

# Index

- AAL type 1 (AAL1) 105, 204, 207
- AAL type 2 (AAL2) 107, 204
- AAL type 3/4 (AAL3/4) 107, 204
- AAL type 5 (AAL5) 104, 107, 108, 204, 208, 219, 240
- Access network 28, 48, 83, 152, 160, 263, 331
- Address resolution protocol (ARP) 132
- Advanced Research Project Agency Network (ARPANET) 48
- Antenna gain 67, 192
- Application layer 9, 10, 24, 27, 48, 138, 149, 152, 231, 262, 332
- Argument of perigee 61, 63
- Asymmetrical code 232
- Asynchronous transfer model (ATM) 18, 24–6, 52, 97, 188
- ATM adaptation layers (AAL) 25, 97, 98, 104, 203, 219
- ATM addressing 117
- ATM cell 25, 97, 98, 100, 101, 111, 119, 120, 124, 191, 193, 194, 197, 203, 205, 207, 301, 322
- ATM cell transmissions 110
- ATM layer 25, 98, 101, 138, 198, 203, 205
- ATM on-board switch 198
- ATM performance 203, 204, 210
- ATM protocol stack 98, 101
- ATM signalling 117, 139
- ATM switch 101, 102, 115, 119, 120–2, 124, 139, 189, 196, 216, 228, 315
- Authentication header (AH) 234
- Availability 93, 94
- Azimuth angle 68
- Bandwidth resource management 194
- Basic rate interface (BRI) 173
- Beam-width angle 67
- Best effort service (BES) 22, 27, 128, 213, 243, 251, 256
- Binary phase shift keying (BPSK) 73
- Bit-error rate (BER) 10, 43, 45, 75, 76, 81, 82, 84, 179, 192, 205, 230, 234, 265, 273, 275
- Bridge 37
- Broadband ISDN (B-ISDN) 24, 25, 48, 52, 153, 203
- Broadcast network 28
- C band 31, 32, 33, 192
- Cascading TCP 262, 278, 279
- Cell delay variation (CDV) 106, 120, 123, 205, 206
- Cell delay variation tolerance (CDVT) 120
- Cell error ratio (CER) 120, 204
- Cell loss priority (CLP) 103, 119, 121, 122, 196
- Cell loss ratio (CLR) 120, 122, 195, 204, 205, 207

- Cell transfer delay (CTD) 120, 122, 205
- Channel capacity 34, 35, 46, 227, 265
- Circuit switching 11, 17, 18, 19, 162, 199, 200
- Classical IP over ATM 138, 141, 142–3
- Classless inter domain routing (CIDR) 130
- Code division multiple access (CDMA) 81, 84
- Coding gain 16, 81, 208, 209
- Concatenated code 79
- Conditional access (CA) 44, 238, 240, 241
- Congestion avoidance 136, 137, 261, 265, 266, 268, 271, 272, 273, 276–7
- Congestion control 23, 122, 133, 136, 190, 196, 230, 261, 265, 266, 270, 274, 275, 276, 285
- Connection admission control (CAC) 119, 122, 195
- Connection-oriented approach 17
- Connection set up 12, 18, 121, 135, 141, 142, 267, 268, 270
- Connectionless approach 18, 19
- Content distribution 10
- Controlled load services (CLS) 251, 298
- Convergence sublayer (CS) 98, 104, 208
- Conversational services 7, 230
- Convolutional code 45, 77, 79, 209
- Coverage 34, 66, 67, 89, 91, 163, 215, 220
- Cyclic code 77, 78
  
- Demand assignment 85
- Differentiated services (Diffserv) 247, 251, 316, 321
- Digital signal (DS) 13, 15, 19, 37, 75, 146, 164, 172
- Digital signal level 1 (DS1) 112
- Digital signal processing (DSP) 4, 29, 302
- Digital video broadcasting (DVB) 42, 43, 214, 236
- Digital video broadcasting via satellite (DVB-S) 43, 214, 236
- Distribution services 7
- Diversity 93
- Domain name system (DNS) 10
  
- DS1 15, 112, 113
- DS2 15
- DS3 15, 114
- DS4 15
- DVB over satellite 213, 236, 238
- DVB security 239, 243
- DVB-RCS security 47, 213, 216, 217, 219, 238, 240, 241, 242
- DVB-S with return channel via satellite (DVB-RCS) 28, 46, 214, 236, 263
  
- E1 15, 113, 153, 156, 164, 165, 166, 170, 175, 282
- E2 15, 164, 166, 170
- E3 15, 164, 166
- E4 15, 164, 165, 166
- Eccentricity 61, 84
- Elastic traffic 297
- Electronic mail (email) 9, 27, 39, 40, 48, 127, 133, 184, 213, 235, 262, 289, 296, 297, 298, 334
- Elevation angle 67, 68, 71, 211
- Encapsulated security payload (ESP) 234, 239
- End-to-end connection 37, 86, 92, 122, 148, 149, 150, 151, 177, 179, 184, 185, 277
- End-to-end two-point IP packet delay variation (IPDV) 245, 246
- Enhancement techniques 209
- Error recovery 21, 210, 265
- Exterior gateway routing protocol (EGRP) 132, 133
  
- Fast recovery 136, 265, 272, 273–4
- Fast retransmit 265, 273
- File transfer protocol (FTP) 9, 279
- Fixed assignment access 84, 85
- Fixed satellite service (FSS) 5, 6, 31, 33, 50
- Flow control 22, 24, 37, 119, 133, 136, 230, 261, 265, 297, 298
- Forward error correction (FEC) 16, 77, 276
- Fractional Brownian motion (FBM) 304
- Free-space loss 33, 71, 191, 201

- Frequency division multiple access (FDMA) 81, 83
- Frequency division multiplexing (FDM) 13
- Gatekeeper 291
- Gateway earth station (GES) 3, 90, 217, 220, 224, 227
- Gaussian-filtered minimum shift keying (GMSK) 74
- General mark up language (GML) 8
- Generic cell rate algorithm (GCRA) 97, 123
- Generic flow control (GFC) 98, 101
- Geostationary orbit 31, 60, 64, 65, 230
- Geosynchronous orbit 60, 63, 64
- Ground segment 28, 29, 30, 192, 193, 194, 216
- Guaranteed services (GS) 22, 251, 298
- Handover 89, 90, 91
- Header error check (HEC) 104, 111
- Heterogeneous networks 20, 38, 183, 184
- High elliptical orbit (HEO) 64, 65
- High-level data link control (HDLC) 176, 217
- High performance amplifier (HPA) 30
- Highly elliptical earth orbit (HEO) 30, 31
- Hypertext transfer protocol (HTTP) 8
- Hypothetical reference connection (IRX) 177
- Hypothetical reference digital path (HRDP) 178
- In-band signalling 154, 155
- Inclination 61, 62–4
- Inelastic traffic 297
- Integrated services (Intserv) 247, 251, 256, 316
- Integrated services digital networks (ISDN) 24, 48, 52, 173
- Inter-satellite links (ISL) 2, 4, 53, 76, 88, 179, 190, 191, 201, 264
- Interactive services 6, 43, 201, 217, 238, 241
- Interconnection scenarios 179
- Interior gateway routing protocol (IGRP) 132, 133, 228
- Internet group membership protocol (IGMP) 225, 226, 227–8
- Internet integrated service 296
- Internet protocol (IP) 26, 27, 38, 52, 97, 107, 127, 128, 137, 138, 148, 149, 188, 213, 214, 219, 243, 261, 277, 283, 295–7, 311
- Internet protocol version 6 (IPv6) 27, 127, 129, 231, 252, 295, 296, 324, 325, 326, 327, 328, 329–30
- Internet protocols reference model 26, 27
- Internet quality of service (IP QoS) 213, 243, 247
- Internet routing protocol 132
- Internet security association establishment and key management protocol (ISAKMP) 234
- Internet services 8, 9, 53, 213, 214, 236, 281, 312
- Internet traffic 50, 100, 213, 261, 295, 297, 298, 302, 311, 314
- Internetworking 1, 37, 92, 138, 139, 145, 148
- Interruptive mechanisms 277
- IP address 130, 221
- IP multicast 223, 225, 227, 234, 285, 291
- IP multicast over satellite 223
- IP multicast routing 223, 225
- IP multicast security 235, 243
- IP Network Performance Objectives 246
- IP over DVB 47, 214, 241, 242
- IP packet error ratio (IPER) 246
- IP packet format 128
- IP packet loss ratio (IPLR) 246
- IP packet severe loss block ratio (IPSLBR) 246
- IP packet transfer delay (IPTD) 245, 246
- IP security (IPsec) 213, 234, 235, 239, 240
- IPv6 packet format 252, 324
- ISDN over satellite 145, 177
- Ka band 31–3, 202, 242
- Ku band 31, 32, 33, 192, 202

- Label distribution protocol (LDP) 320, 324
- Label switched paths (LSP) 319
- Label switching router (LSR) 318
- LAN emulation 138, 139, 140
- Laws of physics 55, 56
- Layering principle 22, 97, 128, 277
- Leaky bucket algorithm (LBA) 123, 124, 125
- Line-termination (LE) 174
- Linear block code 77, 78, 79
- Link layers 6, 17, 23, 37, 55, 141, 176, 217
- Local exchange (LEX) 11, 24, 151, 160, 162, 178
- Long range dependence (LRD) 303
- Low earth orbit (LEO) 30, 31, 34, 65
- Mass of the earth 56, 57
- Maximum gain 67
- Maximum transfer unit (MTU) 142, 264
- Mean IP packet transfer delay 245
- Media earth orbit (MEO) 30, 31, 66, 187, 190, 197, 201, 203, 211
- Messaging services 7
- Minimum cell rate (MCR) 120
- Mobile satellite service (MSS) 5, 6, 50
- Modulation technique 21, 55, 71
- Motion Picture Expert Group (MPEG) 43, 237
- MPEG-2 44, 45, 217, 236, 237, 238, 241, 309
- Multi-layer modelling 311
- Multicast 10, 141, 223, 224, 225, 226, 227, 228, 230, 235, 243
- Multimedia conferencing (MMC) 261, 291
- Multiple access technique 81, 82, 84
- Narrowband ISDN (N-ISDN) 24, 174
- Network-centric view of satellite network 216
- Network connection 88, 93, 105, 149, 150, 152, 153
- Network control centre (NCC) 29, 30, 194, 242
- Network element 120, 149, 159, 251, 315
- Network layers 27, 37, 128, 157, 176
- Network management centre (NMC) 29, 30
- Network node 4, 18, 27, 53, 86, 101, 109, 113, 114, 115, 147, 149, 150, 157, 166, 190, 222, 316, 320, 334
- Network node interface (NNI) 101, 115, 190
- Network parameter control (NPC) 122, 195
- Network performance (NP) 39, 40, 203, 204, 246, 298
- Network security 231
- Network services 5, 6, 152
- Network terminal 131, 138, 146, 148, 149, 150, 180, 216, 296
- Network termination (NT) 180
- Network traffic 28, 30, 119, 152, 153, 161, 313
- Nyquist formula 34
- On-board circuit switching 162, 163
- On-board processing (OBP) 86, 172, 190, 197, 199
- On-board switching (OBS) 86, 163, 164, 185, 187, 190, 197, 198, 201, 217, 243
- Open shortest path first (OSPF) 133, 226, 314, 323, 324
- Orbit period 60, 63
- Orbital perturbation 66
- OSI/ISO reference model 22, 24, 157
- Out-of-band signalling 154, 155
- Packet encapsulation 141, 213, 217, 283
- Packet switching 16, 17, 19, 20, 24, 25, 48, 173, 187, 199, 200, 201
- Pareto distribution model 304
- Peak cell rate (PCR) 120, 122, 123, 195, 196
- Performance objectives 145, 179, 192, 203, 213, 244, 246, 313, 323
- Per-hop behaviour (PHB) 253, 254, 321
- Phase shift keying (PSK) 72
- Physical layer 6, 23, 25, 37, 75–7, 98, 102, 109, 110, 175, 198, 203

- Physical medium (PM) sublayers 109
- Plesiochronous digital hierarchy (PDH) 165, 203
- Point-to-point protocol (PPP) 218
- Primary rate interface (PRI) 174, 180
- Private key 232, 233
- Private network 28, 117, 119, 146, 147, 151, 152, 235, 318, 334
- Propagation delay 33, 41, 64, 68, 69, 85, 91, 92, 171, 177, 190, 191, 194, 243, 265, 267
- Propagation loss 16, 33, 71
- Protocol-centric view of satellite IP network 214
- Protocol hierarchies 128
- Public network 114, 146, 147, 148, 151, 152
  
- QoS provision 298
- Quadrature PSK (QPSK) 45, 73
- Quality of service (QoS) 5, 39, 49, 120, 151, 187, 214, 243
  
- Random access 86
- Reactive congestion control 196
- Real-time transport control protocol (RTCP) 10, 26, 27, 261, 283, 285, 286, 287, 288, 298
- Real-time transport protocol (RTP) 10, 149, 261, 283, 284, 307
- Reference configuration 113, 151
- Resource reservation protocol (RSVP) 248, 249, 250, 252, 256, 257, 320, 324
- Retrieval services 7
- Reverse address resolution protocol (RARP) 132
- Right ascension of the node 61, 63
- Round trip time (RTT) 191, 263, 265, 268, 269, 280
- Router 18, 38, 128, 129, 149, 214, 221, 225–31, 235, 244, 248, 249, 250–2, 254–7, 275–7, 278, 315–16, 331
- Routing information protocol (RIP) 132–3
- Routing plan 180, 182
- RSVP-TE 320, 324
  
- Satellite ATM networking architecture 192
- Satellite-centric view of global network 215
- Satellite constellation 31, 53, 65, 88, 89, 90, 91, 198, 201, 202
- Satellite control centre (SCC) 29
- Satellite earth terminals 28, 334
- Satellite IP networking 213, 219
- Satellite link characteristics 55, 69, 71
- Satellite network 2–3, 4, 28–30, 32, 38, 50, 53, 77, 86, 88, 93, 162, 179, 187, 213, 216, 220, 221, 222, 235, 256, 261, 263, 264, 269, 277, 279, 329, 330
- Satellite networking 1–2, 4, 16, 28, 31, 37, 40, 52, 55, 67, 75, 76, 84, 86, 92, 145, 146, 187, 188, 189, 199, 213, 214, 230, 231, 234, 269, 279, 295, 296, 332, 334
- Satellite networking security 234
- Satellite orbits 30, 31, 55, 57, 61
- Satellite services 5, 6, 50, 178, 188
- Satellite terminals 3, 46, 90, 93, 188, 229, 241, 242, 243, 296
- Satellite velocity 60, 61
- Satellite VPN 235
- SDH over satellite 145, 171, 172
- Secret key 231, 232, 243
- Secure socket layer (SSL) 234
- Segmentation and reassembly (SAR) 22, 98, 104, 116, 207, 316
- Selective acknowledgement (SACK) 272, 273, 274, 277
- Semi-major axis 56, 59, 60, 61
- Session directory service (SDS) 290
- Session initiation protocol (SIP) 288–90
- Shannon power limit 35, 36
- Shannon theorem 34
- Signal processing (DSP) 4, 29, 30, 150, 302
- Signalling 12, 116, 117, 152, 153, 154, 155, 156, 173, 177, 291
- Slow start 136, 137, 261, 265, 266, 267, 268, 269, 270, 271, 272, 273, 279, 280
- Space segment 28, 29, 179, 193, 197, 201, 216, 243
- Space switching 15, 16, 164

- Spread spectrum multiple access (SSMA) 84
- Sustained cell rate (SCR) 120
- Switch 12, 15, 37, 115, 139–40, 156, 189, 198, 247
- Symmetrical code 232
- Synchronous digital hierarchy (SDH) 109, 110–13, 166, 167, 168, 169–70, 171–2, 203, 244
- Synchronous optical network (SONET) 111, 171
- Synchronous transfer mode type 1 (STM-1) 52, 111–12, 160, 167, 168–9, 170, 171, 172
- Synchronous transport signal optical carrier 3 (STS-3C) 111
  
- TCP performance analysis 266
- TCP spoofing 262, 277, 278
- Telnet 9, 26, 27, 48, 127, 135, 265, 280, 297, 298
- Terminal adapters (TA) 114, 174
- Terminal equipment (TE) 101, 109, 114, 146, 148, 173, 174, 180
- The payload type (PT) 104, 285
- The radius of earth 59, 215
- The session announcement protocol (SAP) 289
- Time division multiple access (TDMA) 46, 81, 83
- Time division multiplexing (TDM) 13, 19, 45, 46, 97, 150, 163, 164, 291
- Time switching 15, 16, 164
- Tracking, telemetry and telecommand (TT&T) 28
- Traffic descriptors 120, 195, 299
- Traffic engineering 5, 127, 161, 295, 296, 299, 312, 313, 314, 316, 321, 323
- Traffic modelling 295, 296, 298, 299, 300, 305, 306, 309
- Traffic models 299, 300, 301, 302
- Transit network 28, 48, 50, 83, 85, 146, 148, 149, 152, 160, 162, 183, 256, 257
  
- Transmission control protocol (TCP) 26, 27, 97, 133, 149, 261
- Transmission convergence (TC) sublayer 109
- Transmission frequency bands 31
- Transmission multiplexing hierarchy 13, 14
- Transport layer 27, 128, 130, 133, 137, 149, 221, 230, 234, 247, 261, 277, 296, 297
- Trellis coding 79
- Trunk exchange (TEX) 11
- Turbo code 77, 80
  
- Universal gravity constant 56
- Usage parameter control (UPC) 114, 122, 195, 299
- User datagram protocol (UDP) 10, 27, 97, 137, 149, 261
- User earth station (UES) 3, 220, 224, 264
- User network interface (UNI) 4, 101, 173, 190
  
- Van Allen radiation belts 31
- VC and VP Switch 102, 103, 122, 123, 168, 169, 194, 198, 203, 210
- Video traffic 309, 310
- Virtual path identifier (VPI) 101
- Virtual private network (VPN) 119, 147, 152, 235, 318
- Virtual scheduling algorithm (VSA) 123, 126
- Voice over internet protocol (VoIP) 10
- Voice over IP 214, 261, 291, 298, 304
- Voice traffic 12, 306, 307, 308
- VP switch 103
  
- Web caching 279, 282
- World wide web (WWW) 8, 9, 27, 40, 49, 127, 133, 135, 188, 213, 235, 262, 280–1, 290, 296, 302, 311
- WWW traffic 311
  
- X band 31–3



