

INDEX

Note to the Reader: Page numbers in **bold** indicate the principle discussion of a topic or the definition of a term. Page numbers in *italic* indicate illustrations.

Numbers

- 2-tier client/server applications, **299**, 300
- 3-tier client/server applications, 300,
300–301
- 5-4-3 Rule, 89, **89**
- 10Base2 (Thinnet) Ethernet, 49, **49**, 62,
210, **744**, **782**
- 10Base5 (Thicknet) Ethernet, **48–49**, 49,
62, **782**
- 10BaseFL Ethernet, 99, **744**
- 10BaseT Ethernet, 376–377, 377, **744**
- 100BaseF Ethernet, 61
- 100BaseT (Fast Ethernet), 61, **62**, **64–65**,
100, **755**
- 100VG (Voice Grade) standard, 100, **744**
- 802 standards. *See* IEEE

A

- A+ Complete Study Guide, Deluxe Edition*
(Groth and Newland), 3
- AARP (AppleTalk Address Resolution
Protocol), **131**
- AAS (Application Assignment Scripts), **224**
- ABEND error messages, **420**
- ABEND.LOG files, 398
- Access database example, **656–658**
- access methods, media, 19–20, **93–94**
- access models, resource. *See* peer-to-peer;
server-based
- ACK (acknowledgement) message, **744**
- ACK bit for TCP, 581
- ACLs (Access Control Lists), **624**, **744**
- active directory domains, **31**
- Active Directory. *See* software deployment
- active monitors, **59**, **744**
- Active Server Pages (ASP), **554–555**
- ActiveX controls, 534, **554**
- adapters, **745**, *See also* NICs
- Address Resolution Protocol (AARP),
AppleTalk, **131**
- Address Resolution Protocol (ARP), **125**,
178, 745
- addresses, *See also* IP addresses; website
addresses
 - address records, 745
 - broadcast addresses, 747
 - defined, **105**, **745**
 - I/O addresses, 164–165
 - IPX addresses, 104–105, 761
 - logical addresses, 103–104, 104
 - MAC addresses
 - bridges and, 178
 - defined, **92–93**, **105**
 - duplication problems, 208
 - overview of, 104, 488
 - source addresses, 779
- Admin users, **606–607**, 621, 626, 628
- ADSL (asymmetrical digital subscriber line),
99, **745**, *See also* DSL
- Advanced Options menu. *See* DSREPAIR
- advertising, **222**
- Anderson, Christa, 29, 145, 245, 453, 537
- ANDing calculations, 180, **180**, 181

- animated GIFs, 526
- animation, 546–547
- antivirus software, **384–385**, 642, **643–644**, **745**
- Apple MacOS, **195–196**, 197
- AppleTalk protocol suite, **129–134**, *See also* protocol suites
 - defined, **129**
 - lower-layer protocols
 - AppleTalk Address Resolution Protocol, 131
 - EtherTalk, 131
 - LocalTalk, 58, 130–131
 - overview of, 130
 - TokenTalk, 131
 - mapped to OSI model, 130
 - middle-layer protocols
 - AppleTalk Transaction Protocol, 132
 - Datagram Delivery Protocol, 132
 - Name Binding Protocol, 132
 - overview of, 131
 - Routing Table Maintenance Protocol, 132
 - remote access options, 688–689, 689
 - upper-layer protocols
 - AppleShare File Server, 134
 - AppleShare PC, 134
 - AppleShare Print Server, 134
 - AppleTalk Data Stream Protocol, 133
 - AppleTalk Filing Protocol, 133–134
 - AppleTalk Session Protocol, 133
 - overview of, 132–133
 - Printer Access Protocol, 133
 - Zone Information Protocol, 133
- Application Assignment Scripts (AAS), **224**
- application developers, 735, **737**
- application languages. *See* programming
- Application layer, **82**, **113**, **486**
- Application Log file, 373, **373–374**
- Application Service Providers (ASPs), **242**, 243
- application-level gateways, **604**
- applications, *See also* software
 - application clients, 303
 - application managers, 322–323
 - application servers, 41
 - categorizing, 234, 235–236
 - client/server applications, 299–302, 300, 302, 656–659
 - defining, 298
 - embedding, 271
 - enterprise applications, 298, 299
 - file-based applications, 656–659
 - launching, 270
 - removing, 219, 221, 232, 236–237, 237
 - scheduling, 253–254
 - server applications, 304
 - sharing, 10–11, 708–710, 709
 - web-based applications, 303
 - workgroup applications, 298–299
- ARCnet (Attached Resource Computer Network), 97–98, **745**
- ARP (Address Resolution Protocol), **125**, 178, 745
- ARPAnet (Advanced Research Projects Agency Network), **121**
- ASCII character sets, *See also* EBCDIC
 - 7-bit standard set, 807–808
 - 8-bit IBM extended set, 808–812
 - control characters, 806
 - overview of, 113, 805
- ASP (Active Server Pages), **554–555**
- asymmetrical digital subscriber line (ADSL), 99, **745**, *See also* DSL
- ATM (Asynchronous Transfer Mode), 141, **141**, **745–746**
- ATP (AppleTalk Transaction Protocol), **132**
- attacks. *See* hacker attacks
- attributes. *See* securing NetWare

audio mapping, client, *279*, **279**
 Audit Policy dialog box, **371**
 AUI (Attachment Unit Interface) ports,
88, **746**
 authentication, 561–562, **685–688**, 686
 AUTOEXEC.NCF files, 402, 403
 Available Options in DSREPAIR, *433*,
433–434
 Aware security level, **583**

B

B-ISDN (Broadband Integrated Services
 Digital Network), 138
 back end, 5, 6
 Back Orifice software, 591
 backgrounds, website, **520–524**,
521–523, 546
 BackOffice software, 304
 backup managers, **322**
 backups. *See* disaster recovery
 BACP (Bandwidth Allocation Control
 Protocol), *690*, **691**
 bandwidth, **654–660**, **746**
 Banyan VINES protocol, **308–309**
 BAP (Bandwidth Allocation Protocol),
690, **691**
 Barnett, David, 171
 base I/O addresses, 164–165
 baseband, 61, 84, 99, **746**
 Bay Networks, 108, 109
 binary system, **164**
 bindings, *508*, **508**
 block sub allocation, **193**
 BOOT\$LOGERR files, 398
 BorderManager software, **604**
 Bragg, Marc S., 729
 bridges, *See also* connectivity devices
 defined, *101*, **101–102**, **176**, **747**
 hub problems and, 179
 IP addresses and, 178
 limitations, 179
 MAC addresses and, 178
 source-route bridging, *177*, *177*
 versus switches, 179
 translation bridging, *177*, *177*
 transparent bridging, *176*, *176*
 wireless bridges, 787
 broadband, 61, 85, **747**
 Broadband Local Area Networks (802.7),
98–99
 routers, **109**, **747**
 buffered distributors, **65–66**
 bug, fragmented packets, **592**
 “bundling”, 650
 bus, 18–19, **747**
 bus mastering NICs, **19**, **167–168**, *168*
 bus slots, **168**
 bus topologies, *See also* topologies
 defined, **747**
 logical topologies, 54–58, 56
 physical topologies, 48–50, *49*, 85, 85

C

C2 security certification, **644–645**
 cable, *See also* physical topologies
 access methods
 contention, 93
 CSMA/CA, 94
 CSMA/CD, 93–94
 overview of, 19–20
 polling, 93, 772
 token passing, 93, 94
 categories, 748
 coaxial cable
 defined, **749**
 overview of, *172–173*, *172–173*

- Thicknet (10Base5) coax, 48–49, 49, 62, 782
- Thinnet (10Base2) coax, 48, 49, 62, 210, 744, 782
- defined, **16, 747**
- in Ethernet home networks, 340–341
- fiber-optic cable
 - 802.8 LAN/MAN standard, 99
 - defined, **72–73, 756**
 - infrastructure, 305, 306–307
 - troubleshooting, 214
- infrastructure, 305–308, 305, 311–312
- installation
 - allowing for slack, 146–147
 - in ceilings, 147–148
 - electromagnetic interference and, 149, 211, 754
 - labeling everything, 148–149
 - neatness counts, 147–149
 - on/under floors, 148
 - overview of, 146, 169
 - planning ahead, 146
 - questions for contractors, 149–151
 - renting vs. building and, 341
 - warning, 147
 - wireless networks, 151–152
- OSI Physical layer and, 84–85
- patch cable, 770
- in Remote Access Service, 661, 663
- shielded twisted-pair cable, 97, 778
- in Token Ring networks, 97, 98
- troubleshooting
 - 10Base2 cable, 210
 - 10BaseT cable, 376–377, 377
 - by avoiding problems, 423–424
 - cable break problems, 49–50
 - with cable testers, 211, 384
 - with crossover cable, 376–377, 377, 750
 - fiber-optic cable, 214
 - overview of, 360, 383–384
 - in Token Ring networks, 213
 - by tracking performance, 424–426, 425
 - twisted-pair cable, 172–173, 173, 784
 - unshielded twisted-pair cable, 97, 785
- Cabling: The Complete Guide to Network Wiring* (Groth, McBee, and Barnett), 171
- cache, **189–190**
- cache, local host, **283**
- cache server, proxy, **774**
- caching, client side, **248**
- Carrier Sense Multiple Access with Collision Avoidance (CSMA/CA), **94, 748**
- Carrier Sense Multiple Access with Collision Detection (CSMA/CD), 60, **62–64, 64, 65, 748**
- carrier-sensing signals, **62, 93**
- carriers, **93, 748**
- Cascading Style Sheets (CSS), 535, **550**
- categories, **748**
- Cautious security level, **591–594**
- CCA: Citrix MetaFrame XP 1.0 Administration Study Guide* (Price and Price), 265
- CD-ROM tech support, 375
- central processing units. *See* CPUs
- centralized processing, **5**
- CERT (Computer Emergency Response Team), **601**
- certificates, **559–567**, *See also* encryption; security
 - certificate authorities
 - defined, **559**
 - enterprise CAs, 566
 - hierarchy of, 565–566, 565
 - in NetWare 6, 645–646
 - revoking certificates, 564
 - roles of, 566

- stand-alone CAs, 566
- types of, 566
- validating certificates, 565–566, 565
- defined, **562–563**
- encryption and, 561
- features
 - authentication, 561–562
 - non-repudiation, 562
 - privacy, 561
- key recovery/key escrow, 566
- private/public keys, 560–562
- public-key infrastructure and
 - certificate authorities, 564
 - certificate publishers, 564
 - defined, **563**
 - management tools, 564
 - overview of, 567
 - PKI-savvy applications, 564–565
 - services, 563–564
- secret keys and, 560
- signing, 561, 562, 563
- certification, C2 security, **644–645**
- certification programs
 - abbreviations, 798–799
 - network-related programs, 800–803
 - overview of, 797
- CGI (Common Gateway Interface), **554**
- Chacon, Michael, 217
- CHAP (Challenge-Handshake Authentication Protocol), **687**
- character set, EBCDIC, **813–816**,
See also ASCII
- checksum, **124, 748**
- Chellis, James, 29, 203, 217, 483, 559
- circuit-level gateways, **603**
- Cisco, 108–109, 182
- Citrix Management Console, 281, **281**,
289–290, 289–290
- Citrix MetaFrame 1.x, 273, 278, 282–283,
284, 292
- Citrix MetaFrame XP, **265–293**, *See also*
thin client
 - administrator use, 287–288
 - benefits
 - any client device, 269
 - any network connection, 270
 - any network protocol, 270
 - application embedding, 271
 - application launching, 270
 - digital independence, 268–272
 - load balancing, 272
 - resource mapping/redirection, 271
 - scalability, 272
 - seamless desktop integration,
270–272
 - server farms, 271–272
 - Client Device Licensing, 292
 - defined, **267**
 - flavors, 267–268
 - ICA protocol
 - client resource redirection,
277–279, 279
 - criteria for creating, 273–274
 - disconnecting sessions, 291–292
 - features, 255
 - ICA Packets, 274–275, 274
 - versus RDP protocol, 255–256
 - session states, 291–292
 - SpeedScreen options, 275–277, 277
 - IMA protocol
 - administration, 281, 281
 - configuration storage, 282–283
 - defined, **280–281**
 - license pooling, 284
 - logging shadowed sessions,
287–288, 288
 - published applications and,
284–286
 - subsystems, 280

- listener ports, 289–290, *289–290*
- MultiWin and, 266–267
- overview of, 264, 292–293
- resetting idle sessions, 290–291, *291*
- server farm monitoring, 289
- technologies in, 272–273
- Terminal Services and, 265–266
- Citrix WinFrame, **253, 266–267**
- Client Device Licensing, **292**
- client operating systems, *See also* NOSs
 - Apple MacOS, 195–196, 197
 - defined, **184**
 - Windows 95/98/ME, 196, 197
 - Windows 2000/XP Professional, 196–197
 - Windows NT Workstation, 196–197
- client side caching, **248**
- client-based applications, **656–659**
- client-server model, 44, **749**, *See also* Citrix; server-based; thin client
- client-side web applications, **552–554**
- clients, *See also* workstations
 - application clients, 303
 - client hardware, 47
 - client software, 9
 - costs, 259
 - defined, **9–10, 30, 749**
 - limitations, 246
 - replacing, 259, 261
 - resource redirection/mapping, 277–279, *279*
 - upgrading, 260–261
- clipboard mapping, client, *279*, **279**
- clustering, multiple-server, **765**
- clustering servers, 419, **470–472, 749**
- coaxial cable, *See also* cable
 - defined, **749**
 - overview of, 172–173, *172–173*
 - Thicknet (10Base5) coax, 48–49, 49, 62, 782
 - Thinnet (10Base2) coax, 48, 49, 62, 210, 744, 782
- college security, **574–575**
- collisions. *See* packets
- colors in intranets, **520–525**, *521–523*, 546
- COM port redirection, 271, **278**, *279*
- Common Gateway Interface (CGI), **554**
- Complete Encyclopedia of Networking* (Feibel), 600
- The Complete PC Upgrade and Maintenance Guide* (Minasi), 478
- compressing software, 690, 691
- CompTIA Network+ exam, 4
- Computer Emergency Response Team (CERT), **601**
- Computer Management MMC, 676, *676*
- computers. *See* clients; CPUs; servers; workstations
- computing history, **4–7**, *6–7*, **21–24**, *242*
- concentrators. *See* hubs
- Concerned security level. *See* firewalls
- configuration file copies, **401–402**, *402*, **404**
- connected star networks, **52**, *53*
- connection management. *See* NICs; protocols
- connection sharing options, **706–708**, *707*, *See also* RAS
- connection-oriented services, 60, *110*, **110**, *487*, **750**
- connectionless services, 60, **111**, 485, **487–488, 749**
- connectivity devices, **171–182**
 - bridges
 - defined, *101*, **101–102, 176, 747**
 - hub problems and, 179
 - IP addresses and, 178
 - limitations, 179
 - MAC addresses and, 178
 - MAC bridges, 96, 96
 - source-route bridging, *177*, *177*
 - versus switches, 179

- translation bridging, 177, 177
- transparent bridging, 176, 176
- wireless bridges, 787
- brouters, 109
- buffered distributors, 65–66
- hubs
 - active hubs, 90, 744
 - assessing, 317–318
 - collisions and, 174–175, 174–175
 - defined, **51–52, 89–90, 90, 173, 173–174**
 - intelligent hubs, 100, 102–103
 - link lights, 356, 762–763
 - LinkSys hubs, 425–426, 425
 - passive hubs, 90, 770
 - in physical star topologies, 85–86, 86
 - versus repeaters, 172
 - versus switches, 307
 - switching hubs, 102–103, 102
- infrastructure, 305–308, 305, 311–312
- ISDN terminal adapters, 761
- media attachment units, 70
- multistation access units
 - defined, **90–91, 91, 765**
 - overview of, 69–70
 - troubleshooting, 213
 - warning, 213
- overview of, 20, 171
- repeaters
 - defined, **88–89, 89, 171, 172**
 - versus hubs, 172
 - overview of, 66, 776
- routers
 - assessing, 318
 - defined, **108–109, 180–181, 180–182, 776**
 - Linksys Cable/DSL Router, 572
 - overview of, 106, 106, 307
 - Windows 2000 Server as, 498–499, 499
- switches
 - assessing, 317–318
 - benefits, 179
 - versus bridges, 179
 - closet switches, 305, 305, 306
 - core switches, 305, 305
 - DIP switches, 205, 205
 - versus hubs, 307
 - Layer 2 switches, 102–103, 102, 109, 762
 - Layer 3 switches, 109, 762
 - warning, 308
- connectors
 - BNC connectors, 747
 - DIN connectors, 88
 - hardware loopbacks, 377–378, 378
 - jumpers, 205, 205, 761
 - troubleshooting, 214
- CONSOLE.LOG files, 401, **401**
- ConsoleOne, **628–641**, *See also* securing NetWare
 - deleting object rights, 641
 - granting property rights, 625–626, 625
 - granting trustee rights
 - to directories, 631–634, 633–634
 - to objects, 637–641, 639–640
 - to users, 631–632, 635–636, 636–637
 - overview of, 628–629
 - revoking property rights, 629–631, 630
 - viewing directory rights, 609–610, 610
 - viewing file attributes, 620, 620
- consultants, **729–742**
 - defined, **733**
 - network consultants
 - defined, **737**
 - example of becoming, 731–733

- helpful books for, 735
- knowledge needed by, 738–739
- marketing self as, 739, 741–742
- versus other consultants, 738
- personality quiz for, 739–741
- skills needed by, 734
- overview of, 729–730, 742
- reasons to hire, 733–734
- types of
 - application developers, 735, 737
 - “celebrity” experts, 736–737
 - glory temps, 736
 - network consultants, 737–739
 - overview of, 735
 - technical experts, 735
 - unemployees, 735–736
- Control Panel, 206, 206, **750**
- controllers, 93, **750**
- controllers, domain, **31**
- conversion services, **517**
- copper wire, **72**
- corporate webs. *See* intranets
- costs
 - administration, reducing, 259–260
 - of computers, 259
 - hardware scale and, 418–420
 - tech support, reducing, 540
- counters, **406–407**
- CPUs (central processing units)
 - defined, **5, 185**
 - early uses, 157, 158, 165, 166
 - increasing power, 186–187
 - multithreading, 187
 - polling NICs, 157, 158
 - symmetric multiprocessing, 186–187
- CRC (cyclical redundancy check), **643, 750–751**
- CRLs (certificate revocation lists), **564**

- crossover cable, **376–377, 377, 750**
- crosstime, **395**
- CSMA/CA (Carrier Sense Multiple Access with Collision Avoidance), **94, 336, 748**
- CSMA/CD (Carrier Sense Multiple Access with Collision Detection), 60, **62–64, 64, 65, 93–94, 748**
- CSS (Cascading Style Sheets), 535, **550**
- Culp, Scott, 564

D

- daisy-chaining, **48**
- data collectors, **285–286**
- data link connection. *See* LLC
- Data Link layer, *See also* IEEE; MAC; OSI
 - bridges, 101–102, 101
 - CSMA/CA, 94
 - CSMA/CD, 93–94
 - defined, **83–84, 488, 751**
 - devices, 101–103, 101–102
 - IEEE 802 standards, 95–100, 96
 - LLC sublayer, 60, 91–92, 92, 96, 96
 - logical topologies and, 93
 - MAC addresses, 92–93
 - MAC sublayer, 60, 91–93, 92, 96
 - media access methods, 93–94
 - packets, 92
 - switching hubs, 102–103, 102
 - token passing, 93, 94
- data migration, **38**
- data packets, **751**, *See also* packets
- data recovery centers, **477–478**
- data replication, **470, 472**
- database access (in intranets), 540–541
- database servers, **44–45**
- DBAs (database administrators), **323**
- DDP (Datagram Delivery Protocol), **132**
- decimal system, **164–165**

- Demand Priority Access Method (802.12), 96, **100**
- Desai, Anil, 217
- design. *See* network design
- desktop integration, seamless, **270–272**
- Device Manager tab, 161–163, **161–162**
- devices. *See* connectivity devices; hardware
- DHCP (Dynamic Host Configuration Protocol), **499–501**, 500, 505, 689, **753**
- DHTML (Dynamic Hypertext Markup Language), *See also* HTML
- applying dynamic styles, 550
 - creating dynamic content, 551
 - defined, **549–550**
 - embedding data in pages, 551
 - precise positioning, 550
- diagnostic tools. *See* troubleshooting
- dial-up connections. *See* DUN; RAS
- dialogs, 112, **751**
- Dictionary of Networking* (Dyson), 789, 797, 805, 813
- digital certificates. *See* certificates
- digital independence, **268–272**
- digital signatures, **561**, **562**, 563
- Digital Subscriber Line (DSL), 330, 331, **752**, *See also* ADSL
- DIN connectors, 88
- DIP switches, 205, 205
- Directory, Active. *See* software deployment
- directory domains, active, **31**
- directory services, **44**
- Directory Services (NDS), Novell. *See* NDS; securing NetWare;
- troubleshooting NetWare
- disaster recovery, **453–479**
- using backups
 - administrating backup plans, 464–467
 - backup windows, 746
 - choosing backup hardware, 461–463
 - choosing backup software, 463–464
 - creating backup plans, 458–461, 746
 - daily backups, 456, 457
 - differential backups, 456, 458
 - frequency of, 459
 - full backups, 457, 756
 - GFS backup schemes, 461
 - incremental backups, 456, 457–458
 - logging, 457
 - open files and, 460
 - overview of, 456
 - practicing restoring data, 465
 - scheduling, 460–461
 - speed of, 462
 - storing, 466–467
 - timing, 459
 - ToH backup schemes, 461
 - viruses and, 644
 - warning, 466
 - creating plans for
 - characteristics of, 473
 - defined, **472–474**
 - elements in, 476–477
 - people involved in, 474–476
 - and storing copies of, 477
 - and testing, 477
 - using data recovery centers, 477–478
- disasters, *See also* hacker attacks
- defined, **454**
 - equipment breakdowns, 455
 - event-related disasters, 454–455
 - user-caused problems, 455
- overview of, 453–454, 479
- real-time data protection and, *See also* fault tolerance; securing NetWare
- by clustering servers, 470–472
 - using data replication, 470, 472

- overview of, 467
 - using RAID, 467–470
- discussion forums, **518–520**, 519
- disks, *See also* RAID
 - defined, **190–191**
 - disk counters, 407
 - disk thrashing, 189
 - drive mapping, 271, 278, 279
 - duplexing, 419, 468, 753
 - emergency boot disks, 404
 - switching, 472
 - troubleshooting, 421–422, 422
- disks, floppy, 328
- display protocols, 247, 247, 251–252, **254–256**
- distance vector routing, **107**
- distributed databases, **44–45**
- distributed processing, **5**, 6
- distributed star topologies, **52**, 53
- distributors, buffered, **65–66**
- DLC protocol, 310
- DMA channels, 19, **167**
- DMA (direct memory access), **165–168**, 166–168
- DNS (Domain Name Service)
 - address options, 670, 670
 - configuring, 501, 502–504, 503
 - defined, **112**, **126–127**, **752**
 - overview of
 - proxying, 594, 596
 - sharing, 709–710, 709
- documentation, importance of, 366, 395
- DOD (Department of Defense) model, **122–123**, 123
- domains, **752**
- domains, active directory, **31**
- Donald, Lisa, 483
- download time, web page, 534–535
- downtime, eliminating, 470–472
- downtime, tracking, 395–396
- DQDB (Distributed Queue Dual Bus)
 - MANs (802.6), 96, **98**
- drivers
 - NIC drivers, *See also* NICs
 - downloading, 155, 156
 - finding, 493
 - installing, 18, 154–156, 155–156
 - LAN drivers, 762
 - MLID standard, 117–118
 - properties, 491–493, 492–493
 - uninstalling, 492–493
 - updating, 493
 - viewing properties, 491–493, 492–493
 - Novell ODI drivers, 205, 769
 - Windows NDIS drivers, 205
- drives. *See* disks
- drops, 48, 49
- DSL (Digital Subscriber Line), 330, 331, **752**, *See also* ADSL
- DSL Router, Linksys Cable, **572**
- DSREPAIR utility, *See also* troubleshooting
- NetWare
 - Advanced Options menu
 - Check external references, 445
 - Check volume objects and trustees, 445, 445
 - defined, **434**
 - Global schema operations, 445–446
 - Log file and login configuration, 437–438, 438
 - overview of, 436–437, 437
 - Repair local DS database, 438–440, 439
 - Replica and partition operations, 442–444, 442
 - Return to main menu, 447
 - Servers known to this database, 440–442, 441

- View repair log file, 446–447, 446
 - warning, 437
 - Available Options menu, 433–434, 433
 - defined, **432**
 - graphical DSREPAIR, 447–448, 448–449
 - overview of, 428
 - unattended full repairs, 434, 435–436, 436
 - warning, 437
 - what it can do, 432–433
 - what it cannot do, 433
 - DSTRACE utility, *See also* troubleshooting
 - NetWare
 - defined, **428–429**, 429
 - graphical DSTRACE, 430–431, 431
 - turning on, 429–430
 - DUN (Dial-Up Networking), *See also* RAS
 - client configurations, 693–698, 694–699
 - defined, **651–652**
 - overview of, 705
 - duplexing hard drives, 419, 468, **753**
 - Dynamic Host Configuration Protocol (DHCP), **499–501**, 500, 505, 689, **753**
 - Dynamic Hypertext Markup Language. *See* DHTML
 - dynamic routing, **107**, **754**
 - Dyson, Peter, 789, 797, 805, 813
- ## E
- e-mail gateways, **113**
 - e-mail managers, **323**
 - e-mail systems, **42–43**, **754**
 - EAP (Extensible Authentication Protocol), **687**
 - EBCDIC character set, 113, **813–816**
 - Echelon LonWorks network, **332**
 - 802 standards. *See* IEEE
 - ELAP (EtherTalk Link Access Protocol), **131**
 - election criteria, **284–285**
 - electrostatic discharge (ESD), 204, **754**
 - embedding applications, **271**
 - emergency boot disks, **404**
 - EMI (electromagnetic interference), 149, 211, **754**
 - EMS (enterprise management system), **324**
 - encoding, **84**, **754**
 - encoding, signal, **84**, **779**
 - encryption, *See also* certificates
 - defined, **561**
 - encryption keys, 754
 - file level encryption, 193
 - enterprise applications, **298**, **299**
 - ESD (electrostatic discharge), 204, **754**
 - Ethernet networks, *See also* IEEE
 - 10Base2 (Thinnet), 48, 49, 61–62, 744, 782
 - 10Base5 (Thicknet), 48–49, 49, 62, 782
 - 10BaseFL Ethernet, 99, 744
 - 10BaseT Ethernet, 744
 - 100BaseF Ethernet, 61
 - 100BaseT Fast Ethernet, 61–62, 64–65, 100, 755
 - addresses. *See* MAC addresses
 - bus logical topology, 54–58, 56
 - collisions, 62–64, 64, 174–175, 174–175
 - defined, **60**, **755**
 - Gigabit Ethernet, 62, 64–66
 - at home, *See also* home networking
 - minuses, 340–341
 - overview of, 327, 328
 - versus phoneline, 331, 343
 - pluses, 339–340
 - versus powerline, 333, 345
 - versus wireless, 336, 348
 - names/types of, 61–62, 65
 - packets, 55, 60–61, 61

- versus Token Ring (802.5), 97–98
 - troubleshooting
 - 10Base2 cable, 210
 - 10BaseT cable, 376–377, 377
 - frame type incompatibility, 210–211
 - NICs, 208–210, 495–496
 - EtherTalk Link Access Protocol (ELAP), **131**
 - event IDs, **369**, 370
 - Event Viewer, Windows NT/2000, *See also* log files
 - accessing, 367–368
 - Application Log, 373–374, 373
 - Security Log, 371–373, 372–373, 777
 - System Log, 369, 369–370
 - viewing from Windows 95/98, 368
 - warning, 368
 - exabytes, 46
 - expansion slots, **168**, 204, 204, **755**
 - export servers, 470
 - Extensible Authentication Protocol (EAP), **687**
 - eXternal Data Representation (XDR), **128**
- ## F
- fabric, 66
 - failure profiles, **407–409**
 - Fast Ethernet (100BaseT), 61, **62**, **64–65**, 100, **755**
 - FAT (file allocation table), **193**
 - fault tolerance, *See also* disaster recovery
 - clustering servers, 470–472, 765
 - defined, **191–192**
 - monitoring, 315
 - overview of, 86
 - using RAID 1, 191, 419, 468, 469
 - using RAID 5, 191–192, 468–470
 - fax services, 40–41
 - FDDI (Fiber Distributed Data Interface)
 - defined, 136, **136**, **755**
 - features, 100
 - troubleshooting, 214
 - FDM (Frequency Division Multiplexing), **99**, **756**
 - Feibel, Werner, 600
 - fiber channel technology, **54**, **66**, **755**
 - fiber-optic cable, *See also* cable; network media
 - 802.8 LAN/MAN standard, 99
 - defined, **72–73**, **756**
 - infrastructure, 305, 306–307
 - troubleshooting, 214
 - fidelity, **72**
 - file allocation table (FAT), **193**
 - file extension mappings, **233**, 234
 - file level encryption, **193**
 - file locking, **6**
 - file servers
 - archiving files, 39
 - data migration, 38
 - defined, **8**, **36**
 - storing files, 37–38
 - synchronizing file updates, 38–39
 - transferring files, 36–37
 - file systems
 - defined, **192–194**
 - log-based file systems, 46
 - Network File System, 128, 767
 - security. *See* securing NetWare
 - File Transfer Protocol (FTP), **127**, 594, 642, **756**
 - file-based applications, **656–659**
 - filtering. *See* firewalls
 - financial institution security, **576–577**
 - Firewalls 24seven* (Strebe and Perkins), 569
 - firewalls, **578–598**, *See also* security
 - case study, 597
 - Cautious security level
 - fragmented packets, 592
 - ICMP, TCP, UDP rules, 592–594

- Network Address Translation, 591–592
 - overview of, 591
 - protocol proxying, 594–595
 - Concerned level filtering
 - ICMP packets, 584–586
 - IP packets, 586–588
 - TCP packets, 589–591
 - UDP packets, 587–589
 - configuring rules for
 - applying in order, 579
 - graphical user interfaces, 582
 - logging, 582
 - overview of, 578–579
 - per ACK bit for TCP, 581
 - per destination address/port, 580
 - per ICMP message type, 581
 - per interface, 579
 - per options, 581
 - per packet type, 580
 - per source address/port, 580
 - protocol proxying, 581
 - security levels, 582–597
 - defined, **756**
 - hardware firewalls, 308
 - in NetWare 6 networks, *See also* securing NetWare
 - application-level gateways, 604
 - circuit-level gateways, 603
 - defined, **602–603**
 - internal firewalls, 604–605
 - OSI model and, 603
 - packet filters (FILTCFG), 603
 - stateful inspection firewalls, 604
 - security levels
 - Aware, 583
 - Cautious, 591–594
 - Concerned, 583–591
 - overview of, 582
 - Paranoid, 596–597
 - Strict, 595–596
 - software firewalls, 308
 - SonicWALL SOHO, 571–572
 - 5-4-3 Rule, 89, **89**
 - flags (attributes). *See* securing NetWare
 - floppy disks, 328
 - forums, discussion, **518–520**, 519
 - fragmented memory, 358
 - fragmented packets, **592**
 - Frame Relay protocol, **137–138**, 138, 661, 663, **756**
 - framed protocols, **273**
 - frames, **488**, 534
 - frequency, 151, *See also* RF
 - Frequency Division Multiplexing (FDM), **99**, **756**
 - front end, 5, 6
 - FTP (File Transfer Protocol), **127**, 594, 642, **756**
 - full backups, **457**, **756**
 - full-duplex mode, **18**, 65
- ## G
- Gaskin, James E., 387, 599
 - gateways, *See also* RAS
 - application-level gateways, 604
 - circuit-level gateways, 603
 - Common Gateway Interface, 554
 - default gateways, 108, 498–499, 499
 - defined, **113**, **756**
 - e-mail gateways, 113
 - GFS (Grandfather/Father/Son) backups, **461**
 - Gigabit Ethernet, **62**, **64–66**
 - gigabytes, 37
 - glass media. *See* fiber-optic
 - Goldsmith, Marianne, 407

Govanus, Gary, 182
 government bureau security, **574**
 GPOs. *See* software deployment
 graphical DSREPAIR utility, **447–448**,
 448–449
 graphical DSTRACE utility, **430–431**, 431
 graphical user interfaces, firewall, **582**
 graphics in intranets, *See also* images;
 intranets
 graphical navigation, 529–530, 529
 logos, 525–526, 525
 overview of, 525, 526–527
 Groth, David, 3, 79, 171, 353, 743
Guide to Managing PC Networks (Steinke,
 with Goldsmith, Hurwicz, and Koontz),
 407–408

H

hacker attacks
 denial of service attacks, 751
 ICMP (ping) attacks, 314–315
 IP spoofing, 761
 Nimda virus, 597
 Ping of Death, 772
 preventing. *See* firewalls; securing
 NetWare
 SYN attacks, 314, 591, 781
 worms, 597, 601, 788
 half-duplex mode, **18**, 65
 hard disks. *See* disks
 hardware, *See also* connectivity devices;
 CPUs; NICs
 addresses, 757, *See also* MAC addresses
 assessing current, 316–318
 backup hardware, 461–463
 controllers, 93, 750
 diagnostic tools for, *See also*
 troubleshooting
 crossover cable, 376–377, 377, 750
 hardware loopbacks, 377–378,
 378, 757
 overview of, 376
 tone generators/locators, 378–379,
 379, 783
 warning, 379
 firewalls, 308
 gateways, 113
 hardware protocols, 77
 media converters, 764
 NAT security devices, 571, 572
 RAS requirements for, 660–661
 server hardware, 46
 thin client requirements for, 250–251,
 256–257
 troubleshooting, 358
 hash algorithms, **562**
 headers, ICA Packet, 274, **274–275**
 Heldman, William, 297
 help, *See also* technical support
 help desk team, 26
 help desk tracking software, 395
 Henricks, Mark, 327
 hexadecimal numbers, **92**, **164–165**
 high-fidelity, **72**
 history of computing, **4–7**, **6–7**, **21–24**
 home networking technologies, **327–351**
 choosing, 350–351
 Ethernet
 minuses, 340–341
 overview of, 327, 328
 versus phoneline, 331, 343
 pluses, 339–340
 versus powerline, 333, 345
 versus wireless, 336, 348
 hybrid wireless-wired, 337–338, 338
 overview of, 327–328
 phoneline, 328–331, 331
 powerline, 331–333, 332

- pros and cons of
 - Ethernet, 339–341
 - hybrid wireless-wired, 349–350
 - phoneline, 341–344
 - powerline, 344–346
 - wireless, 346–349
 - wireless
 - with CSMA/CA, 336
 - defined, **333**, 334
 - history, 333–335
 - minuses, 347–348
 - overview of, 337
 - performance, 336, 348
 - pluses, 346–347
 - radio spectrum, 335, 336
 - range, 336–337, 348
 - security, 337
 - warning, 337
 - home office security, **570–572**
 - Home Phoneline Networking Alliance (HomePNA), **329–330**
 - Home RF Working Group, **335**, 348
 - HomeRun technology, 329
 - hops, **107**, **757**
 - hospital security, **577**
 - hosts
 - addresses, 497–498, 497
 - defined, **310–311**, **757**
 - evaluating, 310–311
 - HotJava browser, **553**
 - HTML (Hypertext Markup Language), **549**, **757**, *See also* DHTML
 - HTTP (Hypertext Transfer Protocol), 595, 598, **758**
 - hubs, *See also* connectivity devices
 - active hubs, 90, 744
 - assessing, 317–318
 - bridges and, 179
 - collisions and, 174–175, 174–175
 - defined, **51–52**, **89–90**, 90, 173, **173–174**
 - intelligent hubs, 100, 102–103
 - link lights, 356, 762–763
 - LinkSys hubs, 425–426, 425
 - passive hubs, 90, 770
 - in physical star topologies, 85–86, 86
 - versus repeaters, 172
 - versus switches, 307
 - switching hubs, 102–103, 102
 - Hurwicz, Michael, 407
 - hybrid networks, **30**, **33**
 - hybrid operating systems, **185**
 - hybrid wireless-wired networks, **337–338**, 338
 - hypertext. *See* DHTML; HTML; text
- ## I
- I/O addresses, **164–165**
 - Iacobucci, Ed, 266, 267
 - ICA (Independent Computing Architecture), *See also* Citrix MetaFrame
 - client resource redirection, 277–279, 279
 - criteria for creating, 273–274
 - defined, **254–256**
 - disconnecting sessions, 291–292
 - features, 255
 - ICA Packets, 274–275, 274
 - versus Remote Display Protocol, 255–256
 - session states, 291–292
 - SpeedScreen options, 275–277, 277
 - ICMP (Internet Control Message Protocol)
 - defined, **125–126**, **760**
 - firewall rules, 580, 581, 584–586, 592–594
 - ping attacks, 314–315
 - PING command, 506

- icons, 529
- IEEE 802 network standards, **95–100**
 - 802.1 LAN/MAN Management, 96, 96
 - 802.2 Logical Link Control, 59–60, 96, 96
 - 802.3x CSMA/CD, *See also* Ethernet
 - collision handling, 62–64, 64
 - defined, **60, 96–97**
 - Fast Ethernet, 62, 64–65
 - features, 100
 - Gigabit Ethernet, 62, 64–66
 - names/types, 61–62, 65
 - OSI model and, 96
 - packets, 55, 60–61, 61
 - 802.4 Token Bus, 66–67, 67, 96, 97
 - 802.5 Token Ring, 67–70, 68–70, 96, 97–98, 100
 - 802.6 DQDB MAN, 96, 98
 - 802.7 Broadband LANs, 96, 98–99
 - 802.8 Fiber-Optic LANs/MANs, 96, 99
 - 802.9 Integrated Services LAN, 96, 99
 - 802.10 LAN/MAN Security, 96, 99
 - 802.11 Wireless LAN, 96, 99–100, 348
 - 802.12 Demand Priority, 96, 100
 - defined, **59, 95, 758**
 - OSI model and, 96
 - overview of, 59, 758–759
- iFolder problems, **426–428**
- IMA (Independent Management Architecture), *See also* Citrix MetaFrame
 - administration, 281, 281
 - configuration storage, 282–283
 - defined, **280–281**
 - license pooling, 284
 - logging shadowed sessions, 287–288, 288
 - published applications and, 284–286
 - subsystems, 280
- images, *See also* graphics
 - animations, 526, 546–547
 - as backgrounds, 520–524, 521–523, 546
 - download time, 534
 - icons, 529
 - image maps, 530
 - providing access to, 516
 - thin client processing of, 248
- import servers, 470
- Independent Computing Architecture. *See* ICA
- INETCFG utility, 401, 403
- infrared. *See* Ir
- infrastructure, evaluating, 305, **305–308**, 311–312
- infrastructure managers, **322**
- infrastructure specialists, **26**
- inheritance, 622, 625, **625–626**
- Inherited Rights Filter. *See* IRF
- initialization files, **223–224**
- installing, *See also* software deployment
 - modems, 664–667, 665–667
 - NIC drivers, 18, 154–156, 155–156
 - NICs, 152–154, 169, 204–205, 204–205, 489
 - RRAS, 678–683, 679–680, 682
- Integrated Services Digital Network. *See* ISDN
- Integrated Services (IS) LAN Interface (802.9), **99, 759**
- intelligence agency security, **578**
- intelligent hubs, **100, 102–103, 759**
- Intelon CEBus powerline networks, **332**
- International Organization for Standardization (ISO), 80, **759**
- Internet, *See also* RAS
 - defined, **121, 759**
 - versus intranets, 547–548
 - network threats and, 602
 - networks and, 24
- Internet Connection Wizard, **668–671**, 669–671

- Internet Control Message Protocol. *See* ICMP
- Internet Service Providers. *See* ISPs
- internetwork (Data-Comm) managers, **322**
- Internetwork Packet eXchange. *See* IPX
- internetworks, **106, 180, 760**
- interrupt requests (IRQs), **158–162**, 159, 161–163, 209
- intranets, **511–555**, *See also* websites
 - accommodating visitor needs, 513–514
 - announcing changes/additions, 518
 - automating processes, 517
 - balancing flash/usability, 531–535
 - content
 - versus Internet content, 547–548
 - linking/navigating, 547
 - not overdoing extras, 546–547
 - obtaining, 512–513
 - organizing in site maps, 544–545, 545
 - overview of, 544
 - planning/designing, 544–548
 - readability, 546
 - visuals supporting text, 546
 - versus corporate LANs, 542–543
 - defined, **511–512**
 - discussion forums, 518–520, 519
 - helping others contribute
 - overview of, 514
 - provide access to images, 516
 - provide conversion services, 517
 - provide templates, 514, 515
 - publish guidelines, 516
 - send reminders, 517
 - including theme-bearing elements
 - animated GIFs, 526
 - background colors/images, 520–524, 521–523, 546
 - choosing colors, 524–525, 546
 - defined, **520**
 - graphical elements, 525, 526–527
 - graphical navigation, 529–530, 529
 - logos, 525–526, 525
 - placing navigation menus, 530–531, 532
 - textual navigation, 527–528, 528
 - markup languages
 - defined, **548**
 - Dynamic HTML, 549–551
 - eXtensible Markup Language, 551–552
 - Hypertext Markup Language, 549
 - tags, 548, 549
 - overview of, 537, 555
 - programming languages
 - Active Server Pages, 554–555
 - ActiveX controls, 554
 - on client-side, 552–554
 - Common Gateway Interface, 554
 - Java applets, 552–553
 - overview of, 552, 555
 - on server-side, 554–555
 - uses for
 - bring people together, 539–540, 551
 - distribute files, 541–542
 - distribute information, 538–539
 - enhance consistency, 542–543
 - increase security, 543
 - overview of, 538, 542
 - publish research, 542
 - reduce support costs, 540
 - simplify database access, 540–541
 - warning, 533
- IP addresses, *See also* TCP/IP
 - ANDing calculations, 180, 180, 181
 - assigning in RRAS, 680, 681, 682
 - bridges and, 178

- classes of, 125, 498
- configuring
 - dynamically via DHCP, 499–501, 500, 505
 - host name resolution, 111, 501, 502–504, 502–503
 - manually, 497–498, 497, 502
 - NetBIOS name resolution, 501, 502, 504–505, 504
 - subnet masks, 498
 - and testing, 505–506
- conflicts, 104, 104
- defined, **123, 124–125, 497, 497–498**
- in dial-up connections, 669–670, 670
- DNS servers and, 501, 502–504, 502–503
- host node portion, 105, 497, 497
- versus IPX addresses, 104–105
- network portion, 105, 497, 497
- overview of, 104–105
- registering, 497, 498
- routers and, 180–181, 180–181
- spoofing, 761
- subnet masks and, 105, 180, 180, 498
- subnetting, 780
- supernetting, 781
- WINS servers and, 501, 502, 504–505, 504
- IP (Internet Protocol), *See also* TCP/IP
 - defined, **124–125, 181, 760**
 - IP proxy, 761, *See also* NAT
 - packet rules, 586–588
 - remote access options, 688–689, 689
- IPCONFIG command, 505–506, **760**
- IPX (Internetwork Packet eXchange) protocol
 - defined, **118–119, 760**
 - frame type incompatibility, 210–211
 - IPX addresses, 104–105, 761
 - remote access options, 688–690, 689
 - IPX/SPX protocol suite, **116–121**, *See also* protocol suites
 - defined, **116–117**
 - lower-layer protocols, 117–118
 - mapped to OSI model, 117
 - middle-layer protocols
 - Internetwork Packet eXchange, 118–119, 760
 - Network Link Services Protocol, 119
 - overview of, 118
 - Routing Information Protocol, 119, 776
 - Sequenced Packet eXchange, 120, 777
 - Multiple Link Interface Driver, 117–118
 - overview of, 111, 309
 - upper-layer protocols
 - NetWare Core Protocols, 120–121
 - Service Advertising Protocol, 121
 - warning, 121
- Ir (infrared) technology, *See also* wireless
 - defined, **73, 74, 151–152**
 - protocols, 310
 - in Remote Access Service, 661, 663
- IRF (Inherited Rights Filter)
 - and file/directory rights, 612–614, 613–614
 - and object/property rights, 625, 626
 - overview of, 608
- IRQs (interrupt requests), **158–162, 159, 161–163, 209**
- IS (Integrated Services) LAN Interface (802.9), **99, 759**
- ISDN (Integrated Services Digital Network)
 - defined, **138–140, 139, 759**
 - overview of, 99
 - in Remote Access Service, 661, 663
 - terminal adapters, 761
- ISO (International Organization for Standardization), 80, **759**

ISPs (Internet Service Providers)
 account setup, 667–669, 669
 defined, **760**
 security, 575

J

jabber packets, **209**
 Java applets, 534, **552–553**
 Java Beans, **553**
 Java language, **547, 761**
 Java Virtual Machine (JVM), **761**
 JavaScript, 534, **553**
 jumpers, 205, 205, **761**

K

keys, **762**, *See also* certificates
 Klovanish, Steven T., 729
 Koontz, Charles, 407

L

L2TP (Layer 2 Tunneling Protocol), **310**,
 716–717, 717
 languages. *See* markup; programming
 LANs (local area networks), *See also* IEEE
 broadband LANs, 98–99
 computer roles in, 30
 defined, **5–6, 6, 763**
 fiber-optic LANs, 99
 LAN drivers, 762
 management, 96
 micro-LAN segmentation, 179
 protocols, 309
 Virtual LANs, 786
 wireless LANs, 99–100
 Layer 2 switches, 102, **102–103**, 109, **762**
 Layer 3 Switches, **109, 762**
 layers. *See* OSI; protocol suites

LCP (Link Control Protocol), 690,
 691, **762**
 leases, **500**
 Lierly, Mark, 183
 lights
 collision lights, 356, 479
 link lights, 356, 762–763
 network activity lights, 356
 link state routing, **107, 763**
 linked-object documents, **43**
 links. *See* navigating
 Linksys Cable/DSL Router, **572**
 Linux operating systems, **198**, 200–201, **763**
 listener ports, 289–290, **289–290**
 LLAP (LocalTalk Link Access Protocol), 58,
130–131
 LLC (Logical Link Control) sublayer, **60**,
91–92, 92, 96, **96**
 load balancing, **272**
 local area networks. *See* LANs
 local host cache, **283**
 Local Text Echo option, **276**, 277, 277
 log files, *See also* troubleshooting
 creating, 240
 defined, **763**
 DSREPAIR.LOG, 437–438, 438,
 446–447, 446
 in NetWare servers
 ABEND.LOG, 398
 CONSOLE.LOG, 401, 401
 overview of, 367, 398
 SYS\$LOG.ERR, 399, 399
 TTS\$LOG.ERR, 400
 VOL\$LOG.ERR, 399–400, 400
 overview of, 366–367, 374
 warning, 368
 in Windows NT/2000 Event Viewer
 accessing, 367–368
 Application Log, 373–374, 373

Security Log, 371–373, 372–373, 777
 System Log, 369, 369–370
 viewing from Windows 95/98, 368
 warning, 368

log-based file systems, 46

logging
 backups, 457
 firewall rules for, 582
 shadowed sessions, 287–288, 288

logical name resolution, **111**

logical network addressing, **103–105**, 104

logical topologies, *See also* topologies
 bus, 54–58, 56, 763
 in Data Link layer, 93
 defined, **15, 54, 764**
 ring, 58–59, 58, 764

login restrictions, **606–607**

logins, troubleshooting, **354–355**

logon options, 670, 671

logos, 525, **525–526**

loopbacks, hardware, **377–378**, 378

LRU (Least Recently Used) algorithm, 248

M

MAC addresses, *See also* addresses; Data Link layer
 bridges and, 178
 defined, **92–93, 105, 764**
 duplication problems, 208
 overview of, 104, 488

MAC bridges, 96, 96

MAC (Media Access Control) sublayer, 60, **91–93**, 92, 96

McBee, Jim, 171

McCann, John, 643

MANs (Metropolitan Area Networks), 96, 96, **98**, 99, *See also* IEEE

manufacturer security, **573–574**

manufacturers. *See* technical support

MAP (Manufacturing Automation Protocol), 97

markup languages, *See also* intranets
 defined, **548**
 Dynamic HTML, 549–551
 eXtensible Markup Language, 551–552
 Hypertext Markup Language, 549, 757
 tags, 548, 549

Mastering Home Networking (Henricks), 327

Mastering HTML 4 Premium Edition (Ray and Ray), 511

Mastering Local Area Networks (Anderson and Minasi), 29, 145, 245, 453, 537

Mastering NetWare 6 (Gaskin), 387, 599

Mastering Windows 2000 Server (Minasi, Anderson, Smith, and Toombs), 649

Mastering Windows 2000 (Sybex), 405

Mastering Windows NT (Sybex), 405

MAUs (multistation access units), *See also* connectivity devices
 defined, **90–91**, 91, **765**
 overview of, 69–70
 troubleshooting, 213
 warning, 213

MCSA/MCSE: Windows 2000 Network Management Study Guide (Chacon, Chellis, Desai, and Sheltz), 217

MCSA/MCSE: Windows 2000 Professional Study Guide (Donald with Chellis), 483

MCSE: Networking Essentials Study Guide (Chellis, Perkins, and Strebe), 29, 115, 203

MCSE: Windows 2000 Network Infrastructure Administration Study Guide (Robichaux with Chellis), 559

MCSE: Windows 2000 Network Infrastructure Design Study Guide (Heldman), 297

media access, **764**

Media Access Control (MAC) sublayer, 60, **91–93**, 92, 96, *See also* MAC

- media access methods, **93–94**
- media attachment units, **70**
- media converters, **764**
- media. *See* cable; network media
- megabytes, *37*
- memory, *See also* NOSs
 - caching, 189–190
 - direct memory access, 165–168, 166–168
 - fragmented memory, 358
 - managing RAM usage, 187–188
 - memory leaks, 188
 - memory managers, 188, 189
 - overview of, 187
 - virtual memory, 189
- mesh topologies, *87*, **87**, **765**
- message servers
 - defined, **42**
 - directory services, 44
 - e-mail, 42–43
 - object-oriented applications, 43–44
 - workgroup applications, 43
- metadata, **549**
- Metcalfe, Dr. Robert, 60
- metrics monitoring, **313–314**
- Metropolitan Area Networks (MANs), 96, 96, **98**, 99, *See also* IEEE
- micro-LAN segmentation, **179**
- Microsoft Access database example, **656–658**
- Microsoft Challenge-Handshake Authentication Protocol (MS-CHAP), **687**
- Microsoft NWLink IPX/SPX/NetBIOS Compatible Transport, **506–507**
- Microsoft Point-to-Point Compression Protocol (MPPC), 690, 691
- Microsoft Windows. *See* Windows
- middleware, **300**
- military organization security, **577–578**
- Minasi, Mark, 29, 145, 245, 453, 478, 537
- mixed mode, **273**
- MLID (Multiple Link Interface Driver), **117–118**
- MMC (Microsoft Management Console), 676, 676
- modems, *See also* RAS
 - analog modems, 662–663
 - calculating transmission times, 655
 - choosing, 661–662
 - defined, **662–663**, **765**
 - installing, 664–667, 665–667
 - modem standards, 342
 - virtual modems, 720–721, 720–721
- monitoring, *See also* tracking
 - fault tolerance, 315
 - metrics, 313–314
 - with NetWare MONITOR
 - overview of, 380
 - servers, 397–398, 398, 403
 - starting, 380
 - networks, 312–313
 - security, 314–315
 - with SNMP protocol
 - defined, **310**
 - fault tolerance, 315
 - in LinkSys hubs, 425–426, 425
 - server farms, 289
 - websites, 315
 - in Windows 2000, 405
 - with Windows NT Performance Monitor
 - overview of, 380
 - starting, 380
 - workstations, 405, **405–406**
- monitors, active, **59**, **744**
- motherboards, 204, 204
- Mouse Click Feedback option, **276–277**, 277

MPPC (Microsoft Point-to-Point Compression Protocol), 690, 691

MS-CHAP (Microsoft Challenge-Handshake Authentication Protocol), **687**

MSAUs. *See* MAUs

MSI (Microsoft Windows Installer).
See software deployment

MSP (Microsoft Windows Patches), **223**

MST (Microsoft Windows Transformation) files, **223**

multihoming, **338**

Multilink Point-to-Point Protocol (MPPP), 690, **691**

multimedia in intranet sites, **531–535**, 546–547

Multiple Link Interface Driver (MLID), **117–118**

multistation access units. *See* MAUs

multithreading, **187**

multiuser server OSs. *See* thin client networking

MultiWin technology, **266–267**

N

n-tier client/server applications, **301**, 302, **302**

Name Binding Protocol. *See* NBP

name resolution, *See also* address resolution; IP addresses
defined, **765**
host name resolution, 111, 501, 502–504, 502–503
NetBIOS name resolution, 501, 502, 504–505, 504

NAT (Network Address Translation), **591–592**

NAT security devices, 571, 572

native mode, **273**

navigating intranets, *See also* intranets
via graphical links, 529–530, 529
overview of, 547
placing navigation menus, 530–531, 532
via text links, 42, 527–528, 528

NBP (Name Binding Protocol), **132**

NCP (NetWare Core Protocols), **120–121**

NDIS drivers, 205

NDS (Novell Directory Services)
defined, **194**, **768**
NDS tree, 766
problems. *See* troubleshooting NetWare
security. *See* securing NetWare

near-line storage, **38**

NetBEUI (NetBIOS Enhanced User Interface), **112**, **507–508**, 688, **766**

NetBIOS (Network Basic Input/Output System)
defined, **767**
name resolution, 501, 502, 504–505, 504
names, 766
NWLink IPX/SPX/NetBIOS, 506–507

NetWare, *See also* IPX/SPX; Novell
3.x version series, 766
4.x version series, 767
5.x version series, 200–201, 767
6, *See also* securing; troubleshooting
NetWare 6
Administrator, 609–610, 767
Connect, 650
defined, **766**
log files. *See* log files
MONITOR. *See* monitoring
Remote Manager, 402, 403, 404
supervision flexibility, 606–607
TRACK ON command, 428

NetWare Core Protocols. *See* NCP

NetWare Link Services Protocol (NLSP), **767**

NetWare Loadable Module (NLM), **767**

Network+ Study Guide (Groth), 79, 353, 743

network activity lights, **356**

network adapter cards. *See* NICs

- Network Address Translation. *See* NAT
- network addressing, logical, **103–105**, 104
- Network and Dial-Up Connections screen, 668, **668**, 671, 672
- network connection management. *See* NICs; protocols
- Network Connection Wizard, *See also* RAS
 - Internet Connection Sharing, 706–708, 707
 - Network Connection Type, 701–703, 701–702, 725–727, 725–726
 - starting, 668, 668
- network connectivity devices. *See* connectivity devices
- network consultants. *See* consultants
- network design principles, **297–325**
 - analyzing current managers, 322–324
 - analyzing technical support, 320–321
 - assessing current hardware
 - hubs, 317–318
 - miscellaneous devices, 318
 - overview of, 316–317
 - printers, 317
 - routers, 318
 - servers, 317, 318
 - switches, 317–318
 - tape backup systems, 318
 - assessing network services
 - defined, **778**
 - for fault-tolerance monitoring, 315
 - for metrics monitoring, 313–314
 - for network monitoring, 312–313
 - overview of, 312
 - for security monitoring, 314–315
 - TCP/IP services, 314
 - for website monitoring, 315
 - assessing TCP/IP infrastructure, 315–316
 - defining applications
 - application clients, 303
 - client/server, 299–302, 300, 302
 - enterprise, 298, 299
 - overview of, 298
 - server, 304
 - Web-based, 303
 - workgroup, 298–299
 - evaluating current environments
 - hosts, 310–311
 - infrastructure, 305–308, 305, 311–312
 - overview of, 304
 - protocols, 308–310
 - identifying planned upgrades/rollouts, 319–320
 - overview of, 297, 324–325
 - warning, 308
- Network File System (NFS), **128**, **767**
- Network layer, *See also* OSI
 - brouters, 109
 - defined, **83**, **103**, **488**, **768**
 - Layer 3 Switches, 109, 762
 - logical addressing, 103–105, 104
 - routers, 108–109
 - routing, 106–108, 106
- Network Link Services Protocol (NLSP), **119**
- network managers, **320–324**
- network media
 - bounded media, 747
 - copper wire, 72
 - defined, 71, **71–72**
 - fiber-optics, *See also* cable
 - 802.8 LAN/MAN standard, 99
 - defined, **72–73**
 - infrastructure, 305, 306–307
 - troubleshooting, 214
 - infrared
 - defined, **73**, 74, **151–152**

- protocols, 310
 - in Remote Access Service, 661, 663
- overview of, 16, 71
- radio waves, 74–75, 151–152
- warning, 74
- network operating systems. *See* NOSs
- network protocols. *See* protocols
- network resources
 - access models. *See* peer-to-peer; server-based
 - conflicts, 209
 - defined, **10–11**
 - NDS tree and, 766
 - redirecting, 271, 277–279, 279
- network software diagnostics, **379–380**
- network topologies. *See* topologies
- networks, **3–78**, *See also* IEEE; LANs; WANs
 - administrators, 25–27
 - architectures, 16
 - components
 - clients, 9–10, 30
 - network operating systems, 11–12, 14, 30
 - network resources, 10–11
 - overview of, 8
 - servers, 8–9, 30
 - defined, **4–5**, **767**
 - determining need for, 25
 - history of, 4–7, 6–7, 21–24
 - hybrid networks, **30**, **33**
 - Internet and, 24
 - overview of, 3–4
 - peer-to-peer networks, 12–13, 13
 - server-based networks, 13–14, 14
 - subnetworks, 780–781
 - switched networks, 781
 - tracking performance, 407
 - user responsibilities, 11
- Newland, Dan, 3
- NFS (Network File System), **128**, **767**
- NICs (network interface cards)
 - bus-mastered NICs, 167–168, 168
 - choosing, 17
 - cleaning, 209–210
 - configuring properties
 - on Advanced tab, 491, 491
 - base I/O addresses, 164–165
 - direct memory access, 165–168, 166–168
 - on Driver tab, 491–493, 492–493
 - on General tab, 490, 490
 - interrupt requests, 158–162, 159, 161–163, 209
 - for NOSs, 205–207, 206–207
 - overview of, 18, 156–157, 169, 490
 - on Resources tab, 161–162, 161–163, 493, 494
 - controlling data, 17–18
 - at Data Link layer, 489, 489
 - defined, **9**, **16–17**, **489**
 - drivers
 - downloading, 155, 156
 - finding, 493
 - installing, 18, 154–156, 155–156
 - LAN drivers, 762
 - MLID standard for, 117–118
 - uninstalling, 492–493
 - updating, 493
 - viewing properties, 491–493, 492–493
 - full-duplex mode, 18
 - half-duplex mode, 18
 - installing, 152–154, 169, 204–205, 204–205, 489
 - link lights, 356, 762–763
 - overview of, 509
 - PC bus type and, 18–19

- performance, 19
- at Physical layer, 87–88, 88, 489, 489
- polling, 157, 158
- preparing data, 17
- sending data, 17–18
- shared memory adapters, 19
- transceivers
 - defined, **88, 783**
 - in Ethernet NICs, 208–209
 - overview of, 48
- troubleshooting
 - Ethernet cards, 208–210, 495–496
 - multiple cards, 213–214
 - overview of, 494–495
 - Token Ring cards, 212
- NLSP (NetWare Link Services Protocol), **767**
- NLSP (Network Link Services Protocol), **119**
- NMS (network management system), **312–313**
- NOC (network operations center), **312**
- NOS managers, **323**
- NOSs (network operating systems), **183–215**
 - additional features
 - application availability, 194–195
 - open standards compatibility, 194
 - for organizational needs, 195
 - overview of, 194
 - client operating systems
 - Apple MacOS, 195–196, 197
 - defined, **184**
 - versus server OSs, 254
 - Windows 95/98/ME, 196, 197
 - Windows 2000/XP Professional, 196–197
 - Windows NT Workstation, 196–197
 - common features
 - memory, 187–190
 - overview of, 184
 - processing, 185–187
 - storage, 190–194
 - type, 184–185
 - configuring NICs, 205–207, 206–207
 - defined, **11–12**
 - hybrid operating systems, 185
 - installing NICs, 204–205, 204–205
 - memory
 - caching, 189–190
 - managing RAM usage, 187–188
 - overview of, 187
 - virtual memory, 189
 - overview of, 14, 30, 183
 - server operating systems
 - versus client OSs, 254
 - defined, **45–46, 185**
 - Linux, 198, 200–201, 763
 - minimum requirements, 197–198
 - NetWare 5.x, 200–201
 - overview of, 201
 - Windows NT/2000 Servers, 199, 200–201
 - storage
 - fault tolerance, 191–192
 - file systems, 192–194
 - hard disks, 190–191
 - overview of, 190
 - troubleshooting client connections
 - 10Base2 cable, 210
 - using cable testers, 211, 384
 - on Ethernet networks, 208–211
 - on FDDI networks, 214
 - frame type incompatibility, 210–211
 - multiple NIC problems, 213–214
 - overview of, 214–215
 - on Token Ring networks, 212–213
- Novell BorderManager software, **604**
- Novell ConsoleOne. *See* ConsoleOne

Novell Directory Services. *See* NDS
 Novell NetWare. *See* NetWare
 Novell ODI drivers, 205, **769**
 Novell Support Connection, 394, **769**
 numbering systems, **92, 164–165**
 NWLink IPX/SPX/NetBIOS Compatible
 Transport, **506–507**

O

objects, *See also* securing NetWare
 defined, **406, 769**
 giving trustee rights to, 637–641,
 639–640
 linked-object documents, 43
 object rights
 defined, **622–623**
 deleting, 641
 Inherited Rights Filter and, 625, 626
 object-oriented applications, 43–44
 OCR (optical character recognition) software, 41
 ODI (Open Datalink Interface), **118,**
 205, **769**
 OE (operator error), **357, 769**
 100BaseF Ethernet, 61
 100BaseT (Fast Ethernet), 61, **62, 64–65,**
 100, **755**
 100VG (Voice Grade) standard, 100, **744**
 online commerce security, **575**
 Open Shortest Path First (OSPF) protocol, **126**
 open source model, **198**
 open standards compatibility, **194**
 operating systems. *See* NOSs
 optical time-domain reflectometer (OTDR), 214
 OSI (Open Systems Interconnect) model,
79–114
 Application layer, **82, 113, 486**
 Data Link layer, *See also* MAC
 bridges, 101–102, 101

 CSMA/CA, 94
 CSMA/CD, 93–94
 defined, **83–84, 488, 751**
 devices, 101–103, 101–102
 IEEE 802 standards, 95–100, 96
 LLC sublayer, 60, 91–92, 92, 96, 96
 logical topologies and, 93
 MAC addresses, 92–93, 104
 MAC sublayer, 91–93, 92, 96, 96
 media access methods, 93–94
 packets, 92
 switching hubs, 102–103, 102
 token passing, 93, 94
 defined, **80–81, 81–82, 769**
 DOD model layers and, 122–123, 123
 gateway devices, 113
 layers, overview, 81, 81–82, 103, 112,
 485–486
 Network layer
 routers, 109
 defined, **83, 103, 488, 768**
 Layer 3 Switches, 109, 762
 logical addressing, 103–105, 104
 routers, 108–109
 routing, 106–108, 106
 overview of, 78–79
 Physical layer
 bus topologies, 85, 85
 defined, **84–85, 488**
 devices, 87–91, 88–91
 hubs, 85–86, 86, 89–90, 90
 mesh topologies, 87, 87
 multistation access units, 90–91, 91
 network interface cards, 87–88, 88
 repeaters, 88–89, 89
 ring topologies, 86, 86
 star topologies, 85–86, 86
 transceivers, 88

Presentation layer, **82, 113, 486–487**

Session layer, **82–83, 112, 487**

Transport layer

connection-oriented services,
110, 110

connectionless services, 111

defined, **83, 109–110, 487–488**

IPX/SPX protocol suite, 111

logical name resolution, 111

NetBEUI protocol, 112, 766

TCP/IP protocol suite, 111–112,
122–123, 122

OSPF (Open Shortest Path First) protocol, **126**

OTDR (optical time-domain reflectometer), 214

P

packages, Windows Installer, *See also*
software deployment

defined, **223, 224**

overview of, 220, 241

setting options, 231–232, 231

packet filtering. *See* firewalls

packet switching, **770**

packets

collisions

collision lights, 356, 479

CSMA/CA and, 94

CSMA/CD and, 62–64, 64

defined, 56, **56, 93, 479**

how nodes recover from, 57

hubs and, 174–175, 174–175

CTS packets, 94

at Data Link layer, 92

data packets, 751

defined, **55, 770**

in Ethernet, 55, 60–61, 61

fragmented packets, 592

ICA Packets, 274–275, 274

IP packets, 124

jabber packets, 209

non-unicast packets, 768

ping packets, 586

RTS packets, 94

token packets, 58–59, 93, 782

pages (of memory), **189**

PAP (Password Authentication Protocol) in
RRAS, **687–688**

PAP (Printer Access Protocol) in
AppleTalk, **133**

parallel cable in RAS, 661, 663

Paranoid security level, **596–597**

parity, **191–192**

passive hubs, **90, 770**

passwords, **605–607**

patch cables, **770**

patch panels, 305, 305, 306, 307, **770**

patches, software, **223, 770**

PCs. *See* clients; workstations

peer-to-peer networks

advantages, 32

choosing server-based or, 12, 14–15,
34–35

defined, **12–13, 13, 30, 32**

disadvantages, 33

overview of, 185, 770

security, 33–34

performance monitors, 380, *See also*
monitoring

Perkins, Charles, 29, 203, 569

phoneline networks, *See also* home networking
defined, **328–331, 331**

versus Ethernet networks, 331, 343

pros and cons of, 341–344

physical addresses. *See* MAC addresses

Physical layer, *See also* OSI

bus topologies, 85, 85

defined, **84–85, 488**

- devices, 87–91, 88–91
- hubs, 85–86, 86, 89–90, 90
- mesh topologies, 87, 87
- multistation access units, 90–91, 91
- network interface cards, 87–88, 88
- repeaters, 88–89, 89
- ring topologies, 86, 86
- star topologies, 85–86, 86
- transceivers, 88
- physical topologies, *See also* cable; topologies
 - bus, 48–50, 49, 85, 85
 - choosing, 47–48
 - defined, **15, 771**
 - distributed star, 52, 53
 - mesh, 87, 87, 765
 - overview of, 54
 - ring, 53–54, 53, 86, 86, 771
 - star, 48, 50–52, 51, 85–86, 86
- ping attacks, **314–315**
- PING command, 506, **771**
- Ping of Death, **772**
- ping packets, 586
- PIO (Programmable Input/Output), **165, 166**
- PKI (public-key infrastructure). *See* certificates
- plug-ins, **535**
- polling, **157, 158, 772**
- ports
 - AUI ports, 88, 746
 - COM port redirection, 271, 278, 279
 - defined, 106, **106, 772**
 - dynamically allocated ports, 753
 - firewall rules for, 580
 - Internet gateways and, 710, 711
 - listener ports, 289–290, 289–290
 - logical port addresses, 764
 - port density, 307
 - in RRAS, 691–693, 692, 717–718, 717–718
 - in TCP/IP protocols, 710
 - virtual COM ports, 786
- POTS (Plain Old Telephone Service), 330, 331, **772**
- power switches, **356–357**
- powerline networks, *See also* home networking
 - defined, **331–333, 332**
 - versus Ethernet, 333, 345
 - pros and cons, 344–346
- PPP (Point-to-Point Protocol)
 - defined, 135, **135, 772**
 - overview of, 309–310, 678
 - remote access options, 690–691, 690
- PPTP (Point-to-Point Tunneling Protocol)
 - defined, **772**
 - disabling, 719
 - overview of, 651, 716
 - verifying RRAS support for, 717, 717
- Presentation layer, **82, 113, 486–487, 773**
- Price, Brad, 21, 265
- Price, John, 265
- print managers, **323**
- print queues, **40**
- print servers, **8, 39–41, 773**
- Printer Access Protocol (PAP), **133**
- printer mapping, **271, 278, 279**
- printers, assessing, 317
- printing, troubleshooting, 415–416
- private keys, **560–562**, *See also* certificates
- private networks, 652, **700–705, 701–704, 773**
- private networks (VPNs), virtual, **99, 310, 647, 653**, *See also* RAS
- processors. *See* CPUs
- professional firm security, **573**
- programming languages, *See also* intranets
 - Active Server Pages, 554–555
 - ActiveX controls, 554
 - on client-side, 552–554

- Common Gateway Interface, 554
- Java applets, 552–553
- overview of, 552, 555
- on server-side, 554–555
- Project 802. *See* IEEE
- property rights, *See also* securing NetWare
 - defined, **622–624**
 - granting, 625–626, 625
 - revoking, 629–631, 630
- protocol suites, **115–134**
 - AppleTalk, *See also* AppleTalk
 - defined, **129**
 - lower-layer protocols, 130–131
 - mapped to OSI model, 130
 - middle-layer protocols, 131–132
 - upper-layer protocols, 132–134
 - defined, **80, 116, 774**
 - IPX/SPX, *See also* IPX/SPX
 - defined, **116–117**
 - lower-layer protocols, 117–118
 - mapped to OSI model, 117
 - middle-layer protocols, 118–120
 - overview of, 111, 309
 - upper-layer protocols, 120–121
 - warning, 121
 - overview of, 115
 - TCP/IP, *See also* TCP/IP
 - defined, **121, 496, 784**
 - DOD model, 122–123, 123
 - hardware addresses, 123
 - logical node names, 124
 - middle-layer protocols, 123–127
 - OSI model and, 122–123, 122
 - overview of, 111–112, 311
 - upper-layer protocols, 127–129
- protocols
 - Asynchronous Transfer Mode, 141, 141, 745–746
 - Bandwidth Allocation Protocols, 690, 691
 - Banyan VINES, 308–309
 - communication protocols, 309–310
 - connection-oriented mode, 60, 110, 110, 750
 - connectionless mode, 60, 111, 479
 - defined, **76, 76, 116, 774**
 - display protocols, 247, 247, 251–252, 254–256
 - DLC protocol, 310
 - Dynamic Host Configuration Protocol, 499–501, 500, 505, 689
 - evaluating, 308–310
 - Fiber Distributed Data Interface, 136, 136
 - Frame Relay, 137–138, 138, 661, 663, 756
 - framed protocols, 273
 - hardware protocols, 77
 - implementations, 116
 - infrared-device protocols, 310
 - Integrated Services Digital Network, 138–140, 139, 759
 - LAN protocols, 309
 - Layer 2 Tunneling Protocol, 310
 - legacy protocols, 308–309
 - Link Control Protocol, 690, 691, 762
 - Multilink Point-to-Point Protocol, 690, 691
 - NetBEUI, 112, 507–508, 766
 - NWLink IPX/SPX/NetBIOS, 506–507
 - options for in RRAS, 688–691, 689–690
 - OSI model and, *See also* OSI
 - Application layer, 486
 - Data Link layer, 488
 - defined, **484**
 - layers, overview, 485–486
 - network data flow, 484–485, 485
 - Network layer, 488

- overview of, 483–484
 - Physical layer, 488
 - Presentation layer, 486–487
 - Session layer, 487
 - Transport layer, 487–488
 - overview of, 15–16, 75, 134
 - Point-to-Point Protocol, 135, 135, 309–310, 678
 - Point-to-Point Tunneling Protocol, 651, 772
 - protocol analyzers, 380, 774
 - proxying, 581, 594–595, 596
 - RADIUS protocol, 310
 - removing from RRAS, 681, 688
 - routing protocols, 107–108
 - Serial Line Internet Protocol, 135, 135, 778
 - software protocols, 77
 - specialized protocols, 310
 - supported by Windows 2000 Pro, 496
 - Switched Megabit Data Service, 141, 142
 - Synchronous Digital Hierarchy, 140, 140
 - Synchronous Optical Network, 140, 140
 - X protocol, 254
 - X.25, 136–137, 137
 - proxy cache server, **774**
 - proxy, IP, **761**, *See also* NAT
 - proxying Internet gateways, 652–653, *See also* RAS
 - proxying, protocol, **581**, **594–595**, 596
 - public keys. *See* certificates
 - pull technology, **553**
- R**
- radio-frequency. *See* RF; wireless
 - RADIUS (Remote Authentication Dial-In User Service), **310**, 682, **682–683**, 685, 686
 - RAID (Redundant Array of Inexpensive Disks)
 - defined, **419**, **467–468**, **775**
 - disk mirroring (RAID 1), 191, 419, 468, 469, 472
 - disk striping with parity (RAID 5), 191–192, 468–470
 - disk striping without parity, 469
 - types of, pros and cons, 469–470
 - RAM, *See also* memory
 - adding, 416–417
 - freeing up, 421
 - troubleshooting, 420
 - RARP (Reverse Address Resolution Protocol), **125**
 - RAS (Remote Access Service) in Windows 2000 Server, **649–728**
 - accepting remote client calls
 - configuring clients, 693–698, 694–699
 - configuring RRAS, 685–693, 686, 689–690, 692
 - granting dial-in permissions, 683–685, 684
 - installing RRAS, 679–683, 679–680, 682
 - managing client connections, 699–700, 700
 - overview of, 652, 677–678
 - setup requirements, 678–679
 - Windows 9x clients, 697–698, 697–699
 - Windows 2000 Pro, 693
 - Windows NT 4 Workstation, 693–697, 694–696
 - accepting remote client VPN connections
 - benefits, 715
 - configuring clients, 719–727, 720–727
 - disabling connections, 719
 - overview of, 653
 - performance issues, 727–728

- via PPTP and L2TP, 716–720, 717–718, 720
 - protocols, 310
 - stable RAS connections and, 715
 - VPN history, 715–716
 - VPNs, defined, **99, 647, 653, 714**
 - Windows 9x clients, 719, 722–724, 723–724
 - Windows 2000 Pro, 724–727, 725–727
 - Windows NT 4 Workstation, 719–722, 720–722
 - Auto Connection Manager, 676–677, 676
 - bandwidth issues, 654–660
 - choosing modems, 661–663
 - connection devices/circuits, 661–664
 - dial-up Internet connections
 - alternate phone numbers, 673, 674
 - dialing options, 674–675, 674
 - DNS address options, 670, 670
 - granting dial-in permissions, 683–685, 684
 - IP address options, 669–670, 670
 - ISP account setup, 667–669, 669
 - logon options, 670, 671
 - naming, 671
 - optional settings, 672–677, 673–674, 676–677
 - overview of, 651–652, 667
 - redial options, 674, 675–677, 676–677
 - testing, 671, 672
 - dial-up to private networks, 652, 700–705, 701–704
 - using Frame Relay, 661, 663
 - hardware requirements, 660–661
 - using infrared, 661, 663
 - installing modems, 664–667, 665–667
 - as Internet gateway
 - application sharing options, 708–710, 709
 - configuring clients, 712–713, 713
 - connection sharing options, 706–708, 707
 - defined, **705–706**
 - overview of, 652–653, 654, 678
 - ports and, 710, 711
 - service sharing options, 711–712, 711
 - using ISDN, 661, 663
 - knowing when to use, 654–660
 - overview of, 647, 649–651
 - using parallel cable, 661, 663
 - RAS servers, evaluating, 318
 - versus remote control, 659–660
 - as remote-node technology, 654–655
 - Routing and Remote Access Service
 - authentication options, 685–688, 686
 - configuring, 685–693, 686, 689–690, 692
 - defined, **653–654**
 - installing, 678–683, 679–680, 682
 - IP address assignment, 680, 681, 682
 - managing connected users, 699–700, 700
 - overview of, 651
 - port properties, 691–693, 692, 717–718, 717–718
 - protocol options, 688–691, 689–690
 - RADIUS server option, 682–683, 682, 685, 686
 - removing protocols from, 681, 688
 - unauthenticated access, 686, 688
 - using serial cable, 661, 663
 - using X.25, 661, 663
- Ray, Deborah S., 511
- Ray, Eric J., 511

RDP (Remote Display Protocol), **254–256**

README files, **374, 775**

recovery. *See* disaster recovery

redundancy. *See* RAID; replication

regeneration process, **98, 775**

Remote Access Service. *See* RAS

Remote Authentication Dial-In User Service (RADIUS), **310, 682, 682–683, 685, 686**

remote control technology, **659–660**

Remote Manager, 402, 403, 404

Remote Procedure Call (RPC) protocol, **128–129**

remote-node technology, **654–655**

repeaters, *See also* connectivity devices

defined, **88–89, 89, 171, 172**

versus hubs, 172

overview of, 66, 776

replication, data, **470, 472**

resolution. *See* address resolution; name resolution

resources, information. *See* technical support; website addresses

resources, network. *See* network resources

RF (radio-frequency) networks, *See also* wireless

ad hoc RF networks, 745

defined, **74–75, 151–152**

multipoint RF networks, 765

RFI (radio frequency interference), **775**

rights. *See* securing NetWare

ring logical topologies, 58, **58–59**

ring physical topologies, 53, **53–54, 86, 86, 771, 776**

RIP (Routing Information Protocol), **119, 126, 776**

Robichaux, Paul, 559

routers, *See also* connectivity devices

assessing, 318

defined, **108–109, 180–181,**

180–182, 776

Linksys Cable/DSL Router, 572

overview of, 106–107, *106, 307*

Windows 2000 Server as, 498–499, 499

routing

default gateways and, 108

defined, *106, 106, 777*

distance vector routing, 107

dynamic routing, 107, 754

link state routing, 107, 763

at Network layer, 106–108, *106*

routing protocols, 107–108

routing tables, 106, *106, 181, 777*

static routing, 106–107, 780

Routing Information Protocol (RIP), **119, 126, 776**

Routing and Remote Access Service. *See* RAS

RPC (Remote Procedure Call) protocol, **128–129**

RTMP (Routing Table Maintenance Protocol), **132**

RTS (request to send) packets, 94

S

sandboxes, **553**

SAP (Service Advertising Protocol), **121**

scheduling applications, 253–254

scheduling backups, 460–461

schema, **445**

scripting languages, **554–555**, *See also* programming

SDH (Synchronous Digital Hierarchy), *140, 140*

seamless desktop integration, **270–272**

secret keys. *See* certificates

securing NetWare 6 networks, **599–647**, *See also* disaster recovery;

See also hacker attacks

Admin users and, 606–607

with BorderManager software, 604

- C2 security certification and, 644–645
- with certificate authorities, 645–646
- defined, **600–601**
- filesystem security
 - defined, **607–608**
 - directory attributes, 616–617
 - directory rights, 608–611, 610
 - effective rights, 614, 614
 - enhancing with attributes, 615–620
 - file attributes, 617–620, 619–620
 - file rights, 611–612
 - FLAG command and, 619–620, 619
 - guidelines, 614–615
 - hidden protection, 607
 - Inherited Rights Filter, 608, 612–614, 613–614
 - inheriting rights, 608
 - managing with ConsoleOne, 631–636, 633–634, 636–637
 - versus NDS security, 621
 - RIGHTS command, 613–614, 613
 - troubleshooting file problems, 619
 - trustee assignments, 608
 - warning, 615
- with firewalls, *See also* firewalls
 - application-level gateways, 604
 - circuit-level gateways, 603
 - defined, **602–603**
 - internal firewalls, 604–605
 - OSI model and, 603
 - packet filters (FILTCFG), 603
 - stateful inspection firewalls, 604
- with login restrictions, 606–607
- management and, 646–647
- managing with ConsoleOne
 - deleting object rights, 641
 - granting property rights, 625–626, 625
 - granting trustee rights to directories, 631–634, 633–634
 - granting trustee rights to objects, 637–641, 639–640
 - granting trustee rights to users, 631–632, 635–636, 636–637
 - revoking property rights, 629–631, 630
 - viewing directory rights, 609–610, 610
 - viewing file attributes, 620, 620
- NDS security
 - Access Control Lists, 624, 744
 - Admin users, 621, 626, 628
 - default rights, 628–629
 - defined, **621**
 - versus filesystem security, 621
 - guidelines, 627–628
 - Inherited Rights Filter, 625, 626
 - managing with ConsoleOne, 628–631, 630, 637–641, 639–640
 - object rights, 622–623
 - property rights, 622–624
 - rights inheritance, 622, 625–626, 625
 - Supervisor rights, 621–628
- overview of, 599
- with passwords, 605–607
- planning, 600, 601
- virus protection
 - antivirus software, 384–385, 642, 643–644, 745
 - backup systems and, 644
 - cyclical redundancy check, 643, 750–751
 - overview of, 641
 - Read Only .exe/.com files, 615, 641
 - taking precautions, 641–642
 - tracking virus signatures, 642–643
 - virus, defined, **786**
 - warning, 615

- security, **569–578**, *See also* certificates;
firewalls
- 802.10 LAN/MAN Security, 96, 99
 - authentication methods, 561–562,
685–688, 686
 - defined, **600–601**
 - in intranets, 543
 - monitoring, 314–315
 - overview of, 559, 569, 599
 - in peer-to-peer networks, 33–34
 - requirements for
 - financial institutions, 576–577
 - government bureaus, 574
 - home offices, 570–572
 - hospitals, 577
 - intelligence agencies, 578
 - Internet Service Providers, 575
 - manufacturers, 573–574
 - military organizations, 577–578
 - online commerce companies, 575
 - professional firms, 573
 - small service businesses, 572–573
 - universities/colleges, 574–575
 - RRAS port options and, 693
 - in server-based networks, 33–34
 - share-level security, 778
 - user-level security, 785
 - of wireless home networks, 337
- Security Logs, **371–373**, 372–373, **777**
- security managers, **323**
- Select Computer dialog box, 367–368, 367
- Sequenced Packet eXchange (SPX), **120**,
777, *See also* IPX/SPX
- Serf to Surfer: Becoming a Network
Consultant* (Strebe with Bragg and
Klovanish), 729, 730, 735
- Serial Line Internet Protocol (SLIP), **135**, **778**
- server administrators, **26**
- server applications, **304**
- server farms, **271–272**, 289
- server operating systems, *See also* NOSs
defined, **45–46**, **185**
- Linux, 198, 200–201, 763
 - minimum requirements, 197–198
 - NetWare 5.x, 200–201
 - overview of, 201
 - Windows NT/2000 Server, 199,
200–201
- server-based networks, *See also* Citrix;
thin client
- advantages, 31
 - application servers, 41
 - choosing peer-to-peer or, 12, 14–15,
34–35
 - client hardware, 47
 - database servers, 44–45
 - defined, **13–14**, **14**, **23–24**, **30–31**
 - disadvantages, 32
 - file servers
 - data migration, 38
 - defined, **8**, **36**
 - file archiving, 39
 - file storage, 37–38
 - synchronizing file updates, 38–39
 - transferring files, 36–37
 - message servers
 - defined, **42**
 - directory services, 44
 - e-mail, 42–43
 - object-oriented apps, 43–44
 - workgroup applications, 43
 - print servers, 8, 39–41
 - security, 33–34
 - server hardware, 46
 - server operating systems, 45–46
 - server types, overview, 35–36
- server-side includes, 516
- server-side web applications, **554–555**

servers

- assessing, 317, 318
- clustering, 419, 470–472, 765
- dedicated servers, 8–9
- defined, **8–9, 778**
- export servers, 470
- import servers, 470
- multi-purpose servers, 8
- nondedicated servers, 9, 34
- overview of, 30
- proxy servers, 774
- RAS servers, 318
- single-purpose servers, 8
- terminal servers. *See* Citrix; thin client; WTS
- tracking performance
 - with configuration files, 401–402, 402
 - with MONITOR, 397–398, 398
 - overview of, 396
 - with Remote Manager, 402
 - with server logs, 398–401, 399–401
- troubleshooting. *See also* troubleshooting
 - by adding RAM, 416–417
 - availability, 417–418
 - by freeing up RAM, 421
 - hardware scale/costs, 418–420
 - overview of, 359
 - warning, 418
- web servers, 786
- Service Advertising Protocol (SAP), **121**
- service sharing options, 711, **711–712**
- Services and Applications MMC, 676, 676
- Session layer, **82–83, 112, 487, 778**
- sessions. *See also* thin client networking
 - disconnecting, 291–292
 - handling, 248–249, 248
 - logging shadowed sessions, 287–288, 288
 - resetting idle sessions, 290–291, 291
 - shadowing, 255
- share-level security, **778**
- shared memory adapters, **19**
- Shared Wireless Access Protocol (SWAP), 335
- sharing Internet connections. *See* RAS
- Sheltz, Matthew, 217
- shielded twisted-pair cable (STP), 97, **778**
- Shiva Password Authentication Protocol (SPAP), **687**
- signal encoding, **84, 779**
- signaling methods, **84–85, 779**
- signatures, digital, **561, 562, 563**
- signatures, virus, **642–643**
- site licenses, **11**
- site maps, 544–545, 545
- SLIP (Serial Line Internet Protocol), **135, 778**
- small business security, **572–573**
- SMDS (Switched Megabit Data Service), **141, 142**
- SMP (symmetric multiprocessing), **46, 186–187**
- SMTP (Simple Mail Transfer Protocol), **128, 594, 596, 779**
- sneakernet, **22**
- Sniffer products, 407
- SNMP (Simple Network Management Protocol). *See also* monitoring
 - defined, **310, 779**
 - fault-tolerance monitoring, 315
 - in LinkSys hubs, 425–426, 425
 - monitoring server farms, 289
- SOCKS proxying, 594, 595
- software. *See also* applications; drivers
 - client software, 9
 - compressing, 690, 691
 - diagnostic tools for. *See also* troubleshooting

- overview of, 379
- performance monitors, 380
- protocol analyzers, 380, 774
- software protocols, 77
- troubleshooting, 358, 382–383
- software deployment, **217–244**
 - using Active Directory
 - applying updates, 227–228
 - assigning applications, 227
 - defined, **744**
 - overview of, 226
 - preparing for, 226–227
 - publishing applications, 227
 - verifying installations, 228–230, 229
 - before Windows Installer, 220
 - configuring options within GPOs
 - application categories, 234, 235–236
 - file extension mappings, 233, 234
 - general/package options, 231–232, 231
 - overview of, 231
 - for removal, 232, 236–237, 237
 - for Windows Installer, 238
 - and maintenance, 219
 - optimizing/troubleshooting
 - creating log files, 240
 - creating MSI files for older apps, 241
 - deploying in stages, 239–240
 - enforcing option consistency, 241
 - managing distribution points, 240–241
 - managing GPO scope/links, 239
 - using MSI packages, 241
 - organizing categories, 240
 - overview of, 238–239, 242–243
 - reducing redundancy, 240
 - testing before deployment, 239
 - verifying connectivity, 240
 - overview of, 217–218, 243–244
 - using Windows Installer
 - application assignment scripts, 224
 - assigning applications, 225
 - benefits of, 220–223
 - defined, **219–220**
 - initialization files, 223–224
 - package files, 220, 223, 224
 - patches, 223
 - publishing applications, 226
 - removing applications, 219, 221
 - setting options within GPOs, 238
 - transformation files, 223
- software management, **323–324**
- solicit successor frames, **59**
- SONET (Synchronous Optical Network), 140, **140, 779**
- SonicWALL SOHO firewall, **571–572**
- sound in intranet sites, **531–535**, 547
- source-route bridging, 177, **177**
- SPAP (Shiva Password Authentication Protocol), **687**
- SpeedScreen options, **275–277**, 277
- SPX (Sequenced Packet eXchange), **120, 777**, *See also* IPX/SPX
- SQL Server database example, **658–659**
- SSH (Secure Shell), 591, 592
- standards. *See* IEEE
- star physical topologies, **48, 50–52**, 51, **85–86**, 86, **771**
- STARTUP.NCF files, 402–403
- stateful inspection firewalls, **604**
- static electricity, 204, *See also* ESD
- static routing, **106–107, 780**
- Steinke, Steve, 407
- storage, *See also* NOSs
 - of backup plan copies, 477
 - of backups, 466–467
 - fault tolerance, 191–192

- file systems, 192–194
 - hard disks, 190–191
 - network attached storage, 767
 - overview of, 190
 - in thin client networking, 258
 - STP (shielded twisted-pair cable), 97, **778**
 - Strebe, Matthew, 29, 203, 569, 729
 - Strict security level, **595–596**
 - striping, disk. *See* RAID
 - Style Sheets (CSS), Cascading, 535, **550**
 - sub allocation, **193**
 - subnet masks, **105, 180, 180, 498**
 - subnetting, **780**
 - supernetting, **781**
 - SUPERVISOR rights, **606, 621**, 622–628
 - swap files, **189**
 - SWAP (Shared Wireless Access Protocol), 335
 - switched networks, **781**
 - switches, *See also* connectivity devices
 - assessing, 317–318
 - benefits, 179
 - versus bridges, 179
 - closet switches, 305–306, 305
 - DIP switches, 205, 205
 - versus hubs, 307
 - infrastructure, 305–307, 305
 - Layer 2 switches, 102–103, 102, 109, 762
 - Layer 3 Switches, 109, 762
 - switching hubs, 102–103, 102
 - switching, circuit, **748**
 - switching, disk, **472**
 - switching hubs, 102, **102–103**
 - symmetric multiprocessing (SMP), **46, 186–187**
 - SYN attacks, **314**, 591, **781**
 - Synchronous Digital Hierarchy (SDH), 140, **140**
 - Synchronous Optical Network (SONET), 140, **140, 779**
 - SYN\$LOG.ERR files, 399, **399**
 - System Log files, **369, 370**
- ## T
- tape backup systems, 318
 - taps, 48, 49
 - TCP (Transmission Control Protocol)
 - defined, **126, 783**
 - firewall rules, 580, 581, 589–591, 592–594
 - overview of, 111
 - TCP/IP: 24seven* (Govanus), 182
 - TCP/IP protocol suite, **121–129, 496–506**, *See also* IP; protocol suites
 - assessing infrastructure, 315–316
 - assessing services of, 314
 - benefits, 496–497
 - configuring
 - default gateways, 498–499, 499
 - DNS servers, 501, 502–504, 503
 - overview of, 497
 - WINS servers, 501, 504–505, 504
 - configuring IP addresses
 - defined, **123, 124–125, 497, 497–498**
 - dynamically via DHCP, 499–501, 500, 505
 - host name resolution, 501, 502–504, 502–503
 - manually, 497–498, 497, 502
 - NetBIOS name resolution, 501, 502, 504–505, 504
 - subnet masks, 498
 - and testing, 505–506
 - defined, **121, 496, 784**
 - DOD model, 122–123, 123
 - fragmented packets bug, 592
 - middle-layer protocols
 - Address Resolution Protocol, 125, 178

- Domain Name Service, 126–127
- Internet Control Message Protocol, 125–126
- Internet Protocol, 124–125
- Open Shortest Path First, 126
- overview of, 123–124
- Routing Information Protocol, 126
- Transmission Control Protocol, 111, 126
- User Datagram Protocol, 111–112, 126
- OSI model and, 122–123, 122
- overview of, 111–112, 311
- ports, 710
- sharing connections to, 709–710, 709
- upper-layer protocols
 - eXternal Data Representation, 128
 - File Transfer Protocol, 127, 642
 - Network File System, 128
 - Remote Procedure Call, 128–129
 - Simple Mail Transfer Protocol, 128
 - Telnet, 127–128, 591
- TDR (time-domain reflectometer), **211**, 214, **782**
- technical support, *See also* help
 - for end users, 321
 - in intranets, 540
 - from manufacturers
 - on CD-ROMs, 375
 - Novell, 394, 769
 - in README files, 374, 775
 - by telephone, 374–375, 394
 - via websites, 375–376
 - for network managers, 320–321
 - overview of, 320
 - tech support team, 26
- telephony servers, **781**
- telephony systems managers, **323**
- Telnet protocol, **127–128**, **591**, 592, 595
- templates, **514**, 515, **781**
- 10Base2 (Thinnet), 49, **49**, 62, **210**, **744**, **782**
- 10Base5 (Thicknet), **48–49**, 49, 62, **782**
- 10BaseFL Ethernet, 99, **744**
- 10BaseT Ethernet, 376–377, 377, **744**
- terabytes, 37
- terminal servers. *See* Citrix; thin client; WTS
- text, hyper. *See* DHTML; HTML
- text links in intranets, 42, **527–528**, 528
- Thicknet (10Base5) Ethernet, **48–49**, 49, 62, **782**
- thin client networking (NT-based), **245–264**, **301–302**, 302, *See also* Citrix; server-based
 - client hardware requirements, 256–257
 - clients, defined, 247, **247**
 - compute cycles, 257–258
 - defined, **245–246**
 - display protocols, 247, 247, 251–252, 254–256
 - image processing, 248
 - information storage, 258
 - network requirements, 257
 - preparing for, 249–250
 - reasons to use
 - breaking upgrade cycles, 260–261
 - overview of, 259, 264
 - reducing admin costs, 259–260
 - sample applications
 - centralizing desktop control, 263–264
 - for hospital doctors, 262
 - overview of, 262
 - for students, 262–263
 - scheduling applications, 253–254
 - session handling, 248–249, 248
 - terminal servers
 - defined, **246**, 247
 - hardware availability, 252

- hardware requirements, 250–251
- multiuser operating systems, 251–254
- software support, 251–256
- virtual memory, 252–253
- in Windows 2000, 251, 253–254, 255–256
- unnecessary visuals, 258
- user identification, 258–259
- Thinnet (10Base2) Ethernet, 49, **49**, 62, **210**, **744**, **782**
- 3-tier client/server applications, 300, **300–301**
- time-domain reflectometer (TDR), **211**, 214, **782**
- TLAP (TokenTalk Link Access Protocol), **131**
- ToH (Tower of Hanoi) backups, **461**
- Token Bus (802.4) networks, **66–67**, 67, 96, 97
- token masters, **59**
- token packets, **58–59**, 93, **782**
- token passing, 93, 94, **782–783**
- Token Ring (802.5) networks
 - defined, **67–70**, 68–70, **783**
 - versus Ethernet (802.3x), 97–98
 - features, 100
 - MAUs in, 90–91, 91
 - troubleshooting, 212–213
- tone generators/locators, **378–379**, 379, **783**
- topologies
 - defined, **47**, **783**
 - logical topologies
 - bus, 54–58, 56
 - in Data Link layer, 93
 - defined, **15**, **54**, **764**
 - ring, 58–59, 58
 - overview of, 15, 29
 - physical topologies
 - bus, 48–50, 49, 85, 85
 - choosing, 47–48
 - defined, **15**, **771**
 - distributed star, 52, 53
 - mesh, 87, 87, 765
 - overview of, 54
 - ring, 53–54, 53, 86, 86
 - star, 48, 50–52, 51, 85–86, 86
- Torvalds, Linus, 198, 763
- tracking, *See also* monitoring; troubleshooting
- NetWare
 - NetWare servers
 - with configuration files, 401–402, 402
 - with MONITOR, 397–398, 398
 - overview of, 396
 - with Remote Manager, 402
 - with server logs, 398–401, 399–401
 - NetWare workstations
 - with configuration files, 401–402, 402, 404
 - with MONITOR, 403
 - with Remote Manager, 403, 404
 - with Windows utilities, 405–407, 405
 - virus signatures, 642–643
- transceivers, *See also* NICs
 - defined, **88**, **783**
 - in Ethernet NICs, 208–209
 - overview of, 48
- transformation files, **223**
- translation bridging, 177, **177**
- Transmission Control Protocol. *See* TCP
- transparent bridging, 176, **176**
- Transport layer, *See also* OSI
 - connection-oriented services, 110, 110
 - connectionless services, 111
 - defined, **83**, **109–110**, **487–488**
 - IPX/SPX protocol suite, 111
 - logical name resolution, 111

- NetBEUI protocol, 112, 507–508, 766
- TCP/IP protocol suite, 111–112
- troubleshooting, **353–385**, *See also* software deployment
 - cable breaks, 49–50
 - client connections, *See also* NOSs
 - 10Base2 cable, 210
 - using cable testers, 211, 384
 - on Ethernet networks, 208–211
 - on FDDI networks, 214
 - IPX frame type incompatibility, 210–211
 - multiple NIC problems, 213–214
 - overview of, 214–215
 - on Token Ring networks, 212–213
- Ethernet
 - 10BaseT cable, 376–377, 377
 - frame type incompatibility, 210–211
 - NICs, 208–210, 495–496
- with hardware diagnostic tools
 - crossover cable, 376–377, 377, 750
 - hardware loopbacks, 377–378, 378
 - overview of, 376
 - tone generators/locators, 378–379, 379, 783
 - warning, 379
- using log files
 - Application Logs, 373–374, 373
 - in NetWare, 367
 - overview of, 366–367, 374
 - Security Logs, 371–373, 372–373
 - System Logs, 369, 370
 - warning, 368
 - in Windows NT/2000, 367–374
- using manufacturer resources
 - on CD-ROMs, 375
 - Novell, 394, 769
 - overview of, 374
 - README files, 374, 775
 - by telephone, 374–375, 394
 - via websites, 375–376
- narrowing down problem sources
 - cabling, 360
 - collision lights, 356
 - fragmented memory, 358
 - hardware, 358
 - link lights, 356
 - logins, 354–355
 - in network segments, 359–360
 - operator error, 357, 769
 - power switches, 356–357
 - by reproducing problems, 354
 - servers, 359
 - software, 358
 - warning, 356
 - workstations, 359
- overview of, 353, 385
- with software diagnostic tools
 - overview of, 379
 - performance monitors, 380
 - protocol analyzers, 380, 774
- star physical networks, 51–52
- steps
 - 1: establish symptoms, 361
 - 2: identify affected areas, 361–362
 - 3: establish what has changed, 362–364
 - 4: select probable causes, 364
 - 5: implement solutions, 364–365, 365
 - 6: test results, 365
 - 7: see potential effects of solutions, 365–366
 - 8: document solutions, 366
- tips
 - check cable, 383–384
 - check physical conditions, 383
 - check small stuff, 381

- check software configuration, 382–383
 - check for viruses, 384–385
 - prioritize problems, 381–382
 - user file problems, 619
- troubleshooting NetWare 6 networks, **387–451**
- avoiding cable problems, 423–424
 - disk errors, 421–422, 422
 - failure profiles and, 407–409
 - iFolder problems, 426–428
 - NDS using DSREPAIR utility, *See also* DSREPAIR
 - Advanced Options, 434, 436–447, 437–439, 441–442, 445–446
 - Available Options, 433–434, 433
 - defined, **432**
 - graphical DSREPAIR, 447–448, 448–449
 - overview of, 428
 - unattended full repairs, 434, 435–436, 436
 - warning, 437
 - what it can do, 432–433
 - what it cannot do, 433
 - NDS using DSTRACE utility
 - defined, **428–429**, 429
 - graphical DSTRACE, 430–431, 431
 - turning on, 429–430
 - operating system/RAM problems, 420
 - overview of, 387–388
 - server problems
 - by adding RAM, 416–417
 - availability, 417–418
 - by freeing up RAM, 421
 - hardware scale/costs, 418–420
 - warning, 418
 - tips
 - overview of, 388–389
 - for prevention, 390–392, 449–450
 - for solving problems, 392–394
 - tracking normal operation
 - cable performance, 424–426, 425
 - with configuration files, 401–402, 402, 404
 - documenting on paper, 395
 - downtime, 395–396
 - with help desk software, 395
 - with MONITOR, 397–398, 398, 403
 - network performance, 407
 - overview of, 394
 - with Remote Manager, 402, 403, 404
 - with server logs, 398–401, 399–401
 - server performance, 396–403, 398–402
 - with Windows utilities, 405–407, 405
 - workstation performance, 403–407, 404–405
 - workstation problems
 - cannot connect to servers, 409–411
 - cannot use applications, 411–413
 - “not enough memory” errors, 413–414
 - overview of, 409
 - printing problems, 415–416
 - Windows not working, 414–415
 - truncated binary exponential backoff, **57**
 - trustees. *See* securing NetWare
 - TTS\$LOG.ERR files, **400**
 - Tut Systems, 328–329
 - twisted-pair cable, 97, 172–173, 173, **784**
 - 2-tier client/server applications, **299**, 300
- ## U
- UDP (User Datagram Protocol)
 - defined, **126**, **785**

firewall rules, 580, 587–589, 592–594
 overview of, 111–112
 university security, **574–575**
 updating software, **227–228, 643–644**
 upgrades
 cycles, breaking, 260–261
 defined, **785**
 planned, identifying, 319–320
 uptime, **313, 785**
 User Datagram Protocol. *See* UDP
 users
 defined, **785**
 granting trustee rights to, 631–632,
 635–636, 636–637
 responsibilities of, 11
 technical support for, 321
 user-level security, 785
 UTP (unshielded twisted-pair) cable, 97, **785**

V

virtual COM ports, **786**
 virtual drives, 271
 Virtual LANs (VLANs), **786**
 virtual memory, **189, 252–253**
 virtual modems, 720–721, 720–721
 virus protection, *See also* securing NetWare
 antivirus software, 384–385, 642,
 643–644, 745
 backup systems and, 644
 cyclical redundancy check, 643, 750–751
 overview of, 641
 Read Only .exe files, 615, 641
 taking precautions, 641–642
 tracking virus signatures, 642–643
 virus, defined, **786**
 warning, 615
 VOL\$LOG.ERR files, **399–400, 400**

volumes, **631–634, 633–634, 786**
 VPNs (virtual private networks), **99, 310,**
647, 653, See also RAS

W

WANs (wide area networks)
 defined, 7, **7, 653, 786**
 versus LANs, 5
 warning, 121
 web servers, **786**
 web-based applications, **303**
 website addresses
 3Com, 156
 Ceilidh, 518
 free software, 794–795
 hardware companies, 790–791
 HomePNA, 330
 interexchange carriers, 795
 Internet organizations, 792–793
 InterNIC, 498
 ISO, 80
 LinkSys, 425
 local exchange carriers, 795
 Microsoft, 369
 OnTrack, 479
 open source software, 794–795
 overview of, 789
 search engines/portals, 794
 software/service companies, 791–792
 standards/trade groups, 793
 Sybex, 4
 Windows NT Magazine, 262, 538
 websites, *See also* intranets
 monitoring, 315
 tech support via, 375–376
 website managers, 323
 wide area networks. *See* WANs

- Windows 9x clients
 - editing TCP/IP properties, 712
 - remote calls from, 697–698, 697–699
 - VPN connections from, 719, 722–724, 723–724
- Windows 95/98/ME client OSs, **196**, 197
- Windows 2000, *See also* Event Viewer
 - performance monitors, 405
 - Professional
 - client OS, 196–197
 - editing TCP/IP properties, 712
 - network protocols, 496
 - remote calls from, 693
 - VPN connections from, 724–727, 725–727
 - rollouts. *See* network design
 - Server, *See also* RAS
 - configuring as router, 498–499, 499
 - defined, **199**
 - overview of, 200–201
 - rebooting and, 683
 - as terminal server, 251, 253–254, 256, 265, 267
- Windows Installer. *See* software deployment
- Windows NT 4 Terminal Server. *See* WTS
- Windows NT, *See also* Event Viewer
 - defined, **787**
 - Performance Monitor, 380, 405–407, 405
 - Remote Access Service, 650–651
 - Server
 - defined, **199**
 - overview of, 200–201
 - as router, 653
 - Service, 787
 - Workstation
 - defined, **196–197**
 - editing TCP/IP properties, 712–713, 713
 - remote calls from, 693–697, 694–696
 - VPN connections from, 719–722, 720–722
- Windows NT Magazine*, 256, 262, 538
- Windows, troubleshooting, 414–415
- Windows XP Pro client OS, **196–197**
- WinFrame OS, Citrix, **253**
- WINS (Windows Internet Name Service), 501, 504, **504–505**, **786**
- wireless networks, *See also* Ir; RF
 - 802.11 LAN standard, 96, 99–100, 348
 - defined, **333**, **334**
 - history, 333–335
 - at home, *See also* home networking
 - with CSMA/CA, 336
 - versus Ethernet networks, 336, 348
 - using hybrid wireless-wired, 337–338, 338, 349–350
 - minuses, 347–348
 - overview of, 337
 - performance, 336, 348
 - pluses, 346–347
 - radio spectrum, 335, 336
 - range, 336–337, 348
 - security, 337
 - warning, 337
 - using infrared, 73, 74, 151–152
 - using radio waves, 74–75, 151–152
- workgroup applications, **298–299**
- workgroups, 32, 43, **787**
- workstations, *See also* clients
 - defined, **9**, **787**
 - tracking performance
 - with configuration files, 401–402, 402, 404
 - with MONITOR, 403
 - with Remote Manager, 403, 404
 - with Windows utilities, 405–407, 405

troubleshooting

cannot connect to servers, 409–411

cannot use applications, 411–413

“not enough memory” errors,
413–414

overview of, 359, 409

printing problems, 415–416

Windows not working, 414–415

WTS (Windows NT 4 Terminal Server),

See also Citrix; thin client

defined, **253, 265–266**

limitations, 246, 254

refresh rates, 247

remote control functionality, 660

Remote Display Protocol, 254–255

virtual memory, 252

Windows 2000 and, 251, 253–254, 256

X

X protocol, 254

X Window, **788**

X-10 powerline networks, **332**

X.25 protocol, **136–137, 137**, 661, 663

XDR (eXternal Data Representation), **128**

Z

ZAP initialization files, **223–224**

ZIP (Zone Information Protocol), **133**

zones (in server farms), **284–285**