
svrloc           427/tcp     Server Location
svrloc           427/udp     Server Location
#                            <veizades@ftp.com>
ocs_cmu          428/tcp     OCS_CMU
ocs_cmu          428/udp     OCS_CMU
ocs_amu          429/tcp     OCS_AMU
ocs_amu          429/udp     OCS_AMU
#                            Florence Wyman <wyman@peabody.plk.af.mil>
utmpsd           430/tcp     UTMPSD
utmpsd           430/udp     UTMPSD
utmpcd           431/tcp     UTMPCD
utmpcd           431/udp     UTMPCD
iasd             432/tcp     IASD
iasd             432/udp     IASD
#                            Nir Baroz <nbaroz@encore.com>
nnsp             433/tcp     NNSP
nnsp             433/udp     NNSP
#                            Rob Robertson <rob@gangrene.berkeley.edu>
mobileip-agent   434/tcp     MobileIP-Agent
mobileip-agent   434/udp     MobileIP-Agent
mobilip-mn       435/tcp     MobilIP-MN
mobilip-mn       435/udp     MobilIP-MN
#                            Kannan Alagappan <kannan@sejour.lkg.dec.com>
dna-cml          436/tcp     DNA-CML
dna-cml          436/udp     DNA-CML
#                            Dan Flowers <flowers@smaug.lkg.dec.com>
comscm           437/tcp     comscm
comscm           437/udp     comscm
#                            Jim Teague <teague@zso.dec.com>
dsfgw            438/tcp     dsfgw
dsfgw            438/udp     dsfgw
#                            Andy McKeen <mckeen@osf.org>
dasp             439/tcp     dasp        Thomas Obermair
dasp             439/udp     dasp        tommy@inlab.m.eunet.de
#                            Thomas Obermair <tommy@inlab.m.eunet.de>
sgcp             440/tcp     sgcp
sgcp             440/udp     sgcp
#                            Marshall Rose <mrose@dbc.mtview.ca.us>
decvms-sysmgt    441/tcp     decvms-sysmgt
decvms-sysmgt    441/udp     decvms-sysmgt
#                            Lee Barton <barton@star.enet.dec.com>
cvc_hostd        442/tcp     cvc_hostd
cvc_hostd        442/udp     cvc_hostd
#                            Bill Davidson <billd@equalizer.cray.com>
https            443/tcp     https   MCom
https            443/udp     https   MCom
#                            Kipp E.B. Hickman <kipp@mcom.com>
```

```
snpp            444/tcp     Simple Network Paging Protocol
snpp            444/udp     Simple Network Paging Protocol
#                           [RFC1568]
microsoft-ds    445/tcp     Microsoft-DS
microsoft-ds    445/udp     Microsoft-DS
#                           Arnold Miller <arnoldm@microsoft.com>
ddm-rdb         446/tcp     DDM-RDB
ddm-rdb         446/udp     DDM-RDB
ddm-dfm         447/tcp     DDM-RFM
ddm-dfm         447/udp     DDM-RFM
ddm-byte        448/tcp     DDM-BYTE
ddm-byte        448/udp     DDM-BYTE
#                           Jan David Fisher <jdfisher@VNET.IBM.COM>
as-servermap    449/tcp     AS Server Mapper
as-servermap    449/udp     AS Server Mapper
#                           Barbara Foss <BGFOSS@rchvmv.vnet.ibm.com>
tserver         450/tcp     TServer
tserver         450/udp     TServer
#                           Harvey S. Schultz <hss@mtgzfs3.mt.att.com>
sfs-smp-net     451/tcp     Cray Network Semaphore server
sfs-smp-net     451/udp     Cray Network Semaphore server
sfs-config 452/tcp      Cray SFS config server
sfs-config 452/udp      Cray SFS config server
#                           Walter Poxon <wdp@ironwood.cray.com>
creativeserver  453/tcp     CreativeServer
creativeserver  453/udp     CreativeServer
contentserver   454/tcp     ContentServer
contentserver   454/udp     ContentServer
creativepartnr  455/tcp     CreativePartnr
creativepartnr  455/udp     CreativePartnr
#                           Jesus Ortiz <jesus_ortiz@emotion.com>
macon-tcp       456/tcp     macon-tcp
macon-udp       456/udp     macon-udp
#                           Yoshinobu Inoue
#                           <shin@hodaka.mfd.cs.fujitsu.co.jp>
scohelp         457/tcp     scohelp
scohelp         457/udp     scohelp
#                           Faith Zack <faithz@sco.com>
appleqtc        458/tcp     apple quick time
appleqtc        458/udp     apple quick time
#           Murali Ranganathan <murali_ranganathan@quickmail.apple.com>
ampr-rcmd       459/tcp     ampr-rcmd
ampr-rcmd       459/udp     ampr-rcmd
#                           Rob Janssen <rob@sys3.pe1chl.ampr.org>
skronk          460/tcp     skronk
skronk          460/udp     skronk
#                           Henry Strickland <strick@yak.net>
datasurfsrv     461/tcp     DataSurfSrv
datasurfsrv     461/udp     DataSurfSrv
datasurfsrvsec  462/tcp     DataSurfSrvSec
datasurfsrvsec  462/udp     DataSurfSrvSec
```

```
#                       Larry Barnes <Larryb@larryb.MV.COM>

alpes           463/tcp     alpes
alpes           463/udp     alpes
#                       Alain Durand <Alain.Durand@imag.fr>
kpasswd          464/tcp     kpasswd
kpasswd          464/udp     kpasswd
#                       Theodore Ts'o <tytso@MIT.EDU>
ssmtp            465/tcp     ssmtp
ssmtp            465/udp     ssmtp
#                       John Hemming <JohnHemming@Mkn.co.uk>
digital-vrc     466/tcp     digital-vrc
digital-vrc     466/udp     digital-vrc
#                       Dave Forster <forster@marvin.enet.dec.com>
mylex-mapd       467/tcp     mylex-mapd
mylex-mapd       467/udp     mylex-mapd
#                       Gary Lewis <GaryL@hq.mylex.com>
photuris         468/tcp     proturis
photuris         468/udp     proturis
#                       Bill Simpson <Bill.Simpson@um.cc.umich.edu>
rcp              469/tcp     Radio Control Protocol
rcp              469/udp     Radio Control Protocol
#                       Jim Jennings +1-708-538-7241
scx-proxy        470/tcp     scx-proxy
scx-proxy        470/udp     scx-proxy
#                       Walter Poxon <wdp@ironwood-fddi.cray.com>

mondex           471/tcp     Mondex
mondex           471/udp     Mondex
#                       Bill Reding <redingb@nwdt.natwest.co.uk>
ljk-login       472/tcp     ljk-login
ljk-login       472/udp     ljk-login
#                       LJK Software, Cambridge, Massachusetts
#                       <support@ljk.com>
hybrid-pop       473/tcp     hybrid-pop
hybrid-pop       473/udp     hybrid-pop
#                       Rami Rubin <rami@hybrid.com>
tn-tl-w1         474/tcp     tn-tl-w1
tn-tl-w2         474/udp     tn-tl-w2
#                       Ed Kress <eskress@thinknet.com>
tcpnethaspsrv   475/tcp     tcpnethaspsrv
tcpnethaspsrv   475/tcp     tcpnethaspsrv
#                       Charlie Hava <charlie@aladdin.co.il>
#               476-511     Unassigned
exec             512/tcp     remote process execution;
#                       authentication performed using
#                       passwords and UNIX loppgin names
biff             512/udp     used by mail system to notify users
#                       of new mail received; currently
#                       receives messages only from
#                       processes on the same machine
```

```
login           513/tcp      remote login a la telnet;
#                            automatic authentication performed
#                            based on priviledged port numbers
#                            and distributed data bases which
#                            identify “authentication domains”
who              513/udp       maintains data bases showing who’s
#                            logged in to machines on a local
#                            net and the load average of the
#                            machine
cmd              514/tcp       like exec, but automatic
#                            authentication is performed as for
#                            login server
syslog           514/udp
printer          515/tcp     spooler
printer          515/udp      spooler
#                516/tcp      Unassigned
#                516/udp      Unassigned
talk             517/tcp     like tenex link, but across
#                            machine - unfortunately, doesn’t
#                            use link protocol (this is actually
#                            just a rendezvous port from which a
#                            tcp connection is established)
talk             517/udp      like tenex link, but across
#                            machine - unfortunately, doesn’t
#                            use link protocol (this is actually
#                            just a rendezvous port from which a
                             tcp connection is established)
ntalk            518/tcp
ntalk            518/udp
utime            519/tcp      unixtime
utime            519/udp      unixtime
efs              520/tcp     extended file name server
router           520/udp      local routing process (on site);
#                            uses variant of Xerox NS routing
#                            information protocol
#                521-524      Unassigned
timed            525/tcp     timeserver
timed            525/udp      timeserver
tempo           526/tcp     newdate
tempo           526/udp     newdate
#                527-529      Unassigned
courier          530/tcp     rpc
courier          530/udp      rpc
conference       531/tcp      chat
conference       531/udp      chat
netnews          532/tcp      readnews
netnews          532/udp      readnews
netwall          533/tcp     for emergency broadcasts
netwall          533/udp      for emergency broadcasts
#                534-538      Unassigned
apertus-ldp      539/tcp     Apertus Technologies Load Determination
```

apertus-ldp 539/udp Apertus Technologies Load Determination
uucp 540/tcp uucpd
uucp 540/udp uucpd
uucp-rlogin 541/tcp uucp-rlogin
uucp-rlogin 541/udp uucp-rlogin
Stuart Lynne <sl@wimsey.com>
542/tcp Unassigned
542/udp Unassigned
klogin 543/tcp
klogin 543/udp
kshell 544/tcp krcmd
kshell 544/udp krcmd
appleqtcsrvr 545/tcp appleqtcsrvr
appleqtcsrvr 545/udp appleqtcsrvr
Murali Ranganathan <Murali_Ranganathan@quickmail.apple.com>
dhcp-client 546/tcp DHCP Client
dhcp-client 546/udp DHCP Client
dhcp-server 547/tcp DHCP Server
dhcp-server 547/udp DHCP Server
Jim Bound <bound@zk3.dec.com>
548/tcp Unassigned
548/udp Unassigned
549/tcp Unassigned
549/udp Unassigned
new-rwho 550/tcp new-who
new-rwho 550/udp new-who
cybercash 551/tcp cybercash
cybercash 551/udp cybercash
Donald E. Eastlake 3rd <dee@cybercash.com>
deviceshare 552/tcp deviceshare
deviceshare 552/udp deviceshare
Brian Schenkenberger <brians@advsyscon.com>
pirp 553/tcp pirp
pirp 553/udp pirp
D. J. Bernstein <djb@silverton.berkeley.edu>
554/tcp Unassigned
554/udp Unassigned
dsf 555/tcp
dsf 555/udp
remotefs 556/tcp rfs server
remotefs 556/udp rfs server
openvms-sysipc 557/tcp openvms-sysipc
openvms-sysipc 557/udp openvms-sysipc
Alan Potter <potter@movies.enet.dec.com>
sdnskmp 558/tcp SDNSKMP
sdnskmp 558/udp SDNSKMP
teedtap 559/tcp TEEDTAP
teedtap 559/udp TEEDTAP
Mort Hoffman <hoffman@mail.ndhm.gtegsc.com>
rmonitor 560/tcp rmonitord
rmonitor 560/udp rmonitord

```
monitor          561/tcp
monitor          561/udp
chshell          562/tcp      chcmd
chshell          562/udp      chcmd
snews            563/tcp      snews
snews            563/udp      snews
#                             Kipp E.B. Hickman <kipp@netscape.com>
9pfs             564/tcp      plan 9 file service
9pfs             564/udp      plan 9 file service
whoami           565/tcp      whoami
whoami           565/udp      whoami
streettalk       566/tcp      streettalk
streettalk       566/udp      streettalk
banyan-rpc       567/tcp      banyan-rpc
banyan-rpc       567/udp      banyan-rpc
#                             Tom Lemaire <toml@banyan.com>
ms-shuttle       568/tcp      microsoft shuttle
ms-shuttle       568/udp      microsoft shuttle
#                             Rudolph Balaz <rudolphb@microsoft.com>
ms-rome          569/tcp      microsoft rome
ms-rome          569/udp      microsoft rome
#                             Rudolph Balaz <rudolphb@microsoft.com>
meter            570/tcp      demon
meter            570/udp      demon
meter            571/tcp      udemon
meter            571/udp      udemon
sonar            572/tcp      sonar
sonar            572/udp      sonar
#                             Keith Moore <moore@cs.utk.edu>
banyan-vip       573/tcp      banyan-vip
banyan-vip       573/udp      banyan-vip
#                             Denis Leclerc <DLeclerc@banyan.com>
#                574-599      Unassigned
ipcserver        600/tcp      Sun IPC server
ipcserver        600/udp      Sun IPC server
nqs          607/tcp      nqs
nqs          607/udp      nqs
urm              606/tcp      Cray Unified Resource Manager
urm              606/udp      Cray Unified Resource Manager
#                             Bill Schiefelbein <schief@aspen.cray.com>
sift-uft         608/tcp      Sender-Initiated/Unsolicited File Transfer

sift-uft         608/udp      Sender-Initiated/Unsolicited File Transfer
#                             Rick Troth <troth@rice.edu>
npmp-trap        609/tcp      npmp-trap
npmp-trap        609/udp      npmp-trap
npmp-local       610/tcp      npmp-local
npmp-local       610/udp      npmp-local
npmp-gui         611/tcp      npmp-gui
npmp-gui         611/udp      npmp-gui
#                             John Barnes <jbarnes@crl.com>
```

```
ginad               634/tcp      ginad
ginad               634/udp      ginad
#                                Mark Crother <mark@eis.calstate.edu>
mdqs                666/tcp
mdqs                666/udp
doom                666/tcp      doom Id Software
doom                666/udp      doom Id Software
#                                <ddt@idcube.idsoftware.com>
elcsd             704/tcp      errlog copy/server daemon
elcsd             704/udp      errlog copy/server daemon
entrustmanager    709/tcp      EntrustManager
entrustmanager    709/udp      EntrustManager
#                                Peter Whittaker <pww@bnr.ca>
netviewdm1          729/tcp      IBM NetView DM/6000 Server/Client
netviewdm1          729/udp      IBM NetView DM/6000 Server/Client
netviewdm2          730/tcp      IBM NetView DM/6000 send/tcp
netviewdm2          730/udp      IBM NetView DM/6000 send/tcp
netviewdm3          731/tcp      IBM NetView DM/6000 receive/tcp
netviewdm3          731/udp      IBM NetView DM/6000 receive/tcp
#                                Philippe Binet    (phbinet@vnet.IBM.COM)
netgw               741/tcp      netGW
netgw               741/udp      netGW
netrcs              742/tcp      Network based Rev. Cont. Sys.
netrcs              742/udp      Network based Rev. Cont. Sys.
#                                Gordon C. Galligher <gorpong@ping.chi.il.us>
flexlm              744/tcp      Flexible License Manager
flexlm              744/udp      Flexible License Manager
#                                Matt Christiano
#                                <globes@matt@oliveb.atc.olivetti.com>

fujitsu-dev         747/tcp      Fujitsu Device Control
fujitsu-dev         747/udp      Fujitsu Device Control
ris-cm              748/tcp      Russell Info Sci Calendar Manager
ris-cm              748/udp      Russell Info Sci Calendar Manager
kerberos-adm        749/tcp      kerberos administration
kerberos-adm        749/udp      kerberos administration
rfile             750/tcp
loadav              750/udp
pump              751/tcp
pump              751/udp
qrh             752/tcp
qrh             752/udp
rrh                 753/tcp
rrh             753/udp
tell            754/tcp      send
tell            754/udp      send
nlogin            758/tcp
nlogin            758/udp
con             759/tcp
con             759/udp
ns              760/tcp
```

```
ns              760/udp
rxe             761/tcp
rxe             761/udp
quotad          762/tcp
quotad          762/udp
cycleserv       763/tcp
cycleserv       763/udp
omserv          764/tcp
omserv          764/udp
webster         765/tcp
webster         765/udp
phonebook       767/tcp     phone
phonebook       767/udp     phone
vid             769/tcp
vid             769/udp
cadlock         770/tcp
cadlock         770/udp
rtip            771/tcp
rtip            771/udp
cycleserv2      772/tcp
cycleserv2      772/udp
submit          773/tcp
notify          773/udp
rpasswd         774/tcp
acmaint_dbd     774/udp
entomb          775/tcp
acmaint_transd 775/udp
wpages  776/tcp
wpages          776/udp
wpgs    780/tcp
wpgs    780/udp
concert         786/tcp         Concert
concert         786/udp         Concert
#                               Josyula R. Rao <jrrao@watson.ibm.com>
mdbs_daemon 800/tcp
mdbs_daemon 800/udp
device  801/tcp
device  801/udp
accessbuilder   888/tcp         AccessBuilder
accessbuilder   888/udp         AccessBuilder
#                           Steve Sweeney <Steven_Sweeney@3mail.3com.com>
vsinet          996/tcp     vsinet
vsinet          996/udp     vsinet
#                           Rob Juergens <robj@vsi.com>
maitrd  997/tcp
maitrd  997/udp
busboy  998/tcp
puparp  998/udp
garcon  999/tcp
applix  999/udp         Applix ac
puprouter 999/tcp
```

puprouter 999/udp
cadlock 1000/tcp
ock 1000/udp
1023/tcp Reserved
1024/udp Reserved
IANA <iana@isi.edu>

REGISTERED PORT NUMBERS

The Registered Ports are not controlled by the IANA and on most systems can be used by ordinary user processes or programs executed by ordinary users. Ports are used in the TCP [RFC793] to name the ends of logical connections which carry long term conversations. For the purpose of providing services to unknown callers, a service contact port is defined. This list specifies the port used by the server process as its contact port. While the IANA can not control uses of these ports it does register or list uses of these ports as a convienence to the community. To the extent possible, these same port assignments are used with the UDP [RFC768].

The Registered Ports are in the range 1024-65535.
[Go back to top of file]
Port Assignments:

Keyword Decimal Description References
--- --- --- ---
1024/tcp Reserved
1024/udp Reserved
IANA <iana@isi.edu>
blackjack 1025/tcp network blackjack
blackjack 1025/udp network blackjack
iad1 1030/tcp BBN IAD
iad1 1030/udp BBN IAD
iad2 1031/tcp BBN IAD
iad2 1031/udp BBN IAD
iad3 1032/tcp BBN IAD
iad3 1032/udp BBN IAD
Andy Malis <malis_a@timeplex.com>
nim 1058/tcp nim
nim 1058/udp nim
nimreg 1059/tcp nimreg
nimreg 1059/udp nimreg
Robert Gordon <rbg@austin.ibm.com>
instl_boots 1067/tcp Installation Bootstrap Proto. Serv.

instl_boots 1067/udp Installation Bootstrap Proto. Serv.

instl_bootc 1068/tcp Installation Bootstrap Proto. Cli.

instl_bootc 1068/udp Installation Bootstrap Proto. Cli.

```
#                               David Arko <<darko@hpfcrn.fc.hp.com>
socks           1080/tcp    Socks
socks           1080/udp    Socks
#                               Ying-Da Lee <ylee@syl.dl.nec.com
ansoft-lm-1     1083/tcp    Anasoft License Manager
ansoft-lm-1     1083/udp    Anasoft License Manager
ansoft-lm-2     1084/tcp    Anasoft License Manager
ansoft-lm-2     1084/udp    Anasoft License Manager
nfsd-status 1110/tcp    Cluster status info
nfsd-keepalive 1110/udp    Client status info
#                               Edgar Circenis <ec@hpfclj.fc.hp.com>
nfa             1155/tcp    Network File Access

nfa             1155/udp    Network File Access

#                               James Powell <james@mailhost.unidata.com>
lupa            1212/tcp    lupa
lupa            1212/udp    lupa
#                               Barney Wolff <barney@databus.com>
nerv    1222/tcp    SNI R&D network
nerv    1222/udp    SNI R&D network
#                               Martin Freiss <freiss.pad@sni.de>
hermes  1248/tcp
hermes  1248/udp
alta-ana-lm     1346/tcp    Alta Analytics License Manager
alta-ana-lm     1346/udp    Alta Analytics License Manager
bbn-mmc 1347/tcp    multi media conferencing
bbn-mmc 1347/udp    multi media conferencing
bbn-mmx 1348/tcp    multi media conferencing
bbn-mmx 1348/udp    multi media conferencing
sbook           1349/tcp    Registration Network Protocol

sbook           1349/udp    Registration Network Protocol

editbench       1350/tcp    Registration Network Protocol

editbench       1350/udp    Registration Network Protocol

#               Simson L. Garfinkel <simsong@next.cambridge.ma.us>
equationbuilder 1351/tcp    Digital Tool Works (MIT)

equationbuilder 1351/udp    Digital Tool Works (MIT)

#                               Terrence J. Talbot <lexcube!tjt@bu.edu>
lotusnote       1352/tcp    Lotus Note

lotusnote       1352/udp    Lotus Note

#               Greg Pflaum <iris.com!Greg_Pflaum@uunet.uu.net>
relief          1353/tcp    Relief Consulting
```

```
relief          1353/udp    Relief Consulting

#                           John Feiler <relief!jjfeiler@uu2.psi.com>
rightbrain      1354/tcp    RightBrain Software
rightbrain      1354/udp    RightBrain Software
#                           Glenn Reid <glann@rightbrain.com>
intuitive edge  1355/tcp    Intuitive Edge
intuitive edge  1355/udp    Intuitive Edge
#                           Montgomery Zukowski
#                           <monty@nextnorth.acs.ohio-state.edu>

cuillamartin    1356/tcp    CuillaMartin Company
cuillamartin    1356/udp    CuillaMartin Company
pegboard        1357/tcp    Electronic PegBoard
pegboard        1357/udp    Electronic PegBoard
#                           Chris Cuilla
#                           <balr!vpnet!cuilla!chris@clout.chi.il.us>

connlcli        1358/tcp    CONNLCLI

connlcli        1358/udp    CONNLCLI

ftsrv           1359/tcp    FTSRV

ftsrv           1359/udp    FTSRV

#                           Ines Homem de Melo <sidinf@brfapesp.bitnet>
mimer           1360/tcp    MIMER

mimer           1360/udp    MIMER

#                           Per Schroeder   <Per.Schroder@mimer.se>
linx            1361/tcp    LinX
linx            1361/udp    LinX
#                           Steffen Schilke <---none--->
timeflies       1362/tcp    TimeFlies

timeflies       1362/udp    TimeFlies

#                           Doug Kent <mouthers@slugg@nwnexus.wa.com>
ndm-requester   1363/tcp    Network DataMover Requester
ndm-requester   1363/udp    Network DataMover Requester
ndm-server      1364/tcp    Network DataMover Server
ndm-server      1364/udp    Network DataMover Server
#                           Toshio Watanabe
#                           <watanabe@godzilla.rsc.spdd.ricoh.co.j>

adapt-sna       1365/tcp    Network Software Associates
adapt-sna       1365/udp    Network Software Associates
#                           Jeffery Chiao <714-768-401>
netware-csp     1366/tcp    Novell NetWare Comm Service Platform
```

```
netware-csp     1366/udp    Novell NetWare Comm Service Platform
#                           Laurie Lindsey <llindsey@novell.com>
dcs             1367/tcp    DCS
dcs             1367/udp    DCS
#                           Stefan Siebert <ssiebert@dcs.de>
screencast      1368/tcp    ScreenCast

screencast      1368/udp    ScreenCast

#                           Bill Tschumy <other!bill@uunet.UU.NET>
gv-us           1369/tcp    GlobalView to Unix Shell

gv-us           1369/udp    GlobalView to Unix Shell

us-gv           1370/tcp    Unix Shell to GlobalView

us-gv           1370/udp    Unix Shell to GlobalView

#               Makoto Mita <mita@ssdev.ksp.fujixerox.co.jp>
fc-cli          1371/tcp    Fujitsu Config Protocol

fc-cli          1371/udp    Fujitsu Config Protocol

fc-ser          1372/tcp    Fujitsu Config Protocol

fc-ser          1372/udp    Fujitsu Config Protocol

#               Ryuichi Horie <horie@spad.sysrap.cs.fujitsu.co.jp>
chromagrafx     1373/tcp    Chromagrafx

chromagrafx     1373/udp    Chromagrafx

#                           Mike Barthelemy <msb@chromagrafx.com>
molly           1374/tcp    EPI Software Systems
molly           1374/udp    EPI Software Systems
#                           Jim Vlcek <vlcek@epimbe.com>
bytex           1375/tcp    Bytex
bytex           1375/udp    Bytex
#               Mary Ann Burt <bytex!ws054!maryann@uunet.UU.NET>
ibm-pps         1376/tcp    IBM Person to Person Software
ibm-pps         1376/udp    IBM Person to Person Software
#                           Simon Phipps <sphipps@vnet.ibm.com>
cichlid         1377/tcp    Cichlid License Manager
cichlid         1377/udp    Cichlid License Manager
#                           Andy Burgess <aab@cichlid.com>
elan            1378/tcp    Elan License Manager
elan            1378/udp    Elan License Manager
#                           Ken Greer <kg@elan.com>
dbreporter      1379/tcp    Integrity Solutions

dbreporter      1379/udp    Integrity Solutions
```

```
#                       Tim Dawson <tdawson%mspboss@uunet.UU.NET>
telesis-licman  1380/tcp    Telesis Network License Manager

telesis-licman  1380/udp    Telesis Network License Manager

#                       Karl Schendel, Jr. <wiz@telesis.com>
apple-licman    1381/tcp    Apple Network License Manager
apple-licman    1381/udp    Apple Network License Manager
#                       Earl Wallace <earlw@apple.com>
udt_os          1382/tcp
udt_os          1382/udp
gwha            1383/tcp    GW Hannaway Network License Manager
gwha            1383/udp    GW Hannaway Network License Manager
#                       J. Gabriel Foster <fop@gwha.com>
os-licman       1384/tcp    Objective Solutions License Manager

os-licman       1384/udp    Objective Solutions License Manager

#                   Donald Cornwell <don.cornwell@objective.com>
atex_elmd       1385/tcp    Atex Publishing License Manager
atex_elmd       1385/udp    Atex Publishing License Manager
#                       Brett Sorenson <bcs@atex.com>
checksum        1386/tcp    CheckSum License Manager

checksum        1386/udp    CheckSum License Manager

#                       Andreas Glocker <glocker@sirius.com>
cadsi-lm        1387/tcp    Computer Aided Design Software Inc
LM
cadsi-lm        1387/udp    Computer Aided Design Software Inc
LM
#                       Sulistio Muljadi
objective-dbc   1388/tcp    Objective Solutions DataBase Cache
objective-dbc   1388/udp    Objective Solutions DataBase Cache
#                       Donald Cornwell
iclpv-dm        1389/tcp    Document Manager

iclpv-dm        1389/udp    Document Manager

iclpv-sc        1390/tcp    Storage Controller

iclpv-sc        1390/udp    Storage Controller

iclpv-sas       1391/tcp    Storage Access Server

iclpv-sas       1391/udp    Storage Access Server

iclpv-pm        1392/tcp    Print Manager

iclpv-pm        1392/udp    Print Manager
```

```
iclpv-nls          1393/tcp     Network Log Server

iclpv-nls          1393/udp     Network Log Server

iclpv-nlc          1394/tcp     Network Log Client

iclpv-nlc          1394/udp     Network Log Client

iclpv-wsm          1395/tcp     PC Workstation Manager software

iclpv-wsm          1395/udp     PC Workstation Manager software

#                  A.P. Hobson <A.P.Hobson@bra0112.wins.icl.co.uk>
dvl-activemail     1396/tcp     DVL Active Mail

dvl-activemail     1396/udp     DVL Active Mail

audio-activmail 1397/tcp     Audio Active Mail

audio-activmail 1397/udp     Audio Active Mail

video-activmail 1398/tcp     Video Active Mail

video-activmail 1398/udp     Video Active Mail

#                              Ehud Shapiro <udi@wisdon.weizmann.ac.il>
cadkey-licman      1399/tcp     Cadkey License Manager
cadkey-licman      1399/udp     Cadkey License Manager
cadkey-tablet      1400/tcp     Cadkey Tablet Daemon
cadkey-tablet      1400/udp     Cadkey Tablet Daemon
#                              Joe McCollough <joe@cadkey.com>
goldleaf-licman 1401/tcp     Goldleaf License Manager
goldleaf-licman 1401/udp     Goldleaf License Manager
#                              John Fox <---none--->
prm-sm-np          1402/tcp     Prospero Resource Manager
prm-sm-np          1402/udp     Prospero Resource Manager
prm-nm-np          1403/tcp     Prospero Resource Manager
prm-nm-np          1403/udp     Prospero Resource Manager
#                              B. Clifford Neuman <bcn@isi.edu>
igi-lm             1404/tcp     Infinite Graphics License Manager
igi-lm             1404/udp     Infinite Graphics License Manager
ibm-res            1405/tcp     IBM Remote Execution Starter
ibm-res            1405/udp     IBM Remote Execution Starter
netlabs-lm         1406/tcp     NetLabs License Manager
netlabs-lm         1406/udp     NetLabs License Manager
dbsa-lm            1407/tcp     DBSA License Manager
dbsa-lm            1407/udp     DBSA License Manager
#                              Scott Shattuck <ss@dbsa.com>
sophia-lm          1408/tcp     Sophia License Manager
```

```
sophia-lm         1408/udp     Sophia License Manager

#                              Eric Brown <sst!emerald!eric@uunet.UU.net>
here-lm           1409/tcp     Here License Manager
here-lm           1409/udp     Here License Manager
#                              David Ison   <here@dialup.oar.net>
hiq               1410/tcp     HiQ License Manager
hiq               1410/udp     HiQ License Manager
#                              Rick Pugh <rick@bilmillennium.com>
af                1411/tcp     AudioFile
af                1411/udp     AudioFile
#                              Jim Gettys <jg@crl.dec.com>
innosys           1412/tcp     InnoSys
innosys           1412/udp     InnoSys
innosys-acl       1413/tcp     Innosys-ACL
innosys-acl       1413/udp     Innosys-ACL
#                              Eric Welch <--none--->
ibm-mqseries      1414/tcp     IBM MQSeries

ibm-mqseries      1414/udp     IBM MQSeries

#                              Roger Meli <rmmeli%winvmd@vnet.ibm.com>
dbstar            1415/tcp     DBStar
dbstar            1415/udp     DBStar
#                              Jeffrey Millman <jcm@dbstar.com>
novell-lu6.2      1416/tcp     Novell LU6.2
novell-lu6.2      1416/udp     Novell LU6.2
#                              Peter Liu <--none--->
timbuktu-srv1     1417/tcp     Timbuktu Service 1 Port

timbuktu-srv1     1417/tcp     Timbuktu Service 1 Port

timbuktu-srv2     1418/tcp     Timbuktu Service 2 Port

timbuktu-srv2     1418/udp     Timbuktu Service 2 Port

timbuktu-srv3     1419/tcp     Timbuktu Service 3 Port

timbuktu-srv3     1419/udp     Timbuktu Service 3 Port

timbuktu-srv4     1420/tcp     Timbuktu Service 4 Port

timbuktu-srv4     1420/udp     Timbuktu Service 4 Port

#                              Marc Epard <marc@waygate.farallon.com>
gandalf-lm        1421/tcp     Gandalf License Manager
gandalf-lm        1421/udp     Gandalf License Manager
#                              gilmer@gandalf.ca
autodesk-lm       1422/tcp     Autodesk License Manager
autodesk-lm       1422/udp     Autodesk License Manager
#                              David Ko <dko@autodesk.com>
```

```
essbase         1423/tcp    Essbase Arbor Software
essbase         1423/udp    Essbase Arbor Software
hybrid          1424/tcp    Hybrid Encryption Protocol
hybrid          1424/udp    Hybrid Encryption Protocol
#                           Howard Hart <hch@hybrid.com>
zion-lm         1425/tcp    Zion Software License Manager
zion-lm         1425/udp    Zion Software License Manager
#                           David Ferrero <david@zion.com>
sas-1           1426/tcp    Satellite-data Acquisition System 1
sas-1           1426/udp    Satellite-data Acquisition System 1
#                           Bill Taylor <sais@ssec.wisc.edu>
mloadd          1427/tcp    mloadd monitoring tool
mloadd          1427/udp    mloadd monitoring tool
#                           Bob Braden <braden@isi.edu>
informatik-lm   1428/tcp    Informatik License Manager
informatik-lm   1428/udp    Informatik License Manager
#                           Harald Schlangmann
#                           <schlangm@informatik.uni-muenchen.de>

nms             1429/tcp    Hypercom NMS
nms             1429/udp    Hypercom NMS
tpdu            1430/tcp    Hypercom TPDU
tpdu            1430/udp    Hypercom TPDU
#                           Noor Chowdhury <noor@hypercom.com>
rgtp            1431/tcp    Reverse Gossip Transport
rgtp            1431/udp    Reverse Gossip Transport
#                           Ian Jackson   <iwj@cam-orl.co.uk>
blueberry-lm    1432/tcp    Blueberry Software License Manager

blueberry-lm    1432/udp    Blueberry Software License Manager

#                           Steve Beigel <ublueb!steve@uunet.uu.net>
ms-sql-s        1433/tcp    Microsoft-SQL-Server
ms-sql-s        1433/udp    Microsoft-SQL-Server
ms-sql-m        1434/tcp    Microsoft-SQL-Monitor
ms-sql-m        1434/udp    Microsoft-SQL-Monitor

#                           Peter Hussey <peterhus@microsoft.com>
ibm-cics        1435/tcp    IBM CISC
ibm-cics        1435/udp    IBM CISC
#                           Geoff Meacock <gbibmswl@ibmmail.COM>
sas-2           1436/tcp    Satellite-data Acquisition System 2
sas-2           1436/udp    Satellite-data Acquisition System 2
#                           Bill Taylor <sais@ssec.wisc.edu>
tabula          1437/tcp    Tabula
tabula          1437/udp    Tabula
#                           Marcelo Einhorn
#                           <KGUNE%HUJIVM1.bitnet@taunivm.tau.ac.il>

eicon-server    1438/tcp    Eicon Security Agent/Server
```

eicon-server 1438/udp Eicon Security Agent/Server

eicon-x25 1439/tcp Eicon X25/SNA Gateway

eicon-x25 1439/udp Eicon X25/SNA Gateway

eicon-slp 1440/tcp Eicon Service Location Protocol

eicon-slp 1440/udp Eicon Service Location Protocol

Pat Calhoun <CALHOUN@admin.eicon.qc.ca>
cadis-1 1441/tcp Cadis License Management
cadis-1 1441/udp Cadis License Management
cadis-2 1442/tcp Cadis License Management
cadis-2 1442/udp Cadis License Management
Todd Wichers <twichers@csn.org>
ies-lm 1443/tcp Integrated Engineering Software

ies-lm 1443/udp Integrated Engineering Software

David Tong <David_Tong@integrated.mb.ca>
marcam-lm 1444/tcp Marcam License Management
marcam-lm 1444/udp Marcam License Management
Therese Hunt <hunt@marcam.com>
proxima-lm 1445/tcp Proxima License Manager
proxima-lm 1445/udp Proxima License Manager
ora-lm 1446/tcp Optical Research Associates License Manager
ora-lm 1446/udp Optical Research Associates License Manager
apri-lm 1447/tcp Applied Parallel Research LM
apri-lm 1447/udp Applied Parallel Research LM
Jim Dillon <jed@apri.com>
oc-lm 1448/tcp OpenConnect License Manager
oc-lm 1448/udp OpenConnect License Manager
Sue Barnhill <snb@oc.com>
peport 1449/tcp PEport

peport 1449/udp PEport

Qentin Neill <quentin@ColumbiaSC.NCR.COM>
dwf 1450/tcp Tandem Distributed Workbench Facility

dwf 1450/udp Tandem Distributed Workbench Facility

Mike Bert <BERG_MIKE@tandem.com>
infoman 1451/tcp IBM Information Management
infoman 1451/udp IBM Information Management
Karen Burns <---none--->
gtegsc-lm 1452/tcp GTE Government Systems License Man

```
gtegsc-lm       1452/udp    GTE Government Systems License Man

#               Mike Gregory <Gregory_Mike@msmail.iipo.gtegsc.com>
genie-lm        1453/tcp    Genie License Manager

genie-lm        1453/udp    Genie License Manager

#                           Paul Applegate <p.applegate2@genie.geis.com>
interhdl_elmd   1454/tcp    interHDL License Manager
interhdl_elmd   1454/tcp    interHDL License Manager
#                           Eli Sternheim eli@interhdl.com
esl-lm          1455/tcp    ESL License Manager
esl-lm          1455/udp    ESL License Manager
#                           Abel Chou <abel@willy.esl.com>
dca             1456/tcp    DCA
dca             1456/udp    DCA
#                           Jeff Garbers <jgarbers@netcom.com>
valisys-lm      1457/tcp    Valisys License Manager
valisys-lm      1457/udp    Valisys License Manager
#               Leslie Lincoln <leslie_lincoln@valisys.com>
nrcabq-lm       1458/tcp    Nichols Research Corp.
nrcabq-lm       1458/udp    Nichols Research Corp.
#                           Howard Cole <hcole@tumbleweed.nrcabq.com>
proshare1       1459/tcp    Proshare Notebook Application
proshare1       1459/udp    Proshare Notebook Application
proshare2       1460/tcp    Proshare Notebook Application
proshare2       1460/udp    Proshare Notebook Application
#                           Robin Kar <Robin_Kar@ccm.hf.intel.com>
ibm_wrless_lan  1461/tcp    IBM Wireless LAN
ibm_wrless_lan  1461/udp    IBM Wireless LAN
#                           <flanne@vnet.IBM.COM>
world-lm        1462/tcp    World License Manager
world-lm        1462/udp    World License Manager
#                           Michael S Amirault <ambi@world.std.com>
nucleus         1463/tcp    Nucleus
nucleus         1463/udp    Nucleus
#                           Venky Nagar <venky@fafner.Stanford.EDU>
msl_lmd         1464/tcp    MSL License Manager
msl_lmd         1464/udp    MSL License Manager
#                           Matt Timmermans
pipes           1465/tcp    Pipes Platform
pipes           1465/udp    Pipes Platform   mfarlin@peerlogic.com
#                           Mark Farlin <mfarlin@peerlogic.com>
oceansoft-lm    1466/tcp    Ocean Software License Manager
oceansoft-lm    1466/udp    Ocean Software License Manager
#                           Randy Leonard <randy@oceansoft.com>
csdmbase        1467/tcp    CSDMBASE
csdmbase        1467/udp    CSDMBASE
csdm            1468/tcp    CSDM
csdm            1468/udp    CSDM
#               Robert Stabl <stabl@informatik.uni-muenchen.de>
```

```
aal-lm          1469/tcp    Active Analysis Limited License Manager
aal-lm          1469/udp    Active Analysis Limited License Manager
#                           David Snocken  +44 (71)437-7009
uaiact          1470/tcp    Universal Analytics
uaiact          1470/udp    Universal Analytics
#                           Mark R. Ludwig <Mark-Ludwig@uai.com>
csdmbase        1471/tcp    csdmbase
csdmbase        1471/udp    csdmbase
csdm            1472/tcp    csdm
csdm            1472/udp    csdm
#                           Robert Stabl <stabl@informatik.uni-muenchen.de>
openmath        1473/tcp    OpenMath
openmath        1473/udp    OpenMath
#                           Garth Mayville <mayville@maplesoft.on.ca>
telefinder      1474/tcp    Telefinder
telefinder      1474/udp    Telefinder
#                           Jim White <Jim_White@spiderisland.com>
taligent-lm     1475/tcp    Taligent License Manager
taligent-lm     1475/udp    Taligent License Manager
#                           Mark Sapsford <Mark_Sapsford@@taligent.com>
clvm-cfg        1476/tcp    clvm-cfg
clvm-cfg        1476/udp    clvm-cfg
#                           Eric Soderberg <seric@cup.hp.com>
ms-sna-server   1477/tcp    ms-sna-server
ms-sna-server   1477/udp    ms-sna-server
ms-sna-base     1478/tcp    ms-sna-base
ms-sna-base     1478/udp    ms-sna-base
#                           Gordon Mangione <gordm@microsoft.com>
dberegister     1479/tcp    dberegister
dberegister     1479/udp    dberegister
#                           Brian Griswold <brian@dancingbear.com>
pacerforum      1480/tcp    PacerForum
pacerforum      1480/udp    PacerForum
#                           Peter Caswell <pfc@pacvax.pacersoft.com>
airs            1481/tcp    AIRS
airs            1481/udp    AIRS
#                           Bruce Wilson, 905-771-6161
miteksys-lm     1482/tcp    Miteksys License Manager
miteksys-lm     1482/udp    Miteksys License Manager
#                           Shane McRoberts <mcroberts@miteksys.com>
afs             1483/tcp    AFS License Manager
afs             1483/udp    AFS License Manager
#                           Michael R. Pizolato <michael@afs.com>
confluent       1484/tcp    Confluent License Manager
confluent       1484/udp    Confluent License Manager
#                           James Greenfiel <jim@pa.confluent.com>
lansource       1485/tcp    LANSource
lansource       1485/udp    LANSource
#                           Doug Scott <lansourc@hookup.net>
nms_topo_serv   1486/tcp    nms_topo_serv
nms_topo_serv   1486/udp    nms_topo_serv
```

```
#                               Sylvia Siu <Sylvia_Siu@Novell.CO>
localinfosrvr    1487/tcp      LocalInfoSrvr
localinfosrvr    1487/udp      LocalInfoSrvr
#                Brian Matthews <brian_matthews@ibist.ibis.com>
docstor          1488/tcp      DocStor
docstor          1488/udp      DocStor
#                              Brian Spears <bspears@salix.com>
dmdocbroker      1489/tcp      dmdocbroker
dmdocbroker      1489/udp      dmdocbroker
#                              Razmik Abnous <abnous@documentum.com>
insitu-conf      1490/tcp      insitu-conf
insitu-conf      1490/udp      insitu-conf
#                              Paul Blacknell <paul@insitu.com>
anynetgateway    1491/tcp      anynetgateway
anynetgateway    1491/udp      anynetgateway
#                              Dan Poirier <poirier@VNET.IBM.COM>
stone-design-1   1492/tcp      stone-design-1
stone-design-1   1492/udp      stone-design-1
#                              Andrew Stone <andrew@stone.com>
netmap_lm        1493/tcp      netmap_lm
netmap_lm        1493/udp      netmap_lm
#                              Phillip Magson <philm@extro.ucc.su.OZ.AU>
ica              1494/tcp      ica
ica              1494/udp      ica
#                              John Richardson, Citrix Systems
cvc              1495/tcp      cvc
cvc              1495/udp      cvc
#                              Bill Davidson <billd@equalizer.cray.com>
liberty-lm       1496/tcp      liberty-lm
liberty-lm       1496/udp      liberty-lm
#                              Jim Rogers <trane!jimbo@pacbell.com>
rfx-lm           1497/tcp      rfx-lm
rfx-lm           1497/udp      rfx-lm
#                              Bill Bishop <bil@rfx.rfx.com>
watcom-sql       1498/tcp      Watcom-SQL
watcom-sql       1498/udp      Watcom-SQL
#                              Rog Skubowius <rwskubow@ccnga.uwaterloo.ca>
fhc              1499/tcp      Federico Heinz Consultora
fhc              1499/udp      Federico Heinz Consultora
#                              Federico Heinz <federico@heinz.com>
vlsi-lm          1500/tcp      VLSI License Manager
vlsi-lm          1500/udp      VLSI License Manager
#                              Shue-Lin Kuo <shuelin@mdk.sanjose.vlsi.com>
sas-3            1501/tcp      Satellite-data Acquisition System
3
sas-3            1501/udp      Satellite-data Acquisition System
3
#                              Bill Taylor <sais@ssec.wisc.edu>
shivadiscovery   1502/tcp      Shiva
shivadiscovery   1502/udp      Shiva
#                              Jonathan Wenocur <jhw@Shiva.COM>
```

imtc-mcs 1503/tcp Databeam
imtc-mcs 1503/udp Databeam
Jim Johnstone <jjohnstone@databeam.com>
evb-elm 1504/tcp EVB Software Engineering License Manager
evb-elm 1504/udp EVB Software Engineering License Manager
B.G. Mahesh < mahesh@sett.com>
funkproxy 1505/tcp Funk Software, Inc.
funkproxy 1505/udp Funk Software, Inc.
Robert D. Vincent <bert@willowpond.com>
utcd 1506/tcp Universal Time daemon (utcd)
utcd 1506/udp Universal Time daemon (utcd)
Walter Poxon <wdp@ironwood.cray.com>
symplex 1507/tcp symplex
symplex 1507/udp symplex
Mike Turley <turley@symplex.com>
diagmond 1508/tcp diagmond
diagmond 1508/udp diagmond
Pete Moscatelli <moscat@hprdstl0.rose.hp.com>
robcad-lm 1509/tcp Robcad, Ltd. License Manager
robcad-lm 1509/udp Robcad, Ltd. License Manager
Hindin Joseph <hindin%robcad@uunet.uu.net>
mvx-lm 1510/tcp Midland Valley Exploration Ltd. Lic. Man.
mvx-lm 1510/udp Midland Valley Exploration Ltd. Lic. Man.
Charles X. Chen <charles@mvel.demon.co.uk>
3l-l1 1511/tcp 3l-l1
3l-l1 1511/udp 3l-l1
Ian A. Young <iay@threel.co.uk>
wins 1512/tcp Microsoft’s Windows Internet Name Service
wins 1512/udp Microsoft’s Windows Internet Name Service
Pradeep Bahl <pradeepb@microsoft.com>
fujitsu-dtc 1513/tcp Fujitsu Systems Business of America, Inc
fujitsu-dtc 1513/udp Fujitsu Systems Business of America, Inc
fujitsu-dtcns 1514/tcp Fujitsu Systems Business of America, Inc
fujitsu-dtcns 1514/udp Fujitsu Systems Business of America, Inc
Charles A. Higgins
<75730.2257@compuserve.com>
ifor-protocol 1515/tcp ifor-protocol
ifor-protocol 1515/udp ifor-protocol
Dr. R.P. Alston <robin@gradient.com>
vpad 1516/tcp Virtual Places Audio data
vpad 1516/udp Virtual Places Audio data

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vpac                1517/tcp      Virtual Places Audio control
vpac                1517/udp      Virtual Places Audio control
vpvd                1518/tcp      Virtual Places Video data
vpvd                1518/udp      Virtual Places Video data
vpvc                1519/tcp      Virtual Places Video control
vpvc                1519/udp      Virtual Places Video control
#                                 Ehud Shapiro <udi@ubique.co.il>
atm-zip-office   1520/tcp      atm zip office
atm-zip-office   1520/udp      atm zip office
#                                 Wilson Kwan <wilsonk%toronto@zip.atm.com>
ncube-lm            1521/tcp      nCube License Manager
ncube-lm            1521/udp      nCube License Manager
#                                 Maxine Yuen <maxine@hq.ncube.com>
rna-lm              1522/tcp      Ricardo North America License Manager
rna-lm              1522/udp      Ricardo North America License Manager
#                                 MFlemming@aol.com
cichild-lm          1523/tcp      cichild
cichild-lm          1523/udp      cichild
#                                 Andy Burgess <aab@cichlid.com>
ingreslock 1524/tcp      ingres
ingreslock 1524/udp      ingres
orasrv              1525/tcp      oracle
orasrv              1525/udp      oracle
prospero-np         1525/tcp      Prospero Directory Service non-priv
prospero-np         1525/udp      Prospero Directory Service non-priv
pdap-np             1526/tcp      Prospero Data Access Prot non-priv

pdap-np             1526/udp      Prospero Data Access Prot non-priv

#                                 B. Clifford Neuman <bcn@isi.edu>
tlisrv              1527/tcp      oracle
tlisrv              1527/udp      oracle
mciautoreg          1528/tcp      micautoreg
mciautoreg          1528/udp      micautoreg
#                                 John Klensin <klensin@MAIL1.RESTON.MCI.NET>
coauthor            1529/tcp      oracle
coauthor            1529/udp      oracle
rap-service         1530/tcp      rap-service
rap-service         1530/udp      rap-service
rap-listen          1531/tcp      rap-listen
rap-listen          1531/udp      rap-listen
#                                 Phil Servita <meister@ftp.com>
miroconnect         1532/tcp      miroconnect
miroconnect         1532/udp      miroconnect
#                                 Michael Fischer +49 531 21 13 0
virtual-places   1533/tcp      Virtual Places Software
virtual-places   1533/udp      Virtual Places Software
#                                 Ehud Shapiro <udi@ubique.co.il>

micromuse-lm        1534/tcp      micromuse-lm
micromuse-lm        1534/udp      micromuse-lm
```

```
#                               Adam Kerrison <adam@micromuse.co.uk>
ampr-info         1535/tcp      ampr-info
ampr-info         1535/udp      ampr-info
ampr-inter        1536/tcp      ampr-inter
ampr-inter        1536/udp      ampr-inter
#                               Rob Janssen <rob@sys3.pe1chl.ampr.org>
sdsc-lm           1537/tcp      isi-lm
sdsc-lm           1537/udp      isi-lm
#                               Len Wanger <lrw@sdsc.edu>
3ds-lm            1538/tcp      3ds-lm
3ds-lm            1538/udp      3ds-lm
#                               Keith Trummel <ktrummel@autodesk.com>
intellistor-lm    1539/tcp      Intellistor License Manager
intellistor-lm    1539/udp      Intellistor License Manager
#                               Ron Vaughn <rv@intellistor.com>
rds               1540/tcp      rds
rds               1540/udp      rds
rds2              1541/tcp      rds2
rds2              1541/udp      rds2
#                               Sudhakar Rajamannar <mobius1@cerfnet.com>
gridgen-elmd      1542/tcp      gridgen-elmd
gridgen-elmd      1542/udp      gridgen-elmd
#                               John R. Chawner +1 817 354-1004
simba-cs          1543/tcp      simba-cs
simba-cs          1543/udp      simba-cs
#                               Betsy Alexander +1 604-681-4549
aspeclmd          1544/tcp      aspeclmd
aspeclmd          1544/udp      aspeclmd
#                               V. Balaji <balaji@aspec.com>
vistium-share     1545/tcp      vistium-share
vistium-share     1545/udp      vistium-share
#                 Allison Carleton <acarleto@naper1.napervilleil.ncr.com>
abbaccuray        1546/tcp      abbaccuray
abbaccuray        1546/udp      abbaccuray
#                               John Wendt 614-261-2000
laplink           1547/tcp      laplink
laplink           1547/udp      laplink
#                                       Michael Crawford <MichaelC@dev.travsoft.com>
axon-lm           1548/tcp      Axon License Manager
axon-lm           1548/udp      Axon License Manager
#    Mark Pearce <<Mark_A.._Pearce/AXON_Networks_Inc..@notes.axon.com>
shivahose         1549/tcp      Shiva Hose
shivasound        1549/udp      Shiva Sound
#                               Kin Chan <kchan@shiva.com>
3m-image-lm       1550/tcp      Image Storage license manager 3M Company
3m-image-lm       1550/udp      Image Storage license manager 3M Company
#                               J. C. Canessa <jccanessa@mmm.com>
hecmtl-db         1551/tcp      HECMTL-DB
hecmtl-db         1551/udp      HECMTL-DB
#                               Maxime Belanger <R173@hec.ca>
pciarray          1552/tcp      pciarray
```

```
pciarray        1552/udp    pciarray
#                           Ron Folk <rfolkes@avl.com>
sna-cs          1553/tcp    sna-cs
sna-cs          1553/udp    sna-cs
#                           Tony Sowter <ts@datcon.co.uk>
caci-lm         1554/tcp    CACI Products Company License Manager
caci-lm         1554/udp    CACI Products Company License Manager
#                           Erik Blume <erikb@caciasl.com>
livelan         1555/tcp    livelan
livelan         1555/udp    livelan
#                   khedayat@roadrunner.pictel.com <Kaynam
Hedayat>
ashwin          1556/tcp    AshWin CI Tecnologies
ashwin          1556/udp    AshWin CI Tecnologies
#                           Dave Neal <daven@ashwin.com>
arbortext-lm    1557/tcp    ArborText License Manager
arbortext-lm    1557/udp    ArborText License Manager
#                           David J. Wilson <djw@arbortext.com>
xingmpeg        1558/tcp    xingmpeg
xingmpeg        1558/udp    xingmpeg
#                           Howard Gordon <hgordon@system.xingtech.com>
web2host        1559/tcp    web2host
web2host        1559/udp    web2host
#                           Stephen Johnson <sjohnson@mindspring.com>
asci-val        1560/tcp    asci-val
asci-val        1560/udp    asci-val
#                           Brian Schenkenberger <brians@advsyscon.com>
facilityview    1561/tcp    facilityview
facilityview    1561/udp    facilityview
#                           Ed Green <egreen@pmeasuring.com>
pconnectmgr     1562/tcp    pconnectmgr
pconnectmgr     1562/udp    pconnectmgr
#                           Bob Kaiser <BKaiser@palindrome.com>
cadabra-lm      1563/tcp    Cadabra License Manager
cadabra-lm      1563/udp    Cadabra License Manager
#                           Arthur Castonguay <arthurc@doe.carleton.ca>
pay-per-view    1564/tcp    Pay-Per-View
pay-per-view    1564/udp    Pay-Per-View
#                           Brian Tung <brian@isi.edu>
winddlb         1565/tcp    WinDD
winddlb         1565/udp    WinDD
#                           Kelly Sims <kellys@garnet.wv.tek.com>
corelvideo      1566/tcp    CORELVIDEO
corelvideo      1566/udp    CORELVIDEO
#                           Ming Poon <mingp@corel.ca>
jlicelmd        1567/tcp    jlicelmd
jlicelmd        1567/udp    jlicelmd
#                   Christian Schormann <100410.3063@compuserve.com>
tsspmap         1568/tcp    tsspmap
tsspmap         1568/udp    tsspmap
#                           Paul W. Nelson <nelson@thursby.com>
```

```
ets             1569/tcp    ets
ets             1569/udp    ets
#                           Carstein Seeberg <case@boole.no>

orbixd          1570/tcp    orbixd
orbixd          1570/udp    orbixd
#                           Bridget Walsh <bwalsh@iona.ie>
rdb-dbs-disp    1571/tcp    Oracle Remote Data Base
rdb-dbs-disp    1571/udp    Oracle Remote Data Base
#                           <mackin@us.oracle.com>
chip-lm         1572/tcp    Chipcom License Manager
chip-lm         1572/udp    Chipcom License Manager
#                           Jerry Natowitz <Jerry Natowitz>
itscomm-ns      1573/tcp    itscomm-ns
itscomm-ns      1573/udp    itscomm-ns
#                           Rich Thompson <richt@watson.ibm.com>

mvel-lm         1574/tcp    mvel-lm
mvel-lm         1574/udp    mvel-lm
#                           David Bisset <dbisset@mvel.demon.co.uk>
oraclenames     1575/tcp    oraclenames
oraclenames     1575/udp    oraclenames
#                           P.V.Shivkumar <PSHIVKUM@us.oracle.com>
moldflow-lm     1576/tcp    moldflow-lm
moldflow-lm     1576/udp    moldflow-lm
#                           Paul Browne <browne@moldflow.com.au>
hypercube-lm    1577/tcp    hypercube-lm
hypercube-lm    1577/udp    hypercube-lm
#                           Michael Moller <moller@hyper.hyper.com>
jacobus-lm      1578/tcp    Jacobus License Manager
jacobus-lm      1578/udp    Jacobus License Manager
#                           Tony Cleveland <tony.cleveland@jacobus.com>
ioc-sea-lm      1579/tcp    ioc-sea-lm
ioc-sea-lm      1579/tcp    ioc-sea-lm
#                           Paul Nelson <paul@ioc-sea.com>
tn-tl-r1        1580/tcp    tn-tl-r1
tn-tl-r2        1580/udp    tn-tl-r2
#                           Ed Kress <eskress@thinknet.com>
vmf-msg-port    1581/tcp    vmf-msg-port
vmf-msg-port    1581/udp    vmf-msg-port
#                           Eric Whitehill <eawhiteh@itt.com>
tams-lm         1582/tcp    Toshiba America Medical Systems

tams-lm         1582/udp    Toshiba America Medical Systems

#                           Philip Scott<pks@smtp.orasis.com>
simbaexpress    1583/tcp    simbaexpress
simbaexpress    1583/udp    simbaexpress
#                           Betsy Alexander +1 604-681-4549
#               1584-1599   Unassigned
issd    1600/tcp
```

issd 1600/udp
1601-1641 Unassigned
isis-am 1642/tcp isis-am
isis-am 1642/udp isis-am
isis-ambc 1643/tcp isis-ambc
isis-ambc 1643/udp isis-ambc
Ken Chapman <kchapman@isis.com>
1644-1649 Unassigned
nkd 1650/tcp
nkd 1650/udp
shiva_confsrvr 1651/tcp shiva_confsrvr
shiva_confsrvr 1651/udp shiva_confsrvr
Mike Horowitz <mah@Shiva.COM>
xnmp 1652/tcp xnmp
xnmp 1652/udp xnmp
Ali Saleh <scomm@cerf.net>
1653-1660 Unassigned
netview-aix-1 1661/tcp netview-aix-1
netview-aix-1 1661/udp netview-aix-1
netview-aix-2 1662/tcp netview-aix-2
netview-aix-2 1662/udp netview-aix-2
netview-aix-3 1663/tcp netview-aix-3
netview-aix-3 1663/udp netview-aix-3
netview-aix-4 1664/tcp netview-aix-4
netview-aix-4 1664/udp netview-aix-4
netview-aix-5 1665/tcp netview-aix-5
netview-aix-5 1665/udp netview-aix-5
netview-aix-6 1666/tcp netview-aix-6
netview-aix-6 1666/udp netview-aix-6
netview-aix-7 1667/tcp netview-aix-7
netview-aix-7 1667/udp netview-aix-7
netview-aix-8 1668/tcp netview-aix-8
netview-aix-8 1668/udp netview-aix-8
netview-aix-9 1669/tcp netview-aix-9
netview-aix-9 1669/udp netview-aix-9
netview-aix-10 1670/tcp netview-aix-10
netview-aix-10 1670/udp netview-aix-10
netview-aix-11 1671/tcp netview-aix-11
netview-aix-11 1671/udp netview-aix-11
netview-aix-12 1672/tcp netview-aix-12
netview-aix-12 1672/udp netview-aix-12
Martha Crisson <CRISSON@ralvm12.vnet.ibm.com>
1673-1987 Unassigned
licensedaemon 1986/tcp cisco license management
licensedaemon 1986/udp cisco license management
tr-rsrb-p1 1987/tcp cisco RSRB Priority 1 port
tr-rsrb-p1 1987/udp cisco RSRB Priority 1 port
tr-rsrb-p2 1988/tcp cisco RSRB Priority 2 port
tr-rsrb-p2 1988/udp cisco RSRB Priority 2 port
tr-rsrb-p3 1989/tcp cisco RSRB Priority 3 port
tr-rsrb-p3 1989/udp cisco RSRB Priority 3 port

#PROBLEMS!==

mshnet 1989/tcp MHSnet system
mshnet 1989/udp MHSnet system
Bob Kummerfeld <bob@sarad.cs.su.oz.au>
#PROBLEMS!==

stun-p1 1990/tcp cisco STUN Priority 1 port
stun-p1 1990/udp cisco STUN Priority 1 port
stun-p2 1991/tcp cisco STUN Priority 2 port
stun-p2 1991/udp cisco STUN Priority 2 port
stun-p3 1992/tcp cisco STUN Priority 3 port
stun-p3 1992/udp cisco STUN Priority 3 port
#PROBLEMS!==

ipsendmsg 1992/tcp IPsendmsg
ipsendmsg 1992/udp IPsendmsg
Bob Kummerfeld <bob@sarad.cs.su.oz.au>
#PROBLEMS!==

snmp-tcp-port 1993/tcp cisco SNMP TCP port
snmp-tcp-port 1993/udp cisco SNMP TCP port
stun-port 1994/tcp cisco serial tunnel port
stun-port 1994/udp cisco serial tunnel port
perf-port 1995/tcp cisco perf port
perf-port 1995/udp cisco perf port
tr-rsrb-port 1996/tcp cisco Remote SRB port
tr-rsrb-port 1996/udp cisco Remote SRB port
gdp-port 1997/tcp cisco Gateway Discovery Protocol
gdp-port 1997/udp cisco Gateway Discovery Protocol
x25-svc-port 1998/tcp cisco X.25 service (XOT)
x25-svc-port 1998/udp cisco X.25 service (XOT)
tcp-id-port 1999/tcp cisco identification port
tcp-id-port 1999/udp cisco identification port
callbook 2000/tcp
callbook 2000/udp
dc 2001/tcp
wizard 2001/udp curry
globe 2002/tcp
globe 2002/udp
mailbox 2004/tcp
emce 2004/udp CCWS mm conf
berknet 2005/tcp
oracle 2005/udp
invokator 2006/tcp
raid-cc 2006/udp raid
dectalk 2007/tcp
raid-am 2007/udp
conf 2008/tcp
terminaldb 2008/udp
news 2009n/tcp
whosockami 2009/udp
search 2010/tcp

pipe_server 2010/udp
raid-cc 2011/tcp raid
servserv 2011/udp
ttyinfo 2012/tcp
raid-ac 2012/udp
raid-am 2013/tcp
raid-cd 2013/udp
troff 2014/tcp
raid-sf 2014/udp
cypress 2015/tcp
raid-cs 2015/udp
bootserver 2016/tcp
bootserver 2016/udp
cypress-stat 2017/tcp
bootclient 2017/udp
terminaldb 2018/tcp
rellpack 2018/udp
whosockami 2019/tcp
about 2019/udp
xinupageserver 2020/tcp
xinupageserver 2020/udp
servexec 2021/tcp
xinuexpansion1 2021/udp
down 2022/tcp
xinuexpansion2 2022/udp
xinuexpansion3 2023/tcp
xinuexpansion3 2023/udp
xinuexpansion4 2024/tcp
xinuexpansion4 2024/udp
ellpack 2025/tcp
xribs 2025/udp
scrabble 2026/tcp
scrabble 2026/udp
shadowserver 2027/tcp
shadowserver 2027/udp
submitserver 2028/tcp
submitserver 2028/udp
device2 2030/tcp
device2 2030/udp
blackboard 2032/tcp
blackboard 2032/udp
glogger 2033/tcp
glogger 2033/udp
scoremgr 2034/tcp
scoremgr 2034/udp
imsldoc 2035/tcp
imsldoc 2035/udp
objectmanager 2038/tcp
objectmanager 2038/udp
lam 2040/tcp
lam 2040/udp

```
interbase 2041/tcp
interbase 2041/udp
isis   2042/tcp     isis
isis   2042/udp     isis
isis-bcast 2043/tcp     isis-bcast
isis-bcast 2043/udp     isis-bcast
#                               Ken Chapman <kchapman@isis.com
ivs-video          2232/udp     IVS Video default
rimsl   2044/tcp
rimsl   2044/udp
cdfunc   2045/tcp
cdfunc   2045/udp
sdfunc   2046/tcp
sdfunc   2046/udp
dls   2047/tcp
dls   2047/udp
dls-monitor 2048/tcp
dls-monitor 2048/udp
shilp   2049/tcp
shilp   2049/udp
dlsrpn              2065/tcp     Data Link Switch Read Port Number
dlsrpn              2065/udp     Data Link Switch Read Port Number
dlswpn              2067/tcp     Data Link Switch Write Port Number
dlswpn              2067/udp     Data Link Switch Write Port Number
ats                 2201/tcp     Advanced Training System Program
ats                 2201/udp     Advanced Training System Program
#
ivs-video          2232/tcp     IVS Video default
ivs-video          2232/udp     IVS Video default
#          Thierry Turletti <Thierry.Turletti@sophia.inria.fr>
ivsd                2241/tcp     IVS Daemon
ivsd                2241/udp     IVS Daemon
#          Thierry Turletti <Thierry.Turletti@sophia.inria.fr>
pehelp              2307/tcp     pehelp
pehelp              2307/udp     pehelp
#                               Jens Kilian <jensk@hpbeo82.bbn.hp.com>
#
rtsserv             2500/tcp     Resource Tracking system server
rtsserv             2500/udp     Resource Tracking system server
rtsclient           2501/tcp     Resource Tracking system client
rtsclient           2501/udp     Resource Tracking system client
#                               Aubrey Turner
#                   <S95525ta%etsuacad.bitnet@ETSUADMN.ETSU.EDU>
hp-3000-telnet   2564/tcp     HP 3000 NS/VT block mode telnet
www-dev             2784/tcp     world wide web - development
www-dev             2784/udp     world wide web - development
NSWS   3049/tcp
NSWS   3049/udp
vmodem              3141/tcp     VMODEM
vmodem              3141/udp     VMODEM
#                               Ray Gwinn <p00321@psilink.com>
```

```
ccmail              3264/tcp    cc:mail/lotus
ccmail              3264/udp    cc:mail/lotus
dec-notes           3333/tcp    DEC Notes
dec-notes           3333/udp    DEC Notes
#                               Kim Moraros <moraros@via.enet.dec.com>
mapper-nodemgr      3984/tcp    MAPPER network node manager
mapper-nodemgr      3984/udp    MAPPER network node manager
mapper-mapethd      3985/tcp    MAPPER TCP/IP server
mapper-mapethd      3985/udp    MAPPER TCP/IP server
mapper-ws_ethd      3986/tcp    MAPPER workstation server
mapper-ws_ethd      3986/udp    MAPPER workstation server
#                               John C. Horton <jch@unirsvl.rsvl.unisys.com>
bmap                3421/tcp    Bull Apprise portmapper
bmap                3421/udp    Bull Apprise portmapper
#                               Jeremy Gilbert <J.Gilbert@ma30.bull.com>
#
prsvp               3455/tcp    RSVP Port
prsvp               3455/udp    RSVP Port
#                               Bob Braden <Braden@isi.edu>
vat                 3456/tcp    VAT default data
vat                 3456/udp    VAT default data
#                               Van Jacobson <van@ee.lbl.gov>
vat-control         3457/tcp    VAT default control
vat-control         3457/udp    VAT default control
#                               Van Jacobson <van@ee.lbl.gov>
#
udt_os              3900/tcp    Unidata UDT OS
udt_os              3900/udp    Unidata UDT OS
#                               James Powell <james@mailhost.unidata.com>
netcheque           4008/tcp    NetCheque accounting
netcheque           4008/udp    NetCheque accounting
#                               B. Clifford Neuman <bcn@isi.edu>
nuts_dem            4132/tcp    NUTS Daemon
nuts_dem            4132/udp    NUTS Daemon
nuts_bootp          4133/tcp    NUTS Bootp Server
nuts_bootp          4133/udp    NUTS Bootp Server
#                               Martin Freiss <freiss.pad@sni.>
rwhois              4321/tcp    Remote Who Is
rwhois              4321/udp    Remote Who Is
#                               Mark Kosters   <markk@internic.net>
unicall             4343/tcp    UNICALL
unicall             4343/udp    UNICALL
#                               James Powell <james@enghp.unidata.comp>
krb524              4444/tcp    KRB524
krb524              4444/udp    KRB524
#                               B. Clifford Neuman <bcn@isi.edu>
# PROBLEM krb524 assigned the port,
# PROBLEM nv used it without an assignment
nv-video            4444/tcp    NV Video default
nv-video            4444/udp    NV Video default
#                   Ron Frederick <frederick@parc.xerox.com>
```

```
#
sae-urn             4500/tcp    sae-urn
sae-urn             4500/udp    sae-urn
urn-x-cdchoice   4501/tcp    urn-x-cdchoice
urn-x-cdchoice   4501/udp    urn-x-cdchoice
#                                Paul Hoffman <phoffman@proper.com>
rfa                 4672/tcp    remote file access server
rfa                 4672/udp    remote file access server
commplex-main 5000/tcp
commplex-main 5000/udp
commplex-link 5001/tcp
commplex-link 5001/udp
rfe                 5002/tcp    radio free ethernet
rfe                 5002/udp    radio free ethernet
claris-fmpro      5003/tcp    Claris FileMaker Pro
claris-fmpro      5003/udp    Claris FileMaker Pro
#                                Jon Thatcher <jon_thatcher@qm.claris.com>
telelpathstart   5010/tcp    TelepathStart
telelpathstart   5010/udp    TelepathStart
telelpathattack 5011/tcp    TelepathAttack
telelpathattack 5011/udp    TelepathAttack
#                 Helmuth Breitenfellner <hbreitenf@vnet.imb.com>
mmcc                5050/tcp    multimedia conference control tool
mmcc                5050/udp    multimedia conference control tool
#                 Steve Casner <Casner@isi.edu>
rmonitor_secure 5145/tcp
rmonitor_secure 5145/udp
aol                 5190/tcp    America-Online
aol                 5190/udp    America-Online
#                                Marty Lyons <marty@aol.com>
aol-1               5191/tcp    AmericaOnline1
aol-1               5191/udp    AmericaOnline1
aol-2               5192/tcp    AmericaOnline2
aol-2               5192/udp    AmericaOnline2
aol-3               5193/tcp    AmericaOnline3
aol-3               5193/udp    AmericaOnline3
#                                Bruce Mackey <BAMackey@aol.com>
padl2sim 5236/tcp
padl2sim 5236/udp
hacl-hb   5300/tcp # HA cluster heartbeat
hacl-hb   5300/udp # HA cluster heartbeat
hacl-gs   5301/tcp # HA cluster general services
hacl-gs   5301/udp # HA cluster general services
hacl-cfg 5302/tcp # HA cluster configuration
hacl-cfg 5302/udp # HA cluster configuration
hacl-probe 5303/tcp # HA cluster probing
hacl-probe 5303/udp # HA cluster probing
hacl-local        5304/tcp
hacl-local        5304/udp
hacl-test         5305/tcp
hacl-test         5305/udp
```

```
#                                   Eric Soderberg <seric@hposl102.cup.hp>
proshareaudio     5713/tcp     proshare conf audio
proshareaudio     5713/udp     proshare conf audio
prosharevideo     5714/tcp     proshare conf video
prosharevideo     5714/udp     proshare conf video
prosharedata      5715/tcp     proshare conf data
prosharedata      5715/udp     proshare conf data
prosharerequest 5716/tcp     proshare conf request
prosharerequest 5716/udp     proshare conf request
prosharenotify   5717/tcp     proshare conf notify
prosharenotify   5717/udp     proshare conf notify
#                                 <gunner@ibeam.intel.com>
x11               6000-6063/tcp     X Window System
x11               6000-6063/udp     X Window System
#                 Stephen Gildea <gildea@expo.lcs.mit.edu>
softcm            6110/tcp     HP SoftBench CM
softcm            6110/udp     HP SoftBench CM
spc               6111/tcp     HP SoftBench Sub-Process Control
spc               6111/udp     HP SoftBench Sub-Process Control
#                               Scott A. Kramer <sk@tleilaxu.sde.hp.com>
dtspcd            6112/tcp     dtspcd
dtspcd            6112/udp     dtspcd
#                               Doug Royer <Doug.Royer@eng.sun.com>
meta-corp         6141/tcp     Meta Corporation License Manager
meta-corp         6141/udp     Meta Corporation License Manager
#                               Osamu Masuda <--none--->
aspentec-lm       6142/tcp     Aspen Technology License Manager
aspentec-lm       6142/udp     Aspen Technology License Manager
#                               Kevin Massey <massey@aspentec.com>
watershed-lm      6143/tcp     Watershed License Manager
watershed-lm      6143/udp     Watershed License Manager
#                               David Ferrero <david@zion.com>
statsci1-lm       6144/tcp     StatSci License Manager - 1
statsci1-lm       6144/udp     StatSci License Manager - 1
statsci2-lm       6145/tcp     StatSci License Manager - 2
statsci2-lm       6145/udp     StatSci License Manager - 2
#                               Scott Blachowicz <scott@statsci.com>
lonewolf-lm       6146/tcp     Lone Wolf Systems License Manager
lonewolf-lm       6146/udp     Lone Wolf Systems License Manager
#                               Dan Klein <dvk@lonewolf.com>
montage-lm        6147/tcp     Montage License Manager
montage-lm        6147/udp     Montage License Manager
#                               Michael Ubell <michael@montage.com>
ricardo-lm        6148/tcp     Ricardo North America License Manager
ricardo-lm        6148/udp     Ricardo North America License Manager
#                               M Flemming <mflemming@aol.com>
xdsxdm   6558/tcp
xdsxdm   6558/udp
acmsoda           6969/tcp     acmsoda
acmsoda           6969/udp     acmsoda
#                               Daniel Simms <dsimms@acm.uiuc.edu>
```

afs3-fileserver 7000/tcp file server itself
afs3-fileserver 7000/udp file server itself
afs3-callback 7001/tcp callbacks to cache managers
afs3-callback 7001/udp callbacks to cache managers
afs3-prserver 7002/tcp users & groups database
afs3-prserver 7002/udp users & groups database
afs3-vlserver 7003/tcp volume location database
afs3-vlserver 7003/udp volume location database
afs3-kaserver 7004/tcp AFS/Kerberos authentication service
afs3-kaserver 7004/udp AFS/Kerberos authentication service
afs3-volser 7005/tcp volume managment server
afs3-volser 7005/udp volume managment server
afs3-errors 7006/tcp error interpretation service
afs3-errors 7006/udp error interpretation service
afs3-bos 7007/tcp basic overseer process
afs3-bos 7007/udp basic overseer process
afs3-update 7008/tcp server-to-server updater
afs3-update 7008/udp server-to-server updater
afs3-rmtsys 7009/tcp remote cache manager service
afs3-rmtsys 7009/udp remote cache manager service
ups-onlinet 7010/tcp onlinet uninterruptable power supplies
ups-onlinet 7010/udp onlinet uninterruptable power supplies
Brian Hammill <hamill@dolphin.exide.com>
font-service 7100/tcp X Font Service
font-service 7100/udp X Font Service
Stephen Gildea <gildea@expo.lcs.mit.edu>
fodms 7200/tcp FODMS FLIP
fodms 7200/udp FODMS FLIP
David Anthony <anthony@power.amasd.anatcp.rockwell.com>
dlip 7201/tcp DLIP
dlip 7201/udp DLIP
Albert Manfredi <manfredi@engr05.comsys.rockwell.com>
npmp 8450/tcp npmp
npmp 8450/udp npmp
Ian Chard <ian@tanagra.demon.co.uk>
man 9535/tcp
man 9535/udp
sd 9876/tcp Session Director
sd 9876/udp Session Director
Van Jacobson <van@ee.lbl.gov>
distinct 9999/tcp distinct
distinct 9999/udp distinct
Anoop Tewari <anoop@next.distinct.com>
isode-dua 17007/tcp
isode-dua 17007/udp
biimenu 18000/tcp Beckman Instruments, Inc.
biimenu 18000/udp Beckman Instruments, Inc.
R. L. Meyering <RLMEYERING@BIIVAX.DP.BECKMAN.COM>
icl-twobase1 25000/tcp icl-twobase1
icl-twobase1 25000/udp icl-twobase1
icl-twobase2 25001/tcp icl-twobase2

icl-twobase2 25001/udp icl-twobase2
icl-twobase3 25002/tcp icl-twobase3
icl-twobase3 25002/udp icl-twobase3
icl-twobase4 25003/tcp icl-twobase4
icl-twobase4 25003/udp icl-twobase4
icl-twobase5 25004/tcp icl-twobase5
icl-twobase5 25004/udp icl-twobase5
icl-twobase6 25005/tcp icl-twobase6
icl-twobase6 25005/udp icl-twobase6
icl-twobase7 25006/tcp icl-twobase7
icl-twobase7 25006/udp icl-twobase7
icl-twobase8 25007/tcp icl-twobase8
icl-twobase8 25007/udp icl-twobase8
icl-twobase9 25008/tcp icl-twobase9
icl-twobase9 25008/udp icl-twobase9
icl-twobase10 25009/tcp icl-twobase10
icl-twobase10 25009/udp icl-twobase10
J. A. (Tony) Sever <J.A.Sever@bra0119.wins.icl.co.uk>
dbbrowse 47557/tcp Databeam Corporation
dbbrowse 47557/udp Databeam Corporation
Cindy Martin <cmartin@databeam.com>

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[RFC793] Postel, J., ed., “Transmission Control Protocol

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RFC 793,

USC/Information Sciences Institute, September 1981.