Index

A
Access layer, 174
Adjacency(ies), 23-25
   Level 1 and Level 2, 76-77
      three-way handshake to establish, 72-74
Administrative Group (Color) sub-TLV, 234
Advertisement methods, 26-28
Advertising link states, 28-30
AFI, 15, 16
Aggregation, 146. See also Summarization
Aggregation layer, 175
Aging information out of link state network, 131-133
Algo-60, 30
American National Standards Institute (ANSI), 7
AppleTalk, 2
Application specific integrated circuit (ASIC), 226
Area, 21-22
   in OSI addressing, 17, 23-26
Area address(es), 70-71
   in hello packets, 72
Area Addresses TLV, 80-81, 101-102
Area partition repair advertisement, 103
area-password command, 84
Asynchronous Transfer Mode (ATM), 133
Attached bit, 151, 152
   translation into IP routing, 154
ATT (Attached Bits) field (LSP), 98
Authentication Information TLV, 83-85, 104, 109, 110
Authority Format Identifier (AFI), 15, 16
Automatic deaggregation, 188
Autonomous System (AS), 165-168

B
Bachman, Charlie, 3-4
Backdoor links, 241-243
Backlink (two-way connectivity) check, 36-38
Bandwidth
   constrained SPF and, 237
   RSVP to reserve, 231
   spatial, 244-245
"Basic Reference Model for Open Systems Interconnection, The," 5-6
Bellman-Ford algorithm, 27
Best (shortest) path, 30-36, 152. See also SPF algorithm
BGP. See Border Gateway Protocol (BGP)
Bidirectional communication, 36-38
Black holes, routing, 185-188, 205-207
Blocking, LSP, 135-136
Bolt, Beranek, and Newman (BBN), 3, 4
Border Gateway Protocol (BGP), ix, 165-168, 214
   interacting with, through overload bit, 99-101
### Index

British Standards Institution (BSI), 4, 7

**Broadcast network(s)**
- DIS on, 88
- flooding on, 124, 125-130
- Intermediate System Neighbors field operation on, 81-82
- IS-IS routers on, 87-88
- LAN ID/Circuit ID field operation on, 80
- pseudonodes on, 87-95
  - DIS, 91-93
  - pseudonode link state packet, 88-90, 94-95

**C**
- Canepa, Mike, 3-4
- CCITT, 5-6
- Checksum field (LSP), 98
- Checksums
  - Fletcher, 98, 241
  - packet, 240-241
- Circuit identifiers in LSPs, 95
- Cisco IOS Software
  - area address on, 81
  - backdoor links on, 243
  - clear text password neighbor authentication on, 84-85
  - dynamic hostnames on, 240
  - external bit set on, 115
  - flooding interval on, 190
  - hello interval on, 79, 191-192
  - hello packet transmission on, 77
  - intermediate system priority on, 91
  - link state packet generation on, 197
- LSP blocking on, 135-136
- LSP error handling on, 133
- mesh groups on, 136
- overload bit on, 99, 101
- packet pacing on, 198
- partial route calculation on, 196-197
- passive interfacing on, 210
- Remaining Lifetime field on, 137
- route leaking on, 168-171
- routing and BGP information on, 167
- SPF interval on, 194-196
- three-way handshaking on, 74
- wide metrics on, 120
- Cisco router, summary on, 184-185
- Code field, 67
- Common packet header, 68-71
- Complete Sequence Number Packets (CSNPs), 62, 125, 127
  - for database exchange, 107-109
  - for neighbor synchronization, 121-123
- Components, 146
- Connectionless-Mode Network Service (CLNS), 9
  - partition repair system and, 160
  - router’s view of, 21-23
- Connectionless Network Protocol (CLNP), 8-9
- Connection-Oriented Network Protocol (CONP), 10
- Connection-Oriented Network Service (CONS), 10
- Constrained SPF, traffic engineering and, 235-237
- Consultative Committee on International Telegraphy and Telephone (CCITT), 5-6
- Control plane function, 226
- Convergence, 13
  - fast, 253-254
- Core layer, network, 173-175
- Corrupted LSPs, 125, 132-133, 138, 189
- CSNPs. See Complete Sequence Number Packets (CSNPs)

**D**
- Databases, exchanging, 95-123
  - Complete Sequence Number Packets (CSNPs) for, 107-109
Level 1 and Level 2 link state packets for, 96-107
link state fragmentation, 110-113
metrics in, 98, 103, 113-120
default, 113, 114, 117-118
delay, 113
error, 113
expense, 113, 117-119
internal and external, 114-116
preference, 115, 117
traffic engineering with, 116-119
wide, 119-120
Partial Sequence Number packets (PSNPs) for, 109-110
Data center, 208-212
Data link address, 66
Data link layer headers, 62
Data types, 67
Deaggregation, automatic, 188
DECnet, 3
Default metrics, 113, 114, 117-118, 152
Delay metric, 113
Demilitarized Zone (DMZ), 203
reachability to, 214
Denial of service attack, 13, 14, 132
Deploying IS-IS networks, 173-223
case study of, 200-222
connecting to lab network, 214-216
connections to outside, 212-214
data center, 208-212
division issue, 201-203
final design, 216
remote sites, 203-208
sample configurations, 216-222
domains, 173-181
border considerations, 180-181
Level 2-only core, 177-178
network in one routing domain, 175-177
overlapping, 178-179
hierarchical network design, 173-175
multiple net statements, 198-200
summarization of IP prefixes, 181-188
calculating, 182-184
routing black holes and, 185-188, 205-207
timer tuning, 188-198
Hello and Hold intervals, 191-193
IS-IS flooding timers, 189-191
link state packet generation, 197-198
link state packet interval, 198
shortest path first interval, 193-197
Designated intermediate system (DIS), 91-93
on broadcast network, 88
deterministic, 93
functions of, 88
preemptive, 93
priority in electing, 80
Destination stripping, 244-245
Deterministic DIS election, 93
Device, 8
Device packet processing, 64-66
Diffusing Update Algorithm (DUAL), 27
Digital Equipment Corporation, 11
Dijkstra, Edsger W., 30
Dijkstra SPF algorithm, 30-36
in C, 45-55
in pseudocode, 44-45
Distance-vector protocol, 27, 193
Distribution layer, 174
DMZ, 203, 214
DoD four-layer network model, 3, 4-5, 144
Domain(s), 14, 23-26, 141-172, 173-181
border considerations, 147-150, 180-181
defined, 11, 141, 145-146
flooding control with, 144, 147
IP destination handling in, 146
Level 1, 145-146
Domain(s) (continued)
direct connection of, 154-156
next hop reachability and, 165-
171
redundant connections between
Level 2 domain and, 186-187
suboptimal routing and, 163-
165
Level 2, 145-146, 176, 177-178
redundant connections between
Level 1 domain and, 186-187
Level 2-only core, 177-178
network in one routing domain,
175-177
overlapping, 178-179
properties of, 147-150
registering, 16
routing from Level 1 to Level 2,
150-154
as stubs, 152-153, 163
Domain partitions, 180
  Level 1, 158-162
    avoidance, 161-162
    IP routing and, 160-161
  Level 2, 156-158
domain-password command, 84
Domain sizes, 180
Domain Specific Part (DSP), 14
Double-link failures, 180
Downtime, 253
draft-ietf-isis-3way, 73
draft-ietf-isis-ext-lsp-frags, 266
draft-ietf-isis-hmac, 84
draft-ietf-isis-traffic, 170
DUAL, 27
Dynamic hostnames, 239-240
Dynamic Hostname TLV, type 137,
240

End LSP ID field (CSNP), 108
End System (ES), 8
End System Neighbor TLV, 103-104
End System to Intermediate System
protocol (ES-IS), 10
Enhanced Interior Gateway Routing
Protocol (EIGRP), ix, 27, 193
Enhancements, IS-IS, 239-268
backdoor links, 241-243
dynamic hostnames, 239-240
incremental SPF, 262-266
LSP fragments over 256, 266-268
multi-topology routing, 258-262
nonstop forwarding (NSF), 253-
256
packet checksums, 240-241
Redundant Packet Ring (RPR),
243-253
fast failover capability, 245-246
ring wrap, 251-253
spatial bandwidth utilization
along, 144-145
spatial reuse, 246-251
routing IPv6, 256-258
Error metric, 113
Expense metric, 113, 117-119
Extended IP Reachability TLV, 170,
232-233
Extended IS Reachability TLV, 233-
235, 236
Extended system identifier, 266-267
Extended Unique Identifier (EUI), 17
"Extending the Number of IS-IS LSP
Fragments Beyond the 256
Limit," 266
External metric, 114-116
External Reachability TLV, 170

Failover, fast, 245-246
Fast convergence, 253-254
Fast failover capability, 245-246
File Transfer Protocol (FTP), 83
Fixed field (fixed-length) coding, 68
Fletcher Checksum, 98, 241
Flooding, 29-30, 37, 123-138
  aging information out, 131-133
along parallel links, 210
blocking/constraining, 142-145, 147. See also Domain(s)
on broadcast network, 124, 125-130
defined, 124
full-mesh networks and, 133-136
LSP blocking, 135-136
mesh groups, 136, 210
link state fragments and, 112-113
periodic, 136-138
on point-to-point links, 130-131
routing information holding and, 193-194
rules of, 124-125
Flooding diameters, 180
Flooding storms, 132
Flooding times, IS-IS, 189-191
Forwarding, nonstop (NSF), 253-256
Fragmentation, link state, 43-44, 110-113, 128-130
Fragment numbers, 128-130, 266
FTP, 83
Full-mesh networks, 133-136
LSP blocking, 135-136
mesh groups, 136, 210
Holding Time field, 78-80
identifier transmitted in, 72
IPv6 routing and, 256-257
LAN ID/Circuit ID field, 80
Priority field, 80
Reserved/Circuit Type field, 76-78
Source ID field, 78
variable length fields, 80-86
over virtual link, 160
Hierarchical network design, 173-175
High Order-Domain Specific Part (HO-DSP), 16-17, 23
Historical perspective, 2-26
DoD network model, 3, 4-5
Internet development, 11-14
OSI addressing, 14-23
alternate method of viewing, 19-20
area in, 17, 23-26
Authority Format Identifier (AFI), 15, 16
hierarchical organization of, 14
High Order-Domain Specific Part (HO-DSP), 16-17, 23
Initial Domain Identifier (IDI), 15-16, 23
Network Service Access Point (NSAP) selector, 17-19
router’s view of, 21-23
system identifier (ID), 17
OSI protocols, 8-11
Connectionless Network Protocol (CLNP), 8-9
Connection-Oriented Network Protocol (CONP), 90
End System to Intermediate System protocol (ES-IS), 10
Intermediate System to Intermediate System protocol (IS-IS), 10-11
OSI seven-layer model, 4-6
Holding Time field (hello packet), 78-80
Hold intervals, 191-193
Honeywell, 3-4

G
Glossary, 285-291
Government Open Systems Interconnection Profile (GOSIP), 12

H
Handshake
three-way, 72-74
two-way, 73
HDSA, 4
Header Length field (common packet header), 69
Hello intervals, 191-193
Hello packets, 61, 71-72, 75-86
authentication parameters for, 85
fast, 192
Index

Honeywell Distributed Systems Architecture (HDSA), 4
Hostnames, dynamic, 239-240
Hosts, 8

I
ID Length field (common packet header), 70
ignore-lsp-errors command, 133
Incremental SPF, 262-266
Infinite hippety cost bit, 99
Information hiding, 144-145, 150. See also Summarization suboptimal routing and, 164
Initial Domain Identifier (IDI), 15-16, 23
Initial Domain Part (IDP), 14. See also Domain(s)
Integrated (Dual) IS-IS, 13
Inter-area (Level 2) routing, 24, 25
Inter-domain routing, 24
Inter-Domain Routing Information TLV, 106-107
Interface Ipv4 Address sub-TLV, 234-235
Interfaces, passive, 210
Intermediate system (IS)
adjacencies formed by, 24 defined, 8
latency through, 174
removing from network, 99
Intermediate System Neighbors TLV, 81-82, 102-103
Intermediate System to Intermediate System protocol (IS-IS), 10-11
Internal metric, 114-116
Internal Reachability TLV, 170
International Organization for Standardization. See ISO
International Telecommunications Union, Technical Sector (ITU-T), 5
Internet development, 11-14
Internet Protocol (IP), 3, 62
Internet Service Providers (ISPs), 1
Internetwork Packet eXchange (IPX), 2
Intra-area (Level 1) routing, 24, 25
IP address summarization. See Summarization
IP destination handling, 146
IP External Reachability Information TLV, 105-106, 114-116
IP External Reachability TLV, 170
IP Interface Address TLV, 85-86, 104
IP Internal Reachability Information TLV, 104-105, 106, 114-116
IP Internal Reachability TLV, 170
IP routing, Level 1 partitions and, 160-161
IP summarization. See Summarization
IPv6, 256-258
IPv6 Interface Address TLV, 257
IPv6 Reachability TLV, 257-258
IS Alias ID TLV, 267-268
isis circuit-type command, 77
"IS-IS Cryptographic Authentication," 84
"IS-IS Extensions for Traffic Engineering" draft, 170
isis hello-interval command, 79, 191-192
isis hello-multiplier command, 79, 192
isis lsp-interval command, 198
isis mesh-group blocked command, 135
isis mesh-group command, 136
isis metric command, 120
isis priority command, 91
isis three-way handshake command, 74
IS-IS Working Group of the Internet Engineering Task Force (IETF), 12-13
ISO, 3, 4, 7
ISO seven-layer model, 144
ISO Standard 8208, 10
ISO Standard 8473.1, 8
ISO Standard 8878, 10
ISO Standard 9542, 10
ISO Standard 10589, 10, 73, 102, 107, 117, 133, 159, 160
ISO Technical Committee 97, Subcommittee 16, 4, 5
ISO/TR 9577, 85
IS Type field (LSP), 99-101
is-type level-1-2 backdoor command, 243
ITU-T, 5
Japanese Industrial Standards Committee, 7
Kraus, Bruce, 8

Labels. See MultiProtocol Label Switching (MPLS)
Label tunnels for virtual private networks, 228-230
Lab networks, connecting to, 214-216
LAN ID/Circuit ID field (hello packet), 80
Latency through IS, 174
Layer 2 address, 63-64
Layer 2 headers, 62
Layer three switches, 8, 226
Level 1 adjacencies, 76-77
Level 1 and Level 2 link state packets, 96-107
Level 1/Level 2 (overlapping) routing domains, 178-179
Level 1 LSPs, 61
Level 1 routing domain, 145-146, 177
direct connection of, 154-156
next hop reachability and, 165-171
redundant connections between
Level 2 domain and, 186-187
routing to Level 2 from, 150-152
suboptimal routing and, 163-165
Level 1 routing domain partitions, 158-162
avoidance, 161-162
IP routing and, 160-161
Level 1 routing (intra-area routing), 24, 25
Level 2 adjacencies, 76-77
Level 2 LSPs, 61
Level 2 routing domain, 145-146, 176, 177-178
redundant connections between
level 1 domain and, 186-187
routing Level 1 to, 150-152
Level 2 routing domain partitions, 156-158
Level 2 routing (inter-area routing), 24, 25
Levels, router, 23-26
Lightweight protocol, 9
Link failure
in RPR ring, 251-252
suboptimal routing on, 205-207
Links
backdoor, 241-243
parallel, 210
RSVP to reserve bandwidth on, 231
Link state fragmentation, 43-44, 110-113, 128-130
Link state information included in system IDs, 239-240
Link state network, aging information out of, 131
Link state packet interval, 198
Link state packet number (link state packet fragment), 97
Link state packets (LSPs), 29
authentication parameters for, 84-85
circuit identifiers in, 95
corrupted, 125, 132-133, 138, 189
Index

Link state packets (LSPs) (continued)
fragmentation, 43-44
fragments over 256, 266-268
generation of, 197-198
Level 1, 61
Level 2, 61
remaining lifetime field in, 137
self-originated, 189
sequence number packets (SNPs), 85
to synchronize database on
neighbor discovery, 120-123
Link state protocols, 26-58, 193
advertising link states, 28-30
best path computation, 30-36
blocking of, 135-136
Level 1 and Level 2, 96-107
multiple equal cost links, 38-44
pseudonode, 88-90, 94-95
two-way connectivity (backlink)
check, 36-38
Load sharing, 231
LSP Entries TLV, 109-110, 127
lsp-gen-interval command, 197
LSP ID field (LSP), 96-97
lsp-refresh-interval command, 137, 190
between L1 and L2 domains, 186-187
Message Digest (version) 5 (MD5)
algorithm, 83
Metrics, 98, 103, 113-120, 264
default, 113, 114, 117-118, 152
delay, 113
error, 113
expense, 113, 117-119
internal and external, 114-116
preference, 115, 117
traffic engineering with, 116-119
wide, 119-120
metric-style wide command, 120
metric-type external option, 115
Minimum LSP Transmission Interval, 124
MTUs, 44, 82-83
Multicast, 64-66
MultiProtocol Label Switching
(MPLS), 119, 225-238
addition to IS-IS, 231-235
Extended IP Reachability TLV,
170, 232-233
Extended IS Reachability TLV,
233-235, 236
Router ID TLV, 231-232
capabilities of, 225-231
faster packet switching, 226
traffic engineering, 230-231
tunneling packets, 226-228
virtual private networks (VPNs),
228-230
traffic engineering and constrained
SPF, 235-237
Multi-topology routing, 258-262
Multi-topology TLV, 259-262
N
Neighbor discovery, 71-86
hello packets, 61, 71-72, 75-86
authentication parameters for,
85
fast, 192
MAC address, 17
DIS election and, 91
in hello packets, 72
Maximum Area Addresses field
(common packet header), 70-71, 81
Maximum Link Bandwidth sub-TLV, 235
Maximum Transmission Units
(MTUs), 44, 82-83
max-lsp-lifetime command, 137, 190
Mesh groups, 136, 210
Meshing (redundant connections),
133-136
5288_index  Page 300  Tuesday, September 10, 2002  4:05 PM
Holding Time field, 78-80
identifier transmitted in, 72
IPv6 routing and, 256-257
LAN ID/Circuit ID field, 80
Priority field, 80
Reserved/Circuit Type field, 76-78
Source ID field, 78
variable length fields, 80-86
over virtual link, 160
ring wraps and, 252
synchronizing database on, 120-123
three-way handshake, 72-74
Neighbor IPv4 Address sub-TLV, 235
Neighbor relationships, 87-95
designated intermediate system (DIS), 91-93
pseudonode link state packet, 88-90, 94-95
NET, 19
net commands, multiple, 198-200
Network Entity Title (NET) address, 14
Network Service Access Point (NSAP), 14, 17-19
Next hop reachability, 175-176
Level 1 routing domain and, 165-171
Node, 8
Nonstop forwarding (NSF), 253-256
N selector, 21-22

Open Shortest Path First (OSPF), ix, 3, 62-63
Open Systems Interconnection. See OSI
Operation, 61-139
exchanging databases, 95-123
Complete Sequence Number Packets (CSNPs) for, 107-109
Level 1 and Level 2 link state packets for, 96-107
link state fragmentation, 110-113
metrics in, 98, 103, 113-120
Partial Sequence Number packets (PSNPs) for, 109-110
neighbor discovery, 71-86
hello packets, 61, 71-72, 75-86
ring wraps and, 252
synchronizing database on, 120-123
three-way handshake, 72-74
neighbor relationships and pseudonodes on broadcast networks, 87-95
designated intermediate system (DIS), 91-93
pseudonode link state packet, 88-90, 94-95
packet encapsulation, 62-71
commom packet header, 68-71
Type-Length-Value (TLV) data structures, 66-68
packet format, 61-62
synchronizing, 120-123
Optimal routing for remote sites, 207-208
Optional Checksum TLV, type 12, 241
Organizational unit identifier, 17
Originating LSP Buffer Size TLV, 102, 112
OSI, ix, 3
OSI addressing, 14-23
alternate method of viewing, 19-20
area in, 17, 23-26
Authority Format Identifier (AFI), 15, 16
hierarchical organization of, 14
High Order-Domain Specific Part (HO-DSP), 16-17, 23
Initial Domain Identifier (IDI), 15-16, 23
Network Service Access Point (NSAP) selector, 14, 17-19
router’s view of, 21-23
system identifier (ID), 17
OSI protocols, 8-11
  Connectionless Network Protocol (CLNP), 8-9
  Connection-Oriented Network Protocol (CONP), 10
  End System to Intermediate System protocol (ES-IS), 10
  Intermediate System to Intermediate System protocol (IS-IS), 10-11
OSI seven-layer model, 4-6
OSPF, ix, 3, 62-63
Overlapping routing domains, 176-179
Overload bit, 259
Overload Indicator (LSPDBOL) field (LSP), 98-101

P
Packet checksums, 240-241
Packet encapsulation, 62-71
  common packet header, 68-71
  Type-Length-Value (TLV) data structures, 66-68
Packet format, 61-62
Packet Length field (CSNP), 107, 108
Packet Length field (LSP), 96, 97
Packets, out of order, 165
Packet switching, See also Routing
  MPLS and, 226
  types of, 23-24
Packet Type field (common packet header), 70
Packet Type field (hello packet), 75
Padding TLV, 82-83
Parallel links, 210
Partial route calculation (PRC) timers, 196
Partial Sequence Number packets (PSNPs), 62, 109-110
Partition avoidance, 161-162
Partition Designated Level 2 Intermediate System, 159
Partition repair intermediate system, 159, 160
  passive-interface command, 120
Passive interfaces, 210
Passwords, plain text, 83-85
PATH list, 31, 90
Per flow load sharing, 165
Periodic flooding, 136-138
Perlman, Radia, 11
Per-packet load sharing, 165
Physical destination (layer 2) address, 63-64
Plain text passwords, 83-85
Point-to-point links
  circuit type field operation on, 78
  database exchange of information over, 120-121
  flooding on, 130-131
  LAN ID/Circuit ID field operation on, 80
  three-way handshake on, 72-74
  two-way handshake on, 73
prc-interval command, 196-197
PRC timers, 196
Preemptive DIS election, 93
Prefix Neighbor TLV, 104, 105
Prefix summarization. See
  Summarization
Priority field (hello packet), 80
Priority of IS, DIS election and, 91
Protocol identifier, 18
Protocol Identifier field (common packet header), 69
Protocols Supported TLV, 85, 86, 104
Pseudonode identifier, 97
Pseudonodes
  on broadcast networks, 87-95
  designated intermediate system (DIS), 91-93
  pseudonode link state packet, 88-90, 94-95
SPF algorithm and, 89, 90-91
PSNPs, 62, 109-110
Q
QoS Maintenance field, 116, 118

R
Reachability, 26
  to DMZ, 214
  Level 1 partition and, 161
  next hop, 165-171
Reachability information, 13, 155-156
Redundant connections (meshing), 133-136
  between L1 and L2 domains, 186-187
Redundant Packet Ring (RPR), 243-253
  fast failover capability, 245-246
  ring wrap, 251-253
  spatial bandwidth utilization along, 144-145
  spatial reuse, 246-251
  broadcast mode, 247
  broadcast outside, point-to-point inside, 247-250
  point-to-point outside, point-to-point inside, 250-251
Registered Private Operating Authorities, 7
Remaining Lifetime field, 96, 97, 137
Remote sites, 203-208
  optimal routing, 207-208
  routing domain, 208
  summarization, 203-207
Reservable Link Bandwidth sub-TLV, 235
Reserved/Circuit Type field (hello packet), 76-78
Reserved field (common packet header), 70
Resource reservation protocol (RSVP), 119, 231
Restarting TLV, 255
RFC 1195, 86, 105-106
RFC 2763, 240
RFC 2966, 115, 170
Ring wrap, 251-253
Route leaking, 168-171, 176
  remote site optimal routing using, 207
Router(s), 8
  adjacencies formed by, 24
  view of CLNS addresses, 21-23
Router ID TLV, 231-232
Routes, static, 168
Routing
  multi-topology, 258-262
  optimal, for remote sites, 207-208
  suboptimal, 156, 168
  Level 1 domain and, 163-165
  on link failure, 205-207
Routing black holes, 185-188, 205-207
Routing domains. See Domain(s);
  Level 1 routing domain; Level 2 routing domain; Overlapping routing domains
Routing Information Protocol (RIP), 12, 27, 64-66, 193
Routing loops, 156
Routing protocols, ix
Routing table, 27
RSVP, 119, 231

S
Scalability
  of IS-IS, 13
  very fast hellos and, 192-193
Security of IS-IS, 13
Self-originated LSP, 189
Send Routing Message (SRM) flag, 124, 125, 128
Send Sequence Numbers (SSN) flag, 124
Sequence Number field (LSP), 98
Sequence Number Packets (SNPs), 85, 131
  to synchronize database on neighbor discovery, 120-123
Serialization delay, 143
set-overload-bit command, 99, 101
Shand, Mike, 11
Shortest (best) path, 30-36, 152. See also Shortest Path First (SPF); Shortest Path First (SPF) algorithm
Shortest path first interval, 193-197
Shortest Path First (SPF), 30-36
  constrained, 235-237
  incremental, 262-266
Shortest Path First (SPF) algorithm, 112
  in C, 45-55
  multiple equal cost links handling in, 38-44
  partial calculation, 55-58
  in pseudocode, 44-45
  pseudonodes and, 89, 90-91
  with two-way connectivity check, 36-38
show clns neighbor command, 240
show ip bgp command, 167
show ip route command, 167, 169-170
show isis database router.00-00 level-2 detail command, 115
show isis spf-log command, 195
Single-link failure, 180
Single link flap, 44
Source ID field (CSNP), 108
Source ID field (hello packet), 78
Spatial bandwidth utilization along RPR, 244-245
Spatial reuse, 246-251
  broadcast mode, 247
  broadcast outside, point-to-point inside, 247-250
  point-to-point outside, point-to-point inside, 250-251
SPF algorithm. See Shortest Path First (SPF) algorithm
spf-interval command, 194-196
SPF runs, 194
SRM flag, 124, 125, 128
SSN flag, 124
Stability, flooding limits and, 144
Start LSP ID field (CSNP), 108
Static routes, 168
Steady state, 100
Stub domain, 152-153
Stubs, domains as, 152-153, 163
Suboptimal routing, 156, 168
  Level 1 domain and, 163-165
  on link failure, 205-207
Summarization, 146, 161, 162, 175, 181-188
  calculating, 182-184
  on Cisco router, 184-185
  domain border placement and, 180
  for remote sites, 203-207
  routing black holes and, 185-188, 205-207
summary-address command, 184
System identifier (ID), 17, 21-22
  extended, 266-267
  included in link state information, 239-240

T
TCP/IP, ix, 3, 4-5, 11-12
Tentative (TENT) list, 31, 90
Three-layer network model, 173-174
Three-way handshake, 72-74
Timers, 124, 137
Timer tuning, 188-198
  Hello and Hold intervals, 191-193
  IS-IS flooding timers, 189-191
  link state packet generation, 197-198
  link state packet interval, 198
  shortest path first interval, 193-197
TLV. See Type-Length-Value (TLV) data structures
Topology(ies)
  domain border placement and, 180
  multiple overlaying, 258-262
  Topology information hiding, 144
Traffic engineering, 230-231, 234-235
  constrained SPF and, 235-237
  with metrics, 116-119
Traffic Engineering Default Metric sub-TLV, 235
Traffic flow, 227-228
  domain border placement and, 180-181
  transition keyword option, 120
Transmission Control Protocol/Internet Protocol (TCP/IP), ix, 3, 4-5, 11-12
Tunneling packets, 226-228
Two-tier network model, 174-175
Two-way connectivity (backlink) check, 36-38
Type-Length-Value (TLV) data structures, 13, 66-68
  Area Addresses, 80-81, 101-102
  Authentication Information, 83-85, 104, 109, 110
  Dynamic Hostname, type 137, 240
  End System Neighbor, 103-104
  Extended IP Reachability, 170, 232-233
  Extended IS Reachability, 233-235, 236
  Inter-Domain Routing Information, 106-107
  Intermediate System Neighbors, 81-82, 102-103
  IP External Reachability, 170
  IP External Reachability Information, 105-106, 114-116
  IP Interface Address, 85-86, 104
  IP Internal Reachability, 170
  IP Internal Reachability Information, 104-105, 106, 114-116
  IPv6 Interface Address, 257
  IPv6 Reachability, 257-258
  IS Alias ID, 267-268
  LSP Entries, 109-110, 127
  multi-topology, 259-262
  Optional Checksum, type 12, 241
  Originating LSP Buffer Size, 102, 112
  Padding, 82-83
  Prefix Neighbor, 104, 105
  Protocols Supported, 85, 86, 104
  restarting, 255
  Router ID, 231-232
U
  Unreserved Link Bandwidth sub-TLV, 235
  Up/down bit, 170-171, 242-243
  “Use of OSI IS-IS for Routing in TCP/IP and Dual Environments,” 12, 13
V
  Variable length fields
    in CSNP, 108-109
    in hello packets, 80-86
    in LSP, 101-107
  Version field (common packet header), 70
  VINES Internet Protocols (VIP), 2
  Virtual link, hello packets over, 160
  Virtual private networks (VPNs), 228-230
W
  Weight of protocols, 9
  Wide metrics, 119-120
  Workstations, 8
X
  X.400 specification, 6
  Xerox Network System (XNS), 2, 3
Z
  Zero Age Lifetime, 132
  Zero cost links, 88, 90
YOUR GUIDE TO IT REFERENCE

Articles

Keep your edge with thousands of free articles, in-depth features, interviews, and IT reference recommendations – all written by experts you know and trust.

Online Books

Answers in an instant from InformIT Online Book’s 600+ fully searchable online books. For a limited time, you can get your first 14 days free.

Catalog

Review online sample chapters, author biographies and customer rankings and choose exactly the right book from a selection of over 5,000 titles.

www.informit.com
Wouldn’t it be great if the world’s leading technical publishers joined forces to deliver their best tech books in a common digital reference platform?

They have. Introducing InformIT Online Books powered by Safari.

- Specific answers to specific questions. InformIT Online Books’ powerful search engine gives you relevance-ranked results in a matter of seconds.

- Immediate results. With InformIT Online Books, you can select the book you want and view the chapter or section you need immediately.

- Cut, paste and annotate. Paste code to save time and eliminate typographical errors. Make notes on the material you find useful and choose whether or not to share them with your work group.

- Customized for your enterprise. Customize a library for you, your department or your entire organization. You only pay for what you need.

Get your first 14 days FREE! For a limited time, InformIT Online Books is offering its members a 10 book subscription risk-free for 14 days. Visit http://www.informit.com/onlinebooks for details.
If you are interested in writing a book or reviewing manuscripts prior to publication, please write to us at:

Editorial Department
Addison-Wesley Professional
75 Arlington Street, Suite 300
Boston, MA 02116 USA
Email: AWPro@aw.com

Visit us on the Web: http://www.awprofessional.com

You may be eligible to receive:

• Advance notice of forthcoming editions of the book
• Related book recommendations
• Chapter excerpts and supplements of forthcoming titles
• Information about special contests and promotions throughout the year
• Notices and reminders about author appearances, tradeshows, and online chats with special guests

Register
Your Book
at www.awprofessional.com/register

Contact us