

#### INDEX

# **Numerics**

32-bit signed integer values, converting to IP addresses, 420–422
802.1Q tunneling disabling, 185 dropping frames, 196
802.1x Ethernet port authentication, 170–174

### A

AAA, 436-437 accounting, 444 authorization, 442-444 protocol selection, 437 restricting access, 439-440 RADIUS configuration, 440-442 TACACS+ configuration, 440 AAR (automated alternate routing), 66-69 configuring, 67-69 AccessXX.log application log, 355 accounting (AAA) configuring, 444 using CDR data, 394 AD (Active Directory), directory integration planning, 375-377 preparing the directory, 377–382 User Creation Base, 383-387 adapter teaming, 96 adding hard drives to servers, 22 adds, moves, and changes for unsupported CallManager operations, 390 adjusting bandwidth consumption on WANs, 58-59 administrative control traffic, encrypting, 168 administrative operations, 388-389 administrator account modifications, caveats, 104 administrator training, 25-27 advanced services, 316 Alert Log format, 485 Alerting Timeout parameter (CallManager service), 320

alerts (RTMT), preconfigured, 477-478 CallProcessingNodeCpuPegging, 478 CodeRedEntry, 478 CodeYellowEntry, 478 CriticalServiceDown, 479 DirectoryConnectionFailed, 479 DirectoryReplicationFailed, 479 ExcessiveVoiceQualityReports, 479 LowAvailableDiskSpace, 480 LowAvailableMemory, 480 LowCallManagerHeartbeatRate, 480 LowTcdServerHeartbeatRate, 480 LowTFTPServerHeartbeatRate, 480 MaliciousCallTrace, 480 MediaListExhausted, 476, 480 MgcpDChannelOutOfService, 481 NonCallProcessingNodeCpuPegging, 481 NumberOfRegisteredGatewaysDecreased, 481 NumberOfRegisteredGatewaysIncreased, 481 NumberOfRegisteredMediaDevicesDecreased, 481 NumberOfRegisteredMediaDevices-Increased, 481 NumberOfRegisteredPhonesDropped, 481 recipients, selecting, 475 RouteListExhausted, 482 allocating IP addresses, 190-191 Alpha clusters, creating, 140 analyzers (syslog), 457 Annunciator, 497 application layer, 7 applications, CDR-related third-party, 428 assessing current data infrastructure, 5 availability, 6-7 documentation, 8 security, 7-8 assigning privileges to functional groups, 359 ATM (Asynchronous Transfer Mode), WAN deployment architecture, 46-47 authenticating HSRP, 192-193 routing protocol traffic, 191-192

authorization (AAA), configuring, 442–444
Automated Alternate Routing Enabled parameter, 322
AutoSecure feature (IOS routers), 166
availability, maintaining, 6–7
avoiding single points of failure, 161–163
AVVID Partner Program, CDR partners, 428–429

## В

backup servers, versus backup target, 118 backup strategies, 112 backing up CallManager servers, 113 backing up Cisco Unity messaging repository, 115 backing up frequently stored files, 114 backing up gateways, 115-116 backing up log files, 114 backing up MOH sources, 114 backing up router/switch configurations, 116 backing up Subscriber, 113-114 maintaining consistent private password phrases, 123-124 mitigating misconfiguration disasters, 116-117 performing backups with BARS, 119 checking log files for errors, 122 default backup targets, 120-121 moving backup files, 122 planning, 117 scheduling backups, 118 selecting appropriate backup server, 117 staging, ensuring backup space, 123 bandwidth consumption, adjusting on WANs, 58-59 Barge enhancements for release 4.0(1), 503 BARS (Backup and Restore System), 113 checking log files for errors, 122 ensuring backup space, 123 moving backup files, 122 performing backups, 119 default backup targets, 120-121 Restore Wizard, 126 restoring files, 125 baselining CDR data for jitter and latency, 415

BAT (Bulk Administration Tool), release 4.0 enhancements, 512
B-Channels, removing from service for maintenance, 324–325
billing, CDR data, 394 collecting, 318
BPDU Guard, preventing BPDU Spanning-Tree attacks, 181–182
broadcast storm control, disabling, 186

#### С

CAC (Call Admission Control) locations-based, configuring, 62-65 oversubscription, preventing, 60-65 call join feature (release 4.0), 502-503 Call Log format, 487–489 call park, customizing, 326 Call Park Display Timer parameter, 326 Call Park Reversion Timer parameter, 327 callingPartyLoginUserID field (CDR), 406 callingPartyNumber field (CDR), 409 callingPartyNumberPartition field (CDR), 409 CallManager service CDR data, collecting, 318 parameters Automated Alternate Routing Enabled, 322 Call Park Reversion Timer, 327 Digit Analysis Complexity, 319 Forward Maximum Hop Count, 321 Forward No Answer Timer, 321 International Number Prefix, 325 Locations Trace Details Enabled, 319 Max Forward Hops to DN, 322 Maximum Number of Registered Devices, 320 Maximum Phone Fallback Queue Depth, 320 Offhook to First Digit Timer, 321 Speed Dial Await Further Digits, 323 Statistics Enabled, 322 Status Enquiry Poll Flag, 319

T301.320 T302, 321 CallManager Serviceability Alarm Facility configuring, 448 SNMP traps, 465 restarting services, 314 starting/stopping services, 313 CallProcessingNodeCpuPegging alert, 478 calls, diverting to voice mail, 504-505 CAR (CDR Analysis and Reporting Tool), 422 installing, caveats, 424 load settings, configuring, 422-423 quality of service, tracking, 426 reports standard, 424-425 utilization, 425-426 users, tracking, 426 CatOS devices CoS settings, ignoring, 174 OOB management, implementing, 167-168 cause codes ITU Q.850, 410-413 MLPP, 406-407 cBarge, 503 CBR (constant bit rate), 46 CCM Directory Manager account, permissions, 381 CCM trace data, customizing with service parameters, 319 CCMAdministrator user account, 353 tracing logins, 361-362 ccmCallManagerFailed trap, 463 ccmGatewayFailed trap, 464 ccmGatewayLayer2Change trap, 464 ccmMaliciousCall trap, 465 ccmMediaResourceListExhausted trap, 464 ccmPhoneFailed trap, 463 ccmPhoneStatusUpdate trap, 463 ccmQualityReport trap, 465 ccmRouteListExhausted trap, 464 CDR data 32-bit signed integer values, converting to IP addresses, 420-422 collecting, 394-395 limiting entries, 395-396 method of, documenting, 15 service parameters, 395

enterprise parameters, 396-397 examples of normal calls, 414-415 of unsuccessful calls, 416 exporting, 418-419 fields. 399-403 most commonly used, 409-410 updates for Release 4.0, 404-407 for billing, 394 jitter, baselining, 415 latency, baselining, 415 querying SQL database, 417 third-party applications, 428 time stamps, converting to human-readable form, 419-420 CDR UNC Path enterprise parameter, 345 centralized CallManager architecture, gateway selection. 85-87 centralized deployment AAR, 66, 68-69 with ATM, 46 with Frame Relay, 45 with leased lines, 44-45 with MPLS, 47-48 with V3PN, 48 changing service parameters, 316 service status, 312 Cisco CallManager Attendant Console enhancements (release 4.0), 514 Cisco CDR Insert service, 338 Cisco Customer Directory Configuration Plugin, 374 Cisco Extended Functions service, 339-340 Cisco Extension Mobility service, 342 Cisco IOS Software, AutoSecure feature, 166 Cisco Secure ACS, configuring for DC Directory communication, 437-439 Cisco Security Agent, hardening CallManager and voice application servers, 200-202 Cisco Serviceability Reporter service, 340, 484 Cisco Telephony Call Dispatcher service, 335 Cisco Unity messaging repository, backing up, 115 Cisco VT Advantage, 499 ciscoatGUID attribute (User object), 372 ciscoatUserProfile attribute (User Object), 372 ciscoatUserProfileString attribute (User object), 372 CiscoWorks syslog servers, 454-456 classes of service, documenting, 15-16 Cluster Security Mode enterprise parameter, 345 clusters backing up CallManager servers, 113 backup server, selecting, 117 CDR data collection enabling, 395 limiting entries, 395-396 Publisher, attempting MLA configuration changes while down, 355 service parameters, 316 Subscribers, 111 backing up, 113-114 duplicating, 126 reinstalling, 126 CMI (Cisco Messaging Interface) service, 331-333 CMRs examples of normal calls, 414-415 fields, 399-404 codecs, centralized region configuration, 60-61 CodeRedEntry alert, 478 CodeYellowEntry alert, 478 collecting CDR data, 318, 394-395 limiting entries, 395-396 service parameters, 395 commands copy running-config, 116 NBSTAT, 132 comment field (CDR), 405 community strings, 459 selecting, 460-461 comparing Event Viewer and syslog, 458 compartmentalizing services, 203 conferencing cause codes (MLPP), 407 conferencing infrastructure enhancements (release 4.0), 508 configuring AAR, 67-69 accounting, 444 authorization, 442-444 CallManager Serviceability Alarm, 448 CAR, load settings, 422-423 Cisco Secure ACS for DC Directory communication, 437-439 directory access, 370, 372 LFI with traffic shaping, 58 LLQ, 52-55

locations-based CAC, 62-65 Region setting in CallManager Administration, 60 - 61RTMT, 473-474 alerts, 475 polling interval, 476 SNMP traps, 462-465 SRST, 71, 73 syslog, multiple server configuration, 456-457 WINS addresses, 129 connectivity restricting with PVLANs, 174-175 verifying before installation, 95 consistent use of private password phrases, 123-124 contract number, verifying, 97 converting 32-bit signed integer values to IP addresses, 420-422 CDR time stamps to human-readable form, 419-420 copy running-config command, 116 creating Alpha clusters, 140 custom functional groups in MLA, 357 custom reports from RISDC data, 484 Alert Log format, 485 Call Log format, 487-489 Device Log format, 489-490 Perfmon Log format, 490-491 Server Log format, 485-487 custom user groups in MLA, 358 feature inventory database, 9-14 security policies, 161 training curriculum, 24-26 for administrators, 26-28 user information packets, 34 user-specific accounts in MLA, 357 CriticalServiceDown alert, 479 cron, 456 cRTP (Compressed Real-Time Transport Protocol), adjusting bandwidth consumption, 58 CSA (Cisco Security Agent), 107 CTIManager service, 334 CTL (Cisco Certificate Trust List) Provider service, 338-339 current voice applications, assessing, 18-20 custom functional groups, creating in MLA, 357

custom reports Alert Log format, 485 Call Log format, 487–489 creating from RISDC data, 484 Device Log format, 489–490 Perfmon Log format, 490–491 Server Log format, 485 Service Log format, 486–487 custom user groups, creating in MLA, 358 customizing call park, 326 CCM trace data with service parameters, 319 cutover method, establishing, 31–33

# D

DAI (Dynamic ARP Inspection), enabling, 176-179 daily system monitoring, importance of, 436 Data Collection Enabled parameter (RIS Data Collector service). 337 data link layer. See Layer 2 security data retention. See backup strategies Database Layer Monitor service, 338 database synchronization, verifying, 105 dateTimeConnect field (CDR), 410 dateTimeDisconnect field (CDR), 410 dateTimeOrigination field (CDR), 410 dateTimeStamp field (CDR), 410 DC Directory, communicating with Cisco Secure ACS, 437-439 decimal call clearing cause codes (ITU Q.850), 410-413 dedicated servers, 303 **TFTP**, 329 Default MOH Volume Level parameter (MOH Audio Translator service), 336 Default Network Locale enterprise parameter, 345 Default User Locale enterprise parameter, 345 dependencies among services, 301-302

deploying SRST, 73-76 WANs with ATM, 46-47 with Frame Relay, 45 with leased lines, 43, 45 with MPLS, 47-48 with V3PN, 48 desktop video telephony, 498-501 destCause\_value field (CDR), 404, 410 destIpAddr field (CDR), 410 destIpPort field (CDR), 404 destPrecedenceLevel field (CDR), 404 destVideoCap\_Codec field (CDR), 404 destVideoCap\_Resolution field (CDR), 405 destVideoTransportAddress\_IP field (CDR), 405 destVideoTransportAddress\_Port field (CDR), 405 Device Log format, 489-490 Device Search feature (RTMT), 483 Device Security Mode enterprise parameter, 345 devices memory requirements, 22 selecting, 21 device-to-CallManager authentication, 514 DHCP snooping, 176 dial plan, documenting, 14-15 dial tone, selecting for OnNet and OffNet calls, 328 Digit Analysis Complexity parameter, 319 DirAndUIXX.log application log, 354 directory access, 367-369 configuring, 370-372 directory integration, 367-368, 372-373 planning, 375-377 preparing the directory, 377–382 User Creation Base, 383–387 DirectoryConnectionFailed alert, 479 directoryNumPartition field (CDR), 409 DirectoryReplicationFailed alert, 479 DirTrfr (direct transfer), 506 disabling 802.1Q tunneling, 185 broadcast storm control, 186 DTP, 184 IIS on CallManager servers, 363

Layer 2 control protocols, 179–185 VTP, 183 displaying service parameters for every server, 317 service status, 312 distinctive rings, enabling for OnNet and OffNet calls, 325 diverting calls to voice mail, 504-505 DNA (Cisco Dialed Number Analyzer), customizing data with service parameters, 319 documenting CallManager upgrades, 150-151 CDR method, 16 classes of service, 15-16 current infrastructure, 8 dial plan, 14-15 existing hardware, 20-21 server characteristics, pre-installation checklist, 93-94 domains (Window), CallManger server participation, 100 DoS (denial of service) as security threat, 159 downloading CallManager maintenance releases, 144 Remote Desktop Client, 468 Windows OS upgrades, 144 downtime, surviving with SRST, 69-71, 73-76 PSTN calling during fallback, 82-84 voice mail during fallback, 78-80 dropping 802.1q frames on IP Phones, 196 parties from Ad Hoc conferences, 505 DTP, disabling, 184 dual phone and flash cut migration method, 33 duplicating Subscribers, 126

### Ε

Enable Dependency Records enterprise parameter, 344 enabling Access log file for MLA, 356 CDR data collection, 394–395 time synchronization, 398–399 trace logs for MLA, 355 encrypting administrative control traffic, 168 endpoint provisioning, 207 endpoint image authentication, 208 enrollment, 208-215 operation, 215-218 ensuring adequate backup space, 123 CallManager upgrade version compatibility with Windows OS, 141-142 enterprise-related CDR parameters, 396-397 Epoch time, converting to human-readable form, 419-420 escalation plans, 35 establishing escalation plans, 35 operations procedures, 36-38 problem reporting methods, 35 rollout plan, 28 adding phones, 28-30 cutover method, 31-33 second-day support centers, 34-35 Ethernet port authentication, 170-174 Event Viewer, 457-458 examples of CDRs for normal calls, 414-415 for unsuccessful calls, 416 ExcessiveVoiceQualityReports alert, 479 exporting CDR data, 418-419

#### F

failed Subscribers, reinstalling, 126 feature inventory database, creating, 8–11, 13 feature list for release 4.0(1), 493 Ad Hoc conference party drop, 505 annunciator, 497 BAT enhancements, 512 call join, 502–503 cBarge, 503 Cisco CallManager Attendant Console enhancements, 514 conferencing infrastructure enhancements, 508 desktop video telephony, 498–501 DirTrfr, 506 display of configurable call forward information, 505–506

hunt group ehancements, 508, 510 iDivert, 504-505 IPMA enhancements, 506-507 management and monitoring enhancements, 513 MCID, 510-511 MLA enhancements, 513 MLPP, 494-496 multiple calls per line appearance, 502 privacy, 504 published API enhancements, 511-512 Q.SIG enhancements, 496-497 security enhancements, 514-515 Service URL, 505 SIP trunk signaling interface, 497-498 fields of CDR data, 399-403 frequently searched fields, 409-410 updates for release 4.0, 404-407 of CMRs, 403-404 of syslog messages, 447 FIFO (first in, first out) queuing, 49 filtering network traffic, 187-190 with NBAR, 189-190 with PACLs, 188 finalCalledPartyLoginUserID field (CDR), 406 finalCalledPartyNumber field (CDR), 409 finalCalledPartyNumberPartition field (CDR), 409 First Digit Timeout parameter (CallManager service), 321 flash cut, 31 forcing NetBIOS name lookups, 128 Forward Maximum Hop Count parameter, 321 Forward No Answer Timer parameter, 321 fractional PRI, 325 Frame Relay jitter, reducing with LFI, 57 WAN deployment architecture, 45 frequently stored files, backing up, 114 functional groups creating custom groups in MLA, 357 permissions, 349-352 overlapping, managing, 359-360 privileges assigning, 359 user groups, 349

# G-H

GARP, ignoring on IP Phones, 194-195 gateways backing up, 115-116 selecting for centralized CallManager architecture, 85-87 generating CAR utilization reports, 425-426 privileges report in MLA, 356 globalCallID\_callId field (CDR), 409 H323 FastStart Inbound parameter, 326 hard drives, adding to servers, 22 hardening access via IP phones, 194-196 CallManager and Voice application servers, 197 Cisco-provided hardening, 197 services, compartmentalizing, 203 with account/password policies, 204-207 with Cisco Security Agent, 200-202 with patches and updates, 197, 199 with Secure Remote Administration, 202-203 with virus protection software, 200 routers and switches, 165-167 hardware, documenting, 20-21 host-based monitoring, 434 HP Insight Agents, 462-463 HR, updating personnel changes in MLA, 362 HSRP (Hot Standby Routing Protocol), authenticating, 192-193 hunt group enhancements (release 4.0), 508-510

iDivert, 504-505 ignoring CoS settings on CatOS devices, 174 GARP on IP Phones, 194-195 IIS, disabling on CallManager servers, 363 implementing, OOB management on IOS/CatOS devices, 167-168 infrastructure security feature checklist, 164-165 documenting, 8 installing CallManager, 91 adapter teaming, 96 consistent server passwords, creating, 101 contract number, verifying, 97 installation media, preparing, 94 LMHOSTS file, updating, 100 locating key directories and files, 98-99 logistics checklist, 92–93 network connectivity, verifying, 95 post-installation tasks adding Cisco virus protection software, 107 caveats against unsupported software, 103 double-checking pre-installation checklist, 102 maintaining current user accounts, 104 maintaining OS parameters, 103 patching, 104 verifying database synchronization, 105 verifying optimal NIC settings, 105-106 power supply connections, verifying, 95 reading release notes, 97-98 server characteristics, documenting, 93-94 service releases, 152-155 VNC, 470-471 Windows domain participation, avoiding, 100 installing CAR, caveats, 424 integrity, violations of, 160 Interdigit Timeout parameter (CallManager service), 321 International Number Prefix parameter, 325 inventory database, creating, 9-14 IOS routers, implementing OOB management, 167-168

IOS-based gateways, backing up, 115–116 IP addresses allocating, 190-191 converting from, 32-bit signed integer values, 420-422 IP Manager Assistant service, 341 IP phones 802.1Q frames, dropping, 196 directory access, configuring, 370-372 GARP, ignoring, 194-195 IP RTP priority, minimizing latency on WANs, 50 - 52IP Voice Media Streaming App service, 333–334 IPMA enhancements (release 4.0), 506–507 IPSec, securing interserver communication, 219 ISAPI (Internet Service API) filter, 353 ISAPIFilterXXXXXX.txt application log, 354 ITU Q.850, cause codes, 410-413

# J–L

jitter CDR data, baselining, 415 reducing on WANs, 56 with LFI, 56–57

labeling backup tapes, 117 lastRedirectDnPartition field (CDR), 409 lastRedirectRedirectOnBehalfOf field (CDR), 405 lastRedirectRedirectReason field (CDR), 406 latency, baselining CDR data, 415 Layer 2 security 802.1Q tunneling, disabling, 185 broadcast storm control, disabling, 186 connectivity, restricting, 174-175 control protocols, disabling, 179-184 CoS settings, restricting, 174 DAI, enabling, 177-179 DHCP replies, denying, 175 DHCP snooping, 176 Ethernet port access, restricting with Ethernet port authentication, 170-174 HSRP, authenticating, 193 IP addresses, allocating, 191 MAC addresses, restricting on switch ports, 169 network traffic, filtering, 187

on IP Phones dropping, 802.1Q frames, 196-197 ignoring GARP, 194-195 voice traffic, prioritizing, 186-187 Layer 3 security HSRP, authenticating, 192 IP addresses, allocating, 190 network traffic, filtering, 188-190 routing protocol traffic, authenticating, 191-192 layers of OSI reference model, 163 LDAP (Lightweight Directory Access Protocol), 353 leased lines, WAN deployment architecture, 43-45 LFI reducing jitter on Frame Relay networks, 57 reducing jitter on point-to-point links, 56 limiting CDR database entries, 395–396 DHCP responses with Option, 82, 175 Linux-based syslog servers, configuring, 451-454 LLP, minimizing latency on WANs, 52-55 LLQ, minimizing latency on WANs, 50 LMHOSTS file name resolution, 129-131 updating, 100 load settings (CAR), configuring, 422-423 LocalNetPriority, 377 locating key directories and files for installation, 98-99 locations-based CAC, configuring, 62, 64-65 Locations Trace Details Enabled parameter, 319 Lock-and-Key security, 469 log files backing up, 114 for release 4.x, 354 logistics checklist, CallManger installation, 92-93 LowAvailableDiskSpace alert, 480 LowAvailableMemory alert, 480 LowCallManagerHeartbeatRate alert, 480 LowTcdServerHeartbeatRate alert, 480 LowTFTPServerHeartbeatRate alert, 480

## Μ

MAC addresses, restricting on switch ports, 169-170 maintaining availability, 6-7 password consistency across servers, 101 maintenance releases, downloading, 144 MaliciousCallTrace alert, 480 management and monitoring enhancements (release 4.0), 513 managing overlapping permissions in MLA, 359-360 trace facility file sizes, 467-468 mandatory services, 302-305 mass storage media, labeling, 117 master file (Windows), reading, 152 Max CDR Records parameter (Database Layer Monitor service), 338 Max Forward Hops to DN parameter, 322 Maximum Ad Hoc Conference parameter, 327 Maximum Login Time parameter (Cisco Extension Mobility service), 342 Maximum MeetMe Conference Unicast parameter, 327 Maximum Number of Registered Devices parameter, 320 Maximum Phone Fallback Queue Depth parameter, 320 MCID (malicious call identification), 510-511 MCSs (Media Convergence Servers), 111 MediaListExhausted alert, 476, 480 messages, syslog CallManager Serviceability Alarm, 448 format, 447 router logging, 449-451 severity levels, 446 severity levels, selecting, 448 MgcpDChannelOutOfService alert, 481 MIBs. 459 Microsoft Excel, converting UTC and IP addresses, 421-422 Microsoft Performance, 466 migration, methods of, 31 flash cut, 31 PBX migration, 31-33

minimizing latency on WANs, 49-50 with IP RTP, 50-52 with LLP, 52-55 misconfigurations, mitigating disaster with backup strategy, 116-117 mismatched SQLSvc passwords, troubleshooting, 134 mitigating security threats routers and switches, hardening, 165-167 on CallManager and voice application servers, 197 - 207on IOS/CatOS devices, 168 on Laver 2 802.1Q tunneling, disabling, 185 broadcast storm control, disabling, 186 connectivity, restricting, 174-175 control protocols, disabling, 179-185 DAI, enabling, 176, 178-179 default native VLAN value, reassigning, 184 DHCP snooping, 176 dropping 802.1Q frames on IP phones, 196-197 DTP, disabling, 184 ignoring CoS settings on CatOS devices, 174 ignoring GARP on IP Phones, 194-195 limiting DHCP responses, 175 network traffic, filtering, 187-190 voice traffic, prioritizing, 186-187 VTP, disabling, 183 with Ethernet port authentication, 170-174 with port security, 169-170 on Layer 3 HSRP, authenticating, 192-193 IP addresses, allocating, 190-191 routing protocol traffic, authenticating, 191-192 MLA (multilevel administration), 349, 458 Access file, monitoring, 356, 360 access, restricting, 362 application logs, 354 attempting configuration changes while Publisher is down, 355 CCMAdministrator user account, 353 tracing logins, 361-362

custom functional groups, creating, 357 custom user groups, creating, 358 enabling for release 4.x, 355 enhancements to release 4.0, 513 functional groups, 349 assigning privileges, 359 permissions, 349-352 overlapping permissions, managing, 359-360 privileges report, generating, 356 security audits, 364 standard user groups, permissions, 350-352 super user, 349 trace logs, enabling, 355 unauthorized web browser access, preventing, 363 updates from previous release, 353 backup and restore operations, 354 disabled features, 353 log file location, 354 user-specific accounts checking against HR, 362 creating, 357 MLPP (Multilevel Precedence and Preemption), 494-495 cause codes, 406-407 conferencing cause codes, 407 precedence calls to another network, 496 precedence calls withing cluster, 496 precedence values, 407 modifying administrator account, caveats against, 104 OS parameters, caveats against, 103 MOH Audio Translator service, 335-336 Default MOH Volume Level parameter, 336 MOH sources, backing up, 114 monitoring CAR. 424-426 media resouces with RTMT media resouces monitoring with RTMT, 475 MLA Access log file, 356, 360 trunk utilization with RTMT, 476 utilization reports, 425-426 monitoring tools, 435 AAA, 436-437 accounting, configuring, 444 authorization, configuring, 442-444

protocol selection, 437 restricting access, 439-442 daily monitoring, 436 Microsoft Performance, 466 SNMP, 459-460 community strings, 460-461 traps, 462-465 SRA, 466 syslog, 445 analyzers, 457 CallManager Serviceability Alarm, 448 CiscoWorks syslog server, 454-456 cron. 456 Event Viewer, 457-458 facilities, 446 Linux-based server configuration, 451-454 message format, 447 message severity levels, 446 multiple server configuration, 456-457 router logging, 449-451 severity level, selecting, 448 Terminal Services, 468 security vulnerabilities, 469-470 unsupported agents, 435 versus host-based monitoring, 434 moving system into production, 152 MPLS (Multiprotocol Label Switching), WAN deployment architecture, 47-48 Multiple Login Behavior parameter (Cisco Extension Mobility service), 343 multiple syslog server configuration, 456-457 multiple-domain AD forest, placing User Creation Base, 383

# Ν

name resolution LMHOSTS file, 129–131 WINS, configuring, 129 National Number Prefix parameter, 325 native VLAN value, reassigning, 184 NBAR (Network-Based Application Recognition), filtering network traffic, 189–190 NBTSTAT command, 132 **NetBIOS** forcing name lookups, 128 name resolution issues, troubleshooting, 128 resolving names with LMHOSTS file, 129-132 network layer. See Layer 3 security network traffic, filtering, 187-190 with NBAR, 189-190 with PACLs, 188 NICs (Network Interface Cards) adapter teaming, 96 optimal settings, verifying, 105-106 no answer ring duration, 321 NonCallProcessingNodeCpuPegging alert, 481 nonrepudiation, violation of, 160 NTP (Network Time Protocol), enabling time synchronization, 398-399 NumberOfRegisteredGatewaysDecreased alert, 481 NumberOfRegisteredGatewaysIncreased alert, 481 NumberOfRegisteredMediaDevicesDecreased alert, 481 NumberOfRegisteredMediaDevicesIncreased alert, 481 NumberOfRegisteredPhonesDropped alert, 481

# 0

obtaining CallManager upgrade media, 143 Offhook to First Digit Timer parameter, 321 OffNet calls, selecting dial tone, 328 one-time passwords, implementing, 168 OnNet calls, selecting dial tone, 328 OOB (out-of-band) management, implementing on IOS/CatOS devices, 167-168 operations procedures, establishing, 35, 37 optional services, 302-305 recommendations for 500+ user systems, 305-306 recommendations for 1500+ user systems, 306-307 recommendations for 10,000+ user systems, 307-308 recommendations for 20,000+ user systems, 309-312 origCalledPartyRedirectedOnBehalfOf field (CDR), 405 origCalledPartyRedirectReason field (CDR), 406

origCause\_value field (CDR), 404, 410 originalCalledPartyNumber field (CDR), 409 originalCalledPartyNumberPartition field (CDR), 409 origIpAddr field (CDR), 410 origIpPort field (CDR), 403-404 origPrecedenceLevel field (CDR), 404 origVideoCap\_Codec field (CDR), 404 origVideoCap\_Resolution field (CDR), 404 origVideoTransportAddress\_IP field (CDR), 405 origVideoTransportAddress\_Port field (CDR), 405 OSI reference model, layers of, 163 overlapping permissions, managing in MLA, 359-360 oversubscription monitoring with weekly voice messaging utilization reports, 426 preventing with CAC, 60-65

## Ρ

PACLs (port access control lists), filtering network traffic. 188 parameters CallManager service Call Park Display timer, 326 H323 FastStart Inbound, 326 Maximum Ad Hoc Conference, 327 Maximum MeetMe Conference Unicast, 327 National Number Prefix, 325 Party Entrance Tone, 327 Preferred G711 Millisecond Packet Size. 328 Preferred G723 Millisecond Packet Size. 328 Preferred G729 Millisecond Packet Size. 328 Preferred GSM EFR Millisecond Packet Size, 328 Silence Suppression for Gateways, 328 Speed Dial Await Further Digits, 323 Strip G.729 Annex B from Capabilities, 328

Subscriber Number Prefix, 325 Suppress MOH to Conference Bridge, 327 changing, 316 customizing CCM traces and DNA data, 319 displaying for every server, 317 enterprise parameters, 343-345 Unknown Caller ID Text parameter, specifying, 322 Party Entrance Tone parameter, 327 passwords consistent use of, 101, 123-124 for CCMAdministrator user account. changing, 353 SQL mismatches, troubleshooting, 134 patches, 104 installing, 152, 154-155 versus upgrades, 138-139 PerfMon, 466 Perfmon Log format, 490-491 performance counters, setting threshold triggers, 482 performing backups with BARS, 119 checking log files for errors, 122 default backup targets, 120-121 moving backup files, 122 permissions for CCM Directory Manager account, 381 for functional groups, 349-352 for standard user groups, 350-352 PermissionsXXXXXX.txt application log, 354 personnel changes, updating through HR department, 362 planning backup strategies, 117 consistent password phrases, 123-124 ensuring backup space, 123 default backup targets, 120-121 moving backup files, 122 performing backups with BARS, 119-122 scheduling backups, 118 selecting appropriate backup server, 117 directory integration, 375-377 plugins, Cisco Customer Directory Configuration Plugin, 374 point-to-point links, reducing jitter with LFI, 56 polling interval, configuring on RTMT, 476

post-installation tasks caveats when using unsupported software, 103 database synchronization, verifying, 105 double-checking pre-installation checklist, 102 existing user accounts, maintaining, 104 optimal NIC settings, verifying, 105-107 OS parameters, maintaining, 103 patching, 104 power supplies, verifying connections before installation, 95 precautions, observing while installing service releases, 154-155 precedence values (MLPP), 407 preconfigured RTMT alerts, 477-478 CallProcessingNodeCpuPegging, 478 CodeRedEntry, 478 CodeYellowEntry, 478 CriticalServiceDown, 479 DirectoryConnectionFailed, 479 DirectoryReplicationFailed, 479 ExcessiveVoiceQualityReports, 479 LowAvailableDiskSpace, 480 LowAvailableMemory, 480 LowCallManagerHeartbeatRate, 480 LowTcdServerHeartbeatRate, 480 LowTFTPServerHeartbeatRate, 480 MaliciousCallTrace, 480 MediaListExhausted, 480 MgcpDChannelOutOfService, 481 NonCallProcessingNodeCpuPegging, 481 NumberOfRegisteredGatewaysDecreased, 481 NumberOfRegisteredGatewaysIncreased, 481 NumberOfRegisteredMediaDevices-Decreased, 481 NumberOfRegisteredMediaDevices-Increased, 481 NumberOfRegisteredPhonesDropped, 481 RouteListExhausted, 482 Preferred G711 Millisecond Packet Size parameter, 328 Preferred G723 Millisecond Packet Size parameter, 328 Preferred G729 Millisecond Packet Size parameter, 328 Preferred GSM EFR Millisecond Packet Size parameter, 328

pre-installation tasks adapter teaming, 96 contract number, verifying, 97 documenting server characteristics, 93-94 double-checking, 102 logistics checklist, 92 network connectivity, verifying, 95 power supply connections, verifying, 95 preparing installation media, 94 reading release notes, 97-98 preparing CallManager upgrade checklist, 142-143 for directory integration, 377-382 installation media, 94 preventing BPDU Spanning-Tree attacks with BPDU Guard, 181–182 oversubscription with CAC, 60 location-based CAC, 62-65 unathorized web browser access, 363 PRI fractional, 325 prioritizing voice traffic, 186-187 privacy ehancements for release 4.0(1), 504 violations of, 160 private password phrases, consistent use of, 123-124 privileges, assigning to functional groups, 359 privileges report (MLA), generating, 356 problem reporting methods, establishing, 35 provisioning endpoints, 207 endpoing image authentication, 208 enrollment, 208-215 PSTN (public-switched telephone network), 69 published API enhancements (release 4.0), 511-512 Publisher, 111 attempting MLA configuration changes while down. 355 PUT (Product Upgrade Tool), 143

# Q

Q.SIG enhancements, 496–497 QoS (quality of service) bandwidth consumption, adjusting on WANs, 58–59 jitter, minimizing on WANs, 56–57 latency, minimizing on WANs, 49–55 tracking via CAR, 426 Query Builder, querying known CDR values, 417 queuing FIFO, 49 IP RTP priority, minimizing latency on WANs, 50–52 LLP, minimizing latency on WANs, 52–55 LLQ, minimizing latency on WANs, 50

# R

RADIUS (Remote-Access Dial-In User Service) authentication, configuring, 440-442 RAID (redundant array of inexpensive disks) implementing staging environments for CallManager upgrades, 140 remirroring with spare drive, 150 **README files**, 152 reassigning default native VLAN value, 184 recipients to alerts (RTMT), selecting, 475 redundancy, backup strategies, 112 backing up CallManager servers, 113 backing up Cisco Unity messaging repository, 115 backing up frequently stored files, 114 backing up gateways, 115-116 backing up log files, 114 backing up MOH sources, 114 backing up router/switch configurations, 116 backing up Subscriber, 113-114 reestablishing RAID mirroring, 150 Region setting (CallManager Administration), configuring, 60-61 reinstalling Subscribers, 126 release 4.0(1)feature list, 493 Ad Hoc conference party drop, 505 annunciator, 497 BAT enhancements, 512 call join, 502-503 cBarge, 503 Cisco CallManager Attendant Console enhancements, 514

conferencing infrastructure enhancements, 508 desktop video telephony, 498-501 DirTrfr, 506 display of configurable call forward information, 505-506 hunt group enhancements, 508-510 iDivert, 504-505 IPMA enhancements, 506-507 management and monitoring enhancements, 513 MCID. 510-511 MLA enhancements, 513 MLPP, 494-495 precedence calls to another network, 496 precedence calls within cluster, 496 multiple calls per line appearance, 502 privacy, 504 published API enhancements, 511-512 Q.SIG enhancements, 496-497 security enhancements, 514-515 Service URL, 505 SIP trunk signaling interface, 497-498 updated CDR fields, 404-406 codec values, 407 MLPP cause codes, 406 MLPP precedence values, 407 redirect reason codes, 408-409 video resolution values, 408 release 4.x MLA, enabling, 355 updates from previous release, 353-354 release notes, reading, 97-98 release timeline of CallManager components, 139 Remember the Last User Logged In parameter (Cisco Extension Mobility service), 343 Remote Desktop Client, downloading, 468 remote upgrades, VNC, 470-471 replication (SQL), troubleshooting, 133-134 reports (CAR), 424-425 utilization, 425-426 rerouting calls with AAR, 66, 68-69 resolving NetBIOS names with LMHOSTS file, 129-132 restarting services in CallManager Serviceability, 314

Restore Wizard (BARS), 126 restoring from BARS backups, 125 restricting access with AAA authentication, 439-440 RADIUS configuration, 440-442 TACACS+ configuration, 440 access with MLA. 362 CDR database entries, 395–396 Ethernet port access, 170-174 Layer 2 connectivity, 174-175 MAC addresses on switch ports, 169-170 RIS Data Collector service, 336-337 rollout plan, establishing, 27-32 RouteListExhausted alert, 482 router/switch configurations, backing up, 116 routers hardening, 165-167 syslog configuration, 449-451 routing protocol traffic, authenticating, 191-192 RTMT (Real-Time Monitoring Tool) alerts, 475 preconfigured, 477-482 recipients, selecting, 475 changes from previous releases, 474 Cisco Serviceability Reporter service, 483 configuring, 473 counters, setting threshold triggers, 482 custom reports Alert Log format, 485 Call Log format, 487-489 creating, 484 Device Log format, 489–490 Perfmon Log format, 490-491 Server Log format, 485 Service Log format, 486–487 Device Search feature, 483 media resources, monitoring, 475 polling interval, configuring, 476 trunk utilization, monitoring, 476 running Upgrade Assistant Utility, 145

## S

scheduling backups, 118 change freezes, 147-150 searching CDR SQL database, 417 second-day support centers, establishing, 33-34 Secure Remote Administration, hardening CallManager and voice application servers, 202-203 security, 7-8 802.1Q tunneling, disabling, 185 administrative control traffic, encrypting, 168 audits, performing, 364 AutoSecure feature (IOS routers), 166 broadcast storm control, disabling, 186 CoS settings, ignoring on CatOS devices, 174 DAI, enabling, 176-179 default native VLAN value, reassigning, 184 DHCP responses, limiting, 175 DHCP snooping, 176 DTP, disabling, 184 endpoint provisioning, 207 endpoint image authentication, 208 enrollment, 208-215 enhancements to release 4.0. 514-515 Ethernet port authentication, 170-174 HSRP, authenticating, 192–193 infrastructure security feature checklist, 164-165 interserver communication, facilitating with IPSec. 219 IP addresses, allocating, 190-191 Layer 2 connectivity, restricting, 174-175 control protocols, disabling, 179-185 MLA, 349 Access file, monitoring, 360 Access log files, monitoring, 356 application logs, 354 attempting configuration changes while Publisher is down, 355 CCMAdministrator account, tracing logins, 361-362

CCMAdministrator user account, 353 custom functional groups, creating, 357 custom user groups, creating, 358 functional groups, 349-352 overlapping permissions, managing, 359-360 privileges report, generating, 356 privileges, assigning to functional groups, 359 restricting access, 362 standard user groups, 350-352 super user, 349 trace logs, enabling, 355 updates from previous release, 353-354 user-specific accounts, creating, 357 network traffic, filtering, 187-190 on CallManager and voice application servers, hardening, 197-207 on IP Phones 802.1Q frames, dropping, 196 GARP, ignoring, 194-195 one-time passwords, implementing, 168 policies, creating, 161 Port Security, 169-170 routers, hardening, 165-167 routing protocol traffic, authenticating, 191-192 single points of failure, avoiding, 161-163 unauthorized web browser access, preventing, 363 voice traffic, prioritizing, 186–187 VTP, disabling, 183 X.509v3 certificates, 215 endpoint operation, 215-218 selecting AAA protocol, 437 backup servers, 117 CallManager upgrade version, 141 community strings, 460-461 devices, 21 memory requirements, 22 dial tones for OnNet and OffNet calls, 328 gateways for centralized CallManager architecture, 85-87 phone types, 23-24 RTMT alert recipients, 475 syslog message severity levels, 448 serialization delay, 56

Server Log format, 485 servers dedicates, 303 hardware vendor, selecting, 21-22 restoring, 125 Service Log format, 486–487 service releases. See also patches installing, 152-155 Service URL, 505 services, 303, 304-305 advanced, 316 B-Channels, removing from service for maintenance, 324-325 CallManager service collecting CDR data, 318 parameters, 319-322 Cisco CDR Insert, 338 Cisco Extended Functions, 339-340 Cisco Extension Mobility, 342 Cisco Serviceability Reporter, 340 Cisco Telephony Call Dispatcher, 335 clusterwide parameters, 316 CMI, 331-333 compartmentalizing, 203 CTIManager, 334 CTL Provider, 338-339 Database Layer Monitor, 338 dedicated servers, 303 dependencies, 301-302 enterprise parameters, 343-345 IP Manager Assistant, 341 IP Voice Media Streaming App, 333–334 MOH Audio Translator, 335-336 Default MOH Volume Level parameter, 336 optional recommendations for 500+ user systems, 305-306 recommendations for 1500+ user systems, 306-307 recommendations for 10.000+ user systems, 307-308 recommendations for 20,000+ user systems, 309-312 parameters changing, 316 checking for every server, 317

Speed Dial Await Further Digits, 323 Unknown Caller ID Text parameter, specifying, 322 restarting, 314 RIS Data Collector, 336–337 starting/stopping, 313 status, displaying, 312 TFTP, 328-331 WebDialer, 341 severity levels (syslog messages), selecting, 448 Show Ring Settings enterprise parameter, 345 Silence Suppression for Gateways parameter, 328 single points of failure, avoiding, 161, 163 single-domain AD forest, placing User Creation Base, 383 SIP trunk signaling interface (release 4.0(1)), 497-498 SMDI (simplified message desk interface), CMI service, 331-332 SNMP (Simple Network Management Protocol), 459-460 community strings, 460-461 traps, 462 ccmCallManagerFailed, 463 ccmGatewayFailed, 464 ccmGatewayLayer2Change, 464 ccmMaliciousCall, 465 ccmMediaResourceListExhausted, 464 ccmPhoneFailed, 463 ccmPhoneStatusUpdate, 463 ccmQualityReport, 465 ccmRouteListExhausted, 464 for CallManager Serviceability Alarm facility, 465 HP Insight Agents, 462-463 Speed Dial Await Further Digits parameter, 323 spreadsheets (Microsoft Excel), converting to UTC and IP addresses, 421-422 SOL database (CDR) exporting CDR data, 418-419 querying known CDR values, 417 replication, troubleshooting, 133-134 SRA (Serviceability Reports Archive), 466 SRST (Survivable Remote Site Telephony), 69, 112 configuring, 71-73 deploying, 73-76 PSTN calling during fallback, 82-84

user functionality, 70 voicemail during fallback, 78- staging servers, performing CallManager upgrades, 140, 146 staging servers, performing CallManager upgrades, 140.146 documentation, 150-151 moving system into production, 152 reestablishing RAID mirroring, 150 scheduling change freezes, 147-150 standard functional groups, 349 standard user groups, permissions, 350-352 starting services in CallManager Serviceability, 313 Statistics Enabled parameter, 322 Status Enquiry Poll Flag parameter, 319 storage media, labeling, 117 Strip G.729 Annex B from Capabilities parameter, 328 Subscriber Number Prefix parameter, 325 Subscribers, 111 backing up, 113-114 duplicating, 126 IIS, disabling, 363 reinstalling, 126 super user, 349 Suppress MOH to Conference Bridge parameter, 327 surviving WAN outages with SRST, 69-76 PSTN calling during fallback, 82-84 voicemail during fallback, 78-80 switches, hardening, 165-167 syslog, 445 analyzers, 457 CallManager Serviceability Alarm, 448 CiscoWorks syslog server, 454–456 cron, 456 Event Viewer, 457-458 facilities. 446 Linux-based server configuration, 451-454 message format, 447 message severity levels, 446-448 multiple server configuration, 456-457 router logging, configuring, 449-451 versus Event Viewer, 458 system performance, managing with service parameters, 320

### Τ

T301 Timer parameter, 320 T302 Timer parameter, 321 TACACS+ (Terminal Access Controller Access Control Server plus), configuring authentication, 440 TAPS (Tool for Auto-Registered Phones Support), 27 - 28Terminal Services, 468 security vulnerabilities, 469-470 TFTP (Trivial File Transfer Protocol) service, 328-331 dedicated servers, 329 third-party applications backup utilities, caveats when using, 121 CDR-related, 428 threats to security, 159 mitigating hardening routers and switches, 165-167 on CallManager and voice application servers. 197-207 on IOS/CatOS devices, 168 on Layer, 2, 169-190 on Layer 3, 190-193 single points of failure, 161-163 time stamps, converting Epoch time to humanreadable form, 419-420 time synchronization, enabling, 398-399 tool-based monitoring, 435 trace facility, managing file size, 467-468 tracing CCMAdministrator account logins, 361-362 enabling MLA log files, 355 tracking CAR statistics, 426 training curriculum creating, 24-26 for administrators, 26-28 traps ccmCallManagerFailed, 463 ccmGatewayFailed, 464 ccmGatewayLayer2Change, 464 ccmMaliciousCall, 465 ccmMediaResourceListExhausted, 464 ccmPhoneFailed, 463 ccmPhoneStatusUpdate, 463 ccmQualityReport, 465

ccmRouteListExhausted, 464 configuring, 462 for CallManager Serviceability Alarm Facility, 465 HP Insight Agents, 462–463 triggers, setting on performance counters, 482 troubleshooting SQL replication problems, 133–134 using CDR data, 394 WINS name resolution, 128 troubleshooting reports (CAR), 424–425 trunk utilization, monitoring with RTMT, 476

### U

unauthorized access as security threat, 159 to web browser, preventing, 363 Unknown Caller ID Text parameter, specifying, 322 unsuccessful calls, examples of generated CDRs, 416 unsupported administrative CallManager operations, 390 unsupported agents, caveats when using, 435 unsupported software, caveats when adding to CallManager servers, 103 updating LMHOSTS file, 100 Upgrade Assistant Utility, running, 145 upgrading CallManger maintenance releases, downloading, 144 media, obtaining, 143 preparing upgrade checklist, 142-143 running Upgrade Assistant Utility, 145 selecting appropriate version, 141 version compatibility with Windows OS, ensuring, 141-142 versus patching, 138-139 Windows OS upgrades, downloading, 144 with staging server, 140, 146 documentation, 150-151 moving system into production, 152 RAID-capable servers, 140 reestablishing RAID mirroring, 150 scheduling change freezes, 147-150 with VNC, 470-471 user accounts, CCMAdministrator user account, 353 user classes, 18 User Creation Base, 383–387 user groups, 349 creating custom groups in MLA, 358 overlapping privileges, managing, 359–360 user information packets, creating, 34 User object attributes, 372 User Search Base, 380 user training techniques, 25–26 for administrators, 26–28 user types, selecting appropriate phone types, 23–24 user-specific accounts, creating in MLA, 357 utilization reports, 425–426

# V

V3PN (Voice and Video Virtual Private Networking), 193–194 WAN deployment architecture, 48 VBR (variable bit rate), 46 verifying optimal NIC settings, 105-106 database synchronization, 105 power supply connections, 95 pre-installation network connectivity, 95 virus protection software adding to new CallManager installations, 107 hardening CallManager and voice application servers, 200 VNC. 470-471 VNC over SSH, 202-203 voice mail diverting calls to, 504-505 during WAN failure using SRST, 78-80 voice traffic, prioritizing, 186-187 VTP (VLAN Trunking Protocol), disabling, 183

# W-X-Y-Z

WANs deployment architectures ATM, 46-47 Frame Relay, 45 leased lines, 43-45 MPLS, 47-48 V3PN, 48 QoS bandwidth consumption, adjusting, 58-59 jitter, reducing, 56-57 latency, minimizing, 49-55 **SRST**, 69 configuring, 71-73 deploying, 73-76 PSTN calling during fallback, 82-84 user functionality, 70 voice mail during fallback, 78-80 web browsers password lists, 363 unauthorized access, preventing, 363 WebDialer service, 341 Windows domains, avoiding CallManager server participation,100 Windows Event Viewer, 457-458 Windows 9.x OS ensuring compatibility with CallManager upgrade, 141-142 service releases, installing, 152-155 update master file, reading, 152 upgrades, downloading, 144 WINS (Windows Internet Naming Service) addresses, configuring, 129 name resolution, troubleshooting, 128 X.509v3 certificates, 215 endpoint operation, 215-216, 218