

# Index

## Numeric

- 16QAM, 98, 103
- 1G AMPS, 94
- 2.5G, 76, 95, 96, 98, 105
- 2D-spreading CDMA-OFDMA, 209–212
- 2G, 2, 3, 5, 9–11, 32, 33, 44, 48, 58, 68, 75, 76, 78, 80, 82, 84–86, 88, 90, 92, 94–96, 98–100, 102, 104–106, 108, 110, 112, 114–118, 120, 122, 124–126, 128, 130–132, 135, 143, 153–155, 161, 162, 164, 168, 177, 181, 182, 185, 187, 201, 213–215, 219, 223, 229, 241, 297, 304, 311, 318
- GSM, 95
- 3G, 2, 3, 5, 8–11, 17, 31, 33, 44, 48, 54, 56, 58, 68, 75, 85, 95, 96, 98–103, 105, 106, 116, 125, 126, 129, 131, 132, 135, 136, 139, 143, 153–155, 161, 162, 164, 165, 168, 177–182, 187, 191, 193, 201, 213, 214, 216, 219, 222, 223, 229, 241, 283, 297, 301, 304, 311, 318, 331, 347, 367
- 3GPP, 2, 3, 75, 95, 96, 98, 103–106, 110–112, 115, 116, 126, 128, 182
- LTE E-UTRAN standardization, 182
- 3GPP2, 75, 95, 96, 105, 180, 187
- 4-CCL code, 143, 149, 150
- 4G, 3, 8, 34, 154, 177, 182, 222, 297
- 5-CCL code, 143, 149, 150

## A

### Access

- channel, 84, 87–91, 114–117, 124
- handoff, 94
- network, 95, 98, 106
- point, 190, 191
- Preamble Acquisition Indicator Channel (AP-AICH), 119

### Acquisition Indicator

- Channel (AICH), 115, 116, 118, 119

### Active set, 93, 94, 130

### Ad hoc, 195, 371

- Additive White Gaussian Noise (AWGN), 19, 62, 63, 299, 300, 302, 303, 309, 310, 311, 315, 322, 338, 346, 355, 356, 363–366

### Advanced

- Mobile Phone System (AMPS), 1, 32, 77, 94, 99, 181, 222

- Time Division Multiple Access (ATDMA), 102

- All-IP, 106, 125, 132, 183, 184, 187, 201, 215, 222, 224, 292, 301, 319

- wireless network, 301, 319

### Amplify and forward, 198

### AMR, 99, 105

### ANSI JSTD-008, 76

- Antenna, 18, 23, 35, 58, 78, 88, 96, 97, 107, 115, 117, 118, 166, 183, 190, 196, 198, 212–215, 218, 225, 226, 306, 313, 315, 316, 322, 323, 325, 327–333, 335, 339, 346, 347

### AP acquisition Indicator (API), 119

### Aperiodic

- ACF, 13, 175, 256–258, 409, 410
- auto-correlation function, 243, 265, 266, 269, 271, 402, 405, 406

### CCF, 13, 175

- correlation function, 235, 242, 401, 403–407

- cross-correlation function, 161, 243, 264, 266–269, 271, 359, 402, 403, 405, 406

### ARIB of Japan, 10, 105, 155

### ARIB WCDMA, 104, 105

- Association of Radio Industries and Business (ARIB), 10, 95, 96, 103–105, 155
  - Asynchronous, 14, 30, 50, 97, 119, 135, 204, 224, 241, 254, 264, 265, 282, 287, 290, 295, 301, 302, 305, 309, 311, 355
  - CDMA, 49, 141–143, 160, 223, 295, 318
  - Connectionless (ACL), 41
  - Data Subscriber Loop (ADSL), 71, 163
  - DS-CDMA, 161, 164
  - transmission, 5, 80, 88, 140–142, 150, 155, 156, 159, 160, 175, 183, 213–215, 230, 236, 239, 273, 278, 279, 280, 283, 286, 314, 318, 319, 370
  - Atmospheric ducting, 162
  - Autocorrelation, 80, 132, 145, 214, 219, 334, 335, 371
    - condition, 266
    - Interference-Free Window (ACIFW), 273
    - level, 243
    - peak, 50, 92, 93, 239, 296, 298, 299, 300, 383
    - side lobe, 92, 163, 223, 236, 295, 296, 374, 376, 380, 381, 392, 393
  - Function (ACF), 5, 13–15, 46, 47, 50, 92, 142, 144, 149, 150, 155, 159, 161, 163–165, 168–170, 172, 173, 183, 205, 206, 222, 229, 230, 232, 236–239, 241–245, 247, 256, 264–269, 271, 284–286, 292, 295, 298, 302, 313, 314, 318, 319, 321, 371, 374, 375, 382, 383, 384, 390–393, 396, 397, 402–407, 411, 412, 414–417
  - property, 5, 50, 144
- B**
- Balance property, 144
  - Bandpass filter, 20, 21, 24, 35, 37
  - Bandwidth efficiency, 1, 4, 6, 7, 11, 15, 24, 28, 29, 31, 32, 68, 71, 154, 183, 184, 201–212, 218, 219, 221, 241, 275, 297, 301, 302, 309, 311, 332, 333, 352, 353, 366, 367, 370
    - utilization efficiency, 66, 67, 166
  - Barker code, 149
  - Base Station (BS), 4, 11, 30–32, 53, 54, 56, 78–81, 83, 85, 86, 88, 89, 91, 92–94, 96, 97, 98, 106, 107, 110, 117, 119, 123, 125, 128, 141, 142, 144, 156, 157, 217, 218, 305, 306, 315, 332
    - Controller (BSC), 79, 106, 108
  - Beam-forming antennas, 115, 117
  - Bent code, 143, 150
  - Berlekamp-Massey algorithm, 149
  - Beyond 3G (B3G), 3, 8, 10, 11, 132, 160, 163–165, 183, 184, 187, 188, 212, 283, 297, 331, 347, 367
  - Binary Phase-Shift Keying (BPSK), 17, 18, 19, 20–26, 28, 29, 60, 63, 65–67, 82, 97, 218, 219, 276, 290, 315–317, 326, 343, 346, 349–356, 361–366
  - Bit Error
    - Probability (BEP), 61, 63, 160, 314
    - Rate (BER), 29, 62, 127, 128, 149, 159, 160, 212, 218, 285, 286, 290, 291, 302–304, 308, 309, 313, 326–331, 343–347, 361–366, 371, 396, 398
  - Bit-wise detection process, 319
  - BLER, 128, 157, 159
  - Block-Wise Correlation (BWC), 318, 321
  - Bluetooth, 39–42, 45, 192, 200
  - Broadcast
    - Channel (BCH), 93, 114–118
    - Control Channel (BCCH), 114, 116, 121, 125
  - BTS, 107
  - Bursty traffic, 6, 142, 143, 156, 160, 164, 165, 183, 184, 222, 223, 230, 273, 283, 292
- C**
- CAMEL, 104, 105
  - Candidate set, 93, 94
  - Capacity, 1, 5, 11, 33, 39, 57, 60, 77–79, 85, 87, 95, 98, 99, 126, 153, 168, 178, 184, 186, 187, 193, 195, 196, 214, 215, 222, 229, 269, 297, 302, 311, 313, 328, 330, 332, 347, 371, 396
  - CATT China, 75
  - CATT of China, 10, 155
  - CC-based CDMA (CC-CDMA), 7, 220, 273, 274, 276–279, 280, 281, 283, 285–287, 289–299, 301–305, 307–311, 313–320, 322, 324–336, 338–340, 342–347, 372
  - CCSA, 96
  - CD Indicator/CA Indicator (CDI/CAI), 119
  - CDMA
    - Development Group (CDG), 178, 179, 187
    - IPRs, 131, 132
    - PCS system, 76
  - Cdma2000 Phase I, 185, 186, 187

- Cdma2000, 1, 4, 5, 9, 10, 31, 75, 80, 95–98, 100–103, 106–108, 129, 131, 135, 136, 154, 159, 162, 164, 178–181, 184–187, 214, 296, 297
- CdmaOne, 2, 75–78, 168, 178–180, 185–187
- Cell, 12–14, 31–33, 48, 59, 60, 77–79, 82, 83, 85, 86, 92–95, 106, 107, 110, 111, 115–119, 124, 125, 128–130, 138, 139, 141, 142, 149, 155, 165, 167, 168, 182, 186–188, 191, 213, 214, 216, 217, 250, 296, 328
- Central Processing Unit (CPU), 18, 240
- Channel
  - fading, 163, 229
  - propagation theory, 229
  - State Information (CSI), 208, 332, 342
- China Wireless Telecommunications Standard group (CWTS), 96
- Chip
  - delay, 88, 220, 232, 284, 287, 301, 372
  - level, 371
  - wise auto-correlation function, 415
  - wise cross-correlation function, 415
- Circuit-switched, 76, 132, 142, 186
  - continuous traffic, 142
- Circuit-switching technique, 164
- Closed-loop power control, 4, 93, 127, 157, 158, 183, 295
- Cluster, 79, 80, 188
- Co-channel
  - interference, 79, 149, 188, 189, 302, 311
- Code
  - Assignment Blocking (CAB), 138–140, 143
  - Division Duplex (CDD), 198–200
  - Division Multiple Access (CDMA), 9, 11, 48, 60, 151, 157, 177, 212, 238, 370
  - division multiplex, 199, 200
  - Division Testbed (CODIT), 102
  - index, 138, 337, 389, 390
- Coding gain, 32, 198, 314
- Co-existence, 110
- Cognitive radio, 57–59, 184, 185, 193–195
- Collision Detection/Channel Assignment Indication Channel (CD/CA-ICH), 115, 118, 119
- Column-wise complementary codes, 5, 6, 231, 239, 241, 242–246, 291–293, 298, 310, 367
- Commission of the European Communities (CEC), 100, 102
- Common
  - Control Channel (CCCH), 114, 116
  - Packet Channel (CPCH), 115, 117–119
  - Pilot Channel (CPICH), 115, 118, 119, 130
  - Traffic Channel (CTCH), 114, 116
- Communication system, 3–8, 12, 56, 57, 60, 136, 143, 153, 158, 162, 195, 199, 200, 209, 218, 225, 328, 370–372, 380
- Complementary code (CC), 5–8, 16, 135, 143, 149, 201–208, 211, 213, 219, 220, 223, 224, 226, 227, 229–246, 248–255, 261–280, 282–286, 288, 290–302, 304–306, 308–310, 313, 314, 317–321, 325, 331–335, 340, 347, 363, 367, 371, 379, 380–393, 395, 397, 399, 403, 421, 427
- Complete Complementary Code (CCC), 236, 238, 239, 242, 246, 248–253, 255, 261, 263, 298, 304, 305, 308–310, 339, 409, 421
- Conventional unitary spreading code, 219
- Cooperative
  - communication, 195, 196–198, 200
  - node, 185
  - relay transmission, 196
- Core Network (CN), 95, 98, 106, 114, 218
- Correlation reconstruction, 213, 230
- Correlator, 4, 13, 14, 53, 63, 161, 164, 205, 222, 223, 232, 239, 265, 289, 292, 295, 296, 299, 300, 319, 320, 415
- CPCH AP-AICH, 119
- CPCH Status Indication Channel (CSICH), 115
- CPCH Status Indicator Channel (CSICH), 119
- Crosscorrelation, 5, 43, 46, 50, 60, 80, 87, 92, 93, 132, 141–146, 149, 150, 158, 159, 161–165, 16–175, 183, 207, 213, 214, 219, 222, 230–232, 236–239, 241–245, 254, 262, 264, 266–272, 278, 283–286, 300, 302–314, 318–321, 335, 339, 359, 360, 371, 380–385, 386, 387, 388, 397, 420
  - condition, 266, 383
  - Function (CCF), 13–15, 168–172, 174, 175, 205, 207, 208, 241, 263, 293–295, 392, 393, 396, 409–412, 414–417

- Crosscorrelation (*continued*)  
 level, 149, 150, 168, 242, 367, 373, 374, 377, 380
- Cyclic  
 convolution, 71  
 Prefix (CP), 71, 132, 163
- D**
- Data  
 Pilot Time Interleaving (DPTI), 215  
 rate, 10, 18, 19, 29, 33, 35, 40, 52, 63, 81, 84, 85, 87, 88, 96–98, 106, 107, 117, 125, 126, 139, 140, 143, 151, 152, 163, 165, 166, 182, 186, 191, 192, 214, 240, 297, 301, 311
- Decode and forward, 198
- DECT, 95, 102, 103, 108
- Dedicated  
 Channel (DCH), 114–118, 125, 126  
 Control Channel (DCCH), 114–116  
 Physical Channel (DPCH), 118, 124, 125, 127  
 Physical Control Channel (DPCCH), 115–118, 120–124, 128  
 Physical Data Channel (DPDCH), 115–117, 120–124, 128  
 pilot code channel, 215  
 Traffic Channel (DTCH), 114–116  
 Transport Channel (DCH), 114, 115, 118
- Delay spread, 50–52, 71, 306, 308, 333, 342
- Demodulation, 17, 19, 20, 24, 26–28, 37, 55, 59, 71, 73, 82, 88, 127, 219, 221, 227, 286, 322
- Despreading, 19, 20, 23, 24, 26–28, 37, 55, 56, 61, 63, 70, 74, 205, 227, 279, 280, 325
- Digital  
 AMPS (DAMPS), 1, 32, 77, 181, 222  
 audio broadcasting (DAB), 71  
 Radio Mondiale, 163  
 Sense Multiple Access-Collision Detection (DSMA-CD), 118  
 video broadcasting (DVB), 3, 71, 163
- Direct Sequence (DS), 1, 2, 4, 10, 17–19, 21, 24, 25, 27, 29, 31, 33, 45, 46, 48, 54, 57, 68, 69, 109, 119, 144, 150–154, 157, 158, 177, 191, 200–204, 227, 273, 275–277, 279, 281, 283, 285, 287, 291, 293, 295–297, 301, 320, 372  
 modulation, 153  
 Spread Spectrum (DS-SS), 108, 109, 200
- Code Division Multiple Access (DS-CDMA), 7, 8, 10–12, 17, 30–34, 39, 41, 42, 44, 45, 54, 55, 151–153, 157, 161, 164, 219, 223, 224, 227, 278, 290–292, 294, 295, 297, 302, 328, 330, 349, 352, 353, 366, 367, 372  
 spreading, 2, 46, 54, 150–154, 157, 177, 200, 201, 203, 204, 275–277, 279, 281283, 285, 287, 289, 291, 293, 295, 296, 320
- Direction-of-Arrivals (DOAs), 218
- Discontinuous transmission (DTX), 125, 126
- Discrete MultiTone modulation (DMT), 163
- Distance-based registration, 91
- Doppler, 3  
 effect, 5, 24, 28, 71, 167, 208, 209, 370  
 shift, 160, 167  
 spread, 6, 168, 208, 211
- Downlink  
 channel, 3, 56, 80, 86, 95, 98, 118, 143, 166, 187, 213, 214, 220, 302, 309, 315, 319  
 Dedicated Physical Channel (DL DPCH), 118  
 DPCCH/DPDCH, 128  
 DPCH, 124  
 DPDCH/DPCCH, 124  
 Shared Channel (DSCH), 2, 115–118, 126, 191
- DPDCH/DPCCH, 123
- DS spreading modulation, 4, 6, 17, 19, 151, 152, 154, 155, 192, 203, 204, 273, 275, 276, 295, 301, 315, 319, 372
- DS/CC-CDMA, 7, 273, 274, 276–281, 283, 285–297, 313–317, 319, 320, 322, 325–331, 347, 372
- DS  
 OCDMA, 372, 373, 374  
 spreading OCC-CDMA (OCC/DS-CDMA), 223, 224  
 SS signal, 21, 22, 25, 26, 27, 81
- Dual  
 channel QPSK, 122  
 mode, 77, 95, 129  
 relay cooperative communication, 196
- DVB-H, 163
- DVB-T, 3, 163
- DwPTS, 216, 217
- Dynamic Frequency Selection (DFS), 58

**E**

EDGE, 95, 98, 102, 103, 104, 184  
 EIA (Electronic Industries Association), 2, 10, 76, 77, 79, 81, 83, 85, 87, 89, 91, 93, 131  
 EIA/TIA IS-95, 76, 77, 79, 81, 83, 85, 87, 89, 91, 93  
 Electronics Serial Number (ESN), 89  
 Element code, 7, 201, 204, 205, 207, 211–213, 220, 226, 230, 231, 238–244, 248, 249, 251, 252, 255, 264, 267, 270, 275–277, 280, 283, 292, 293, 296, 298, 300–302, 310, 313–322, 326, 330, 333, 335, 337, 380, 381, 383–390, 402–404, 415, 420–424, 427–429, 431, 432, 434  
 Wise Product (EWP), 317, 318, 322, 420  
 EMS, 104  
 Envelope, 19, 21, 333  
 EP-DECT, 102  
 Equal Gain Combining (EGC), 54, 162, 224, 296  
 Error-correction coding, 71  
 Estimate and forward, 198  
 ETSI SMG, 103  
 ETSI UMTS WCDMA, 104  
 ETSI UMTS, 102, 103  
 EU, 155  
 Euclidean distance, 7, 354, 366  
 EUREKA 147, 163  
 European Telecommunications Standards Institute (ETSI), 10, 33, 95–97, 99, 100–105, 107, 109, 111, 113, 115, 117, 119, 121, 123, 125, 127, 129, 155  
 Even periodic correlation function, 222, 380, 403  
 EWP operation, 318, 322, 420  
 Extended complementary code, 231, 238–241, 248, 249  
 External interference, 5, 370

**F**

Fast  
 fading, 50, 128, 167  
 Fourier Transform (FFT), 3, 68, 70, 71, 74, 222  
 Frequency Hopping (FFH), 41  
 FER, 127, 128  
 FH-DS-OCDMA, 373  
 Fibonacci feedback generator, 144  
 Finger, 4, 53, 54, 88, 162, 304, 319  
 Flash-OFDM cellular system, 163

FLASH-OFDM, 163, 181, 183  
 Flat fading, 71, 313, 332, 336–339, 342, 345, 346  
 Forward  
 Access Channel (FACH), 113–118, 126, 129  
 channel, 80, 81, 85, 89  
 Error Correction (FEC), 81, 86  
 link channel, 81, 85, 86, 92  
 traffic channel, 85, 92, 93  
 Freedom of Mobile Multimedia Access (FOMA), 104–106  
 Frequency  
 dispersive channel, 71, 208  
 diversity, 201, 225, 317  
 Division  
 Duplex (FDD), 95–98, 103–105, 108–112, 114, 119–122, 125, 126, 166, 167, 187, 198, 199, 296  
 Multiple Access (FDMA), 1–3, 5, 8, 10–12, 31–34, 48, 53, 56, 57, 59, 68, 79, 154, 160, 185, 188, 189, 195  
 Multiplex (FDM), 71, 163, 276, 296, 314  
 Multiplexing (FDM), 163  
 domain interleaving, 71  
 Hopping (FH), 6, 10, 11, 17, 34–50, 144, 150, 151, 153, 158, 192, 200, 275, 367, 373  
 Code Division Multiple Access (FH-CDMA), 10, 11, 34, 39, 40–42, 44, 45, 151, 367  
 scheme, 373  
 sequence, 158  
 planning, 79, 80  
 reuse factor, 32, 188, 189  
 selective fading, 4, 6, 7, 45, 52, 54, 68, 71, 150, 167, 209, 211, 292, 294, 313, 332, 333, 340–342  
 Shift Keying (FSK), 34, 38, 41  
 spreading, 205, 209–213  
 synthesizer, 17, 34–37, 45  
 Full duplex, 11, 96, 119, 143, 198–200  
 Future  
 Advanced Mobile Universal Telecommunications System (FAMOUS), 100  
 Land Mobile Telecommunications Service (FLMITS), 95  
 Radio Wideband Multiple Access System (FRAMES), 102

**G**

- Galois field (GF), 15, 16, 124, 125, 144, 145, 376, 388–390
  - Gaussian random variable, 356
  - Generalized
    - Even Shift Orthogonal (GESO), 255–259, 261
    - Pair-wise Complementary (GPC), 241, 260, 261, 263, 333–340, 343, 346
  - Global
    - cell, 106, 107
    - Positioning System (GPS), 30, 58, 80, 218
    - System for Mobile Communication (GSM), 1, 10, 33, 44, 45, 75, 77, 95, 98, 99, 100, 104–108, 129, 131, 179, 180–182, 222
  - GMW
    - code, 143
    - sequence, 149
  - Golay complementary code, 149
  - Golay, 149, 232, 233, 236, 241, 298
  - Gold
    - code, 4, 5, 136, 141, 143–147, 149, 150, 154–157, 161, 168, 169, 172–175, 214, 219, 222, 229–231, 241, 273, 292, 298, 302, 309, 313, 314, 318, 328–331
    - sequence, 50, 124, 125, 146
  - GPRS, 98, 104, 180
  - GSM-UMTS, 104
  - Guard
    - band, 160
    - time, 160
- H**
- Half
    - duplex, 198–200
    - length Addition (HLA), 317, 318, 322, 323, 420
  - Handoff, 2, 79, 80, 81, 88, 93, 94, 157, 178
  - Handover, 93, 97, 104, 106, 111, 112, 114–116, 124–126, 128, 129, 177
  - HD Radio, 163
  - Hermitian transform, 136
  - Hexagonal-shaped cell, 188
  - High
    - Data Rate (HDR), 186, 187
    - Power Amplifier (HPA), 107
    - Speed Downlink Packet Access (HSDPA), 2, 98, 103, 191
  - Highest-peak-deleting, 149

## High-speed

- bursty traffic communication, 222, 223
- bursty uplink channel, 224
- Digital Subscriber Loop (HDSL), 71
- Downlink Shared Channel (HS-DSCH), 2, 126, 191
- HLA operation, 317, 318, 322, 420
- Hopping rate, 10, 38, 41
- Hybrid OCDMA, 373

**I**

- Idle handoff, 94
- IEEE 802.11p 31, 168, 190, 294
- IF mixer, 37
- Implicit registration, 91
- IMT-2000
  - CDMA, 95
  - DECT, 95
  - TDMA, 95
- IMT-2000/UMTS spectrum, 99
- IMT
  - DS, 103
  - FT, 103
  - MC, 103
  - SC, 103
  - TC, 103
- Incremental adaptive relay, 199
- Incumbent Profile Detection (IPD), 58
- Indoor wireless network, 149
- Industrial Scientific and Medical (ISM), 40, 192, 194
- Inner loop power control, 117, 127, 128, 158, 159
- In-phase, 13, 14, 24, 26, 27, 124, 299, 300, 314, 320, 420
- Intellectual Property Rights (IPRs), 2, 3, 75, 131, 132, 154, 162, 164, 177, 182, 183, 200
- Intelligent Network (IN), 106
- Interference-free, 5, 6, 7, 11, 156, 184, 205, 223, 230, 241, 243, 246, 255, 263, 264, 272–274, 290, 313, 314, 330, 332–334, 343, 346, 367
  - CDMA, 6, 11, 205, 223, 230, 246, 263, 264, 273
  - Window (IFW), 241, 263, 333, 334, 339, 340, 343
- Interference-limited capacity, 5, 85, 87, 168, 229
- Inter-frequency handover, 129

## Interim Standard

- 124 (IS-124), 79
- 41 (IS-41), 79, 187
- 54 (IS-54), 77
- 634 (IS-634), 79
- 95 (IS-95), 1–5, 9–11, 31–33, 53, 56, 57,
  - 75–81, 83, 85–87, 89, 91, 93, 95,
  - 109, 125, 127, 131, 132, 136, 144,
  - 151, 154, 158, 159, 162, 164, 168,
  - 177, 181, 182, 184, 185, 187, 201,
  - 214, 222, 229, 297, 349

## Intermediate Frequency (IF), 37

## International

- Mobile Telecommunications-2000
  - (IMT-2000), 95, 96, 99, 102–104, 178,
  - 187, 216
- Telecommunication Union (ITU), 95, 96,
- 102, 103, 105, 178, 216

## Inter

- Pulse Distance, 375, 377–379
- RAT handover, 129
- Symbol Interference (ISI), 4, 11, 14,
  - 50–52, 68, 71, 132, 162, 163, 214,
  - 273, 318–320, 332

## Intra-frequency handover, 111, 129

## Inverse

- Discrete Fourier Transform (IDFT), 72
- Fast Fourier Transform (IFFT), 3, 68, 70,
- 71

## Ionospheric reflection, 162

- IP, 104–106, 125, 132, 142, 179, 183, 184,
- 187, 189, 201, 215, 222, 224, 292, 301,
- 319

## IrDA, 192

## IS-95A, 2, 11, 31, 76–78, 80–94, 99, 178

## IS-95B, 76, 77, 80, 178

## ISDB-T, 163

## ISDB-TSB, 163

## ISM band, 40, 194

## ITU

- IMT-2000, 103
- Recommendation ITU-R M, 95
- ITU's IMT-2000, 95, 96
- ITU-R, 95, 102, 103

**J**

- Jamming, 9, 21, 38, 39, 41, 46, 48, 54, 56,
- 151, 152
- JDC, 222
- Johnson Bond, 374, 376
- JSTD-008, 76, 77

**K**

- Kasami code, 4, 5, 136, 141, 143, 145, 148,
- 149, 154, 155, 157, 161, 214, 222, 229,
- 230, 231, 241, 273, 292, 318
- Kronecker sequence, 143, 149

**L**

- LFSR generation of PN code, 146
- Linear
  - Complexity (LC), 149
  - Feedback Shift Register (LFSR), 144, 146,
  - 149
- Link Adaptation (LA), 343
- Local scattering, 214
- Long
  - code mask, 89, 92
  - PN codes, 80
  - Term Evolution (LTE), 3, 182
- Low
  - Pass Filter (LPF), 152, 153
  - Probability of Interception (LPI), 41
- L-QAM, 310

**M**

- MAC sub-layer, 113
- MAC, 111–116, 192
- MAC/RLC, 111
- Macro-cell, 106, 107
- Magic power, 230
- MAI
  - free, 213, 215, 217, 224, 241, 264, 267,
  - 272, 278, 279, 283, 295, 296, 301,
  - 309, 311, 315, 319, 320, 325, 328,
  - 331, 347
  - resistant, 218
- M-ary
  - CDMA, 7, 60, 61, 63, 65–67, 227, 228,
  - 349–356, 358–367
  - QAM, 204
- Master Switching Center (MSC), 79, 106
- Matched filter, 4, 13, 295, 302, 303, 323
- Maximal
  - Likelihood (ML), 228, 362
  - Ratio Combining (MRC), 54, 162, 223,
  - 224, 296, 308, 309
- Micro-cell, 106, 107
- MI
  - free, 213, 215, 217, 224, 264, 267, 272,
  - 279, 280, 283, 295, 296, 319, 320
  - resistant, 218
- Minimum Mean Squared Error (MMSE), 4

- Mitola radio, 194
- MMS, 104, 105
- Mobile
  - Assisted Handoff (MAHO), 81
  - Broadband Wireless Access (MBWA), 163
  - cellular network, 76, 79, 80, 86, 160, 188, 189
  - cellular system, 3, 5, 30, 31, 56, 59, 80, 86, 131, 135, 150, 155, 160, 165, 166, 187, 191, 212, 214–216, 229, 236, 280, 311
  - Station (MS), 33, 78–81, 83–91, 93, 94, 97, 111, 115, 118, 120, 121, 124–126, 128, 167
  - Terminal Switching Office (MTSO), 56
- Mobility Management (MM), 112
- Modulated, 17–23, 26, 34, 35, 37, 46, 55, 56, 68, 71, 73, 82, 125, 151, 152, 157, 163, 205, 213, 221, 226, 275, 299–301, 316, 372
- Modulating, 18, 19, 22, 124, 125, 163, 275
- Modulator, 4, 35, 43, 46, 70, 71, 73, 80, 81, 82, 88, 201–203, 220, 255, 276, 310, 372
- Mono-polar signal, 372
- Most-peak-deleting, 149
- M-PSK, 218, 276
- M-QAM, 218, 276
- MRC-RAKE, 308, 309
- M-sequence, 4, 5, 11, 16, 47, 124, 125, 136, 141, 143–147, 149, 154, 155, 157, 161, 222, 229, 230, 231, 241, 273, 292, 298, 302, 309, 318
- Multi
  - band wavelet packet spreading code, 149
  - Carrier CDMA (MC-CDMA), 10, 296
  - carrier, 4, 10, 68–73, 95, 103, 185, 201, 204, 242, 255, 296, 302, 315, 317, 319, 330, 331, 347, 367, 372
  - code system, 66, 67
  - dimensional spreading, 7, 70, 201
  - length code, 373, 376
  - slit spectrometry, 232
  - User Detection (MUD), 4, 296
- Multipath
  - Interference (MI), 4, 11, 14, 130, 213, 215, 217, 218, 223, 224, 241, 264, 267, 272, 273, 279, 280, 283, 285, 290, 291, 295–297, 318–320, 362
  - propagation, 5, 6, 11, 14, 43, 49–52, 132, 155, 156, 162, 163, 167, 183, 211, 212, 214, 229, 230, 273, 278, 286, 291, 318, 352, 363, 366, 370
  - resist, 313, 332
- Multiple
  - Access Interference (MAI), 5, 11, 13, 14, 143, 159, 168, 205, 213–218, 223, 224, 241, 243, 264, 267, 272, 278, 279, 283, 285, 286, 289, 291–297, 299–303, 309–311, 313–315, 318–320, 325, 328, 331, 347, 356, 357, 359, 370, 372, 374
  - access scheme, 31, 79, 119, 132, 183
  - hop, 197
  - Input-Multiple-Output (MIMO), 7, 78, 190, 191, 212, 225–227, 313, 332–336, 339, 340, 343, 345, 346
  - Input-Single-Output (MISO), 197, 198, 333
- N**
  - Narrowband, 4, 10, 20, 21, 24, 33, 37, 38, 46, 47, 54–56, 68, 71, 163
  - NEAR-FAR EFFECT, 157
  - Near-far problem, 4, 92, 157–159, 295
  - Neighbor set, 94
  - Network IDentification (NID), 84
  - NMT, 181, 222
  - No code, 143, 149
  - Node-B, 98, 107, 128
  - Noise-like sequence, 150
  - Non
    - cooperative node, 185
    - Return Zero (NRZ), 221
  - NTT DoCoMo, 103–106, 131
- O**
  - OCC-CDMA, 223, 224, 226, 227
  - Odd
    - periodic correlation function, 285, 403
    - shift correlation elimination, 259, 262
  - OEM, 105
  - OFDM, 2, 3, 8, 10, 11, 24, 33, 52, 53, 70–74, 132, 162, 163, 181, 183, 191, 192, 194, 195, 201, 209, 296, 302, 319, 331, 347
  - Offset Stacking (OS), 6, 7, 201–204, 219–221, 241, 273, 275, 276, 297, 301–314, 331–336, 339, 340, 343, 345–347

**One**

- code-per-channel, 135
- code-per-node cooperative communication, 200
- code-per-user basis, 2, 4, 5, 16, 60, 143, 150, 223, 231, 240, 264, 379
- flock-per-user basis, 16, 143, 223, 241
- loop power control, 157, 158

Open loop, 314

**Optical**

- CDMA (OCDMA), 8, 371–374, 376, 379, 380–383, 385, 387, 389, 391–393, 385, 387, 389, 391, 393, 395–397, 399
- Complementary Code (OCC), 8, 223, 224, 226, 227, 334, 335, 381–383, 386, 396
- Orthogonal Code (OOC), 372–374, 376–380, 392, 396, 399
- Time Division Multiple Access (OTDMA), 370, 372

OQPSK, 88, 97

Ordered registration, 91

**Orthogonal**

- CDMA (O-CDMA), 49
- code, 5, 49, 135, 136, 140–143, 150, 160, 161, 168, 205, 214, 228, 231, 232, 236, 240, 241, 246, 318, 373, 375, 376, 392, 396
- Complementary Code (OCC), 231, 273, 380, 381, 392, 393–399
- Frequency Division Multiple Access (OFDMA), 2, 3, 8, 10, 11, 33, 34, 59, 132, 133, 154, 163, 181–185, 189, 195, 209–212, 222
- spreading code, 143, 216
- Variable Spreading Factor (OVSF), 4, 5, 12, 13, 49, 122, 123, 125, 126, 132, 135–143, 150, 155, 156, 161, 165, 166, 168, 205, 214, 216, 218, 222, 230, 231, 236, 241, 269, 273, 290–292, 301, 318

OS/CC-CDMA, 7, 273, 297, 298–310, 313, 314, 331, 332, 333, 334, 335, 336, 339, 340, 343, 345, 346, 347

**OS**

- CDMA, 204, 219, 221
  - spreading-based CDMA, 219–221, 276
- Outer loop power control, 127, 128, 158, 159
- Out-of-phase, 13, 14, 92, 264, 265, 267, 298, 302, 314

**P****Packet**

- switched bursty traffic, 142
- switched network, 156, 187

**Paging**

- Channel (PCH), 114–119, 129
- Control Channel (PCCH), 114, 116
- Indication Channel (PICH), 115, 116, 118, 119
- signal, 84

Pair-wise complementary code, 5, 231, 239, 240, 241, 245, 246, 254, 255, 275, 291, 313, 314, 332, 333, 335, 367

Parallel Interference Cancellation (PIC), 4

Parameter-change registration, 91

**Partial**

- auto-correlation function, 164, 243, 402
- auto-correlation property, 144
- cross-correlation function, 164, 243, 402, 403

PDC, 100

Peak-To-Average Power (PTAP) ratio, 167

Perfect Orthogonal Complementary (POC), 264–267, 269–272

**Periodic**

- Auto-Correlation (PAC), 318
- auto-correlation function, 144, 161, 183, 268, 403, 404, 406, 407
- correlation function, 222, 283, 285, 380, 401, 403–407
- Cross-Correlation (PCC), 318
- cross-correlation function, 161, 183, 231, 360, 404, 407

Personal Digital Assistants (PDAs), 191–193

**Physical**

- Common Packet Channel (PCPCH), 115–118
- Downlink Shared Channel (PDSCH), 115, 116, 118
- Random Access Channel (PRACH), 115–118

PICH APAICH, 118

Pico-cell, 106, 107, 149

- wireless communication system, 149

Piconet, 39, 40

Pilot channel, 81–83, 93, 115, 118, 305, 308

Point-to-Multipoint (PtMP), 163

Point-to-Point (PtP), 163

**Power**

- Control (PC), 216, 218
- down registration, 91

Power (*continued*)

- efficiency, 24, 29, 33, 88, 168, 169, 171, 173, 175, 218, 219, 221, 353, 366, 367, 370
- efficient, 185, 241
- Line Communication (PLC), 163
- Spectral Density (PSD), 21–24
  - spectral density, 21, 22, 47, 130, 322, 356
- up registration, 91
- Primary
  - Common Control Physical Channel (PCCPCH), 115, 116, 118, 217
  - Common Pilot Channel (P-CPICH), 118
- Prime code, 373, 376, 380, 392–395
- Primitive complementary code, 231–233, 235, 236, 246, 298
- Processing Gain (PG), 11, 13, 17, 18, 21, 23, 29, 37, 38, 43, 46, 205–207, 220, 239, 248–250, 254, 259, 260, 263, 290, 291, 300, 308–310, 320, 328–331, 393–398, 421–423, 427–429, 431
- Propagation delay, 20, 23, 26–28, 106, 216, 218, 356
- Propagation/penetration loss, 214, 215
- Pseudo
  - Noise (PN), 43, 46, 47, 80, 151, 159
  - noise code sequence, 151
  - random, 17, 47, 48, 50, 80–88, 92, 93, 97, 146, 150–153, 159, 160
  - random binary sequence, 144
  - random noise-like code, 151
- PSK, 97, 163, 218, 276
- Public Subscriber Telephone Network (PSTN), 79
- Pulse
  - Amplitude Modulation (PAM), 89–91, 163, 220
  - Position Modulation (PPM), 42, 43
- Q**
- QAM, 29, 71–73, 163, 204, 218, 276, 310
- QPSK, 18, 24–30, 73, 80–82, 88, 97, 98, 103, 111, 122, 124, 218, 219, 241, 260, 276
- QUALCOMM, 1, 2, 31, 57, 75, 77, 131, 153–155, 157, 164, 177–183, 185, 200, 229
  - Personal Electronic (QPE), 178
- Quality of Service (QoS), 6, 98, 114, 139, 165, 190, 343

## Quasi-orthogonal

- CDMA code, 143
- code, 136, 141, 143, 150, 168, 214, 246, 318
- R**
- RACE, 100
- Radar, 58, 153, 155, 229, 232, 235, 236, 241
- Radio Frequency (RF), 17, 18, 20, 21, 33, 45, 50, 57, 59, 70, 82, 85, 88, 92, 122, 129, 153, 162, 166, 183, 190, 193–195, 198, 215, 221, 296, 335, 367, 370
- Resource Control (RRC) Layer, 112, 114, 128, 159
- Network
  - Controller (RNC), 98, 108, 110, 128, 159
  - Subsystem (RNS), 106
- Raised-cosine-window shaping, 71
- RAKE, 4, 11, 14, 53, 54, 62, 68, 80, 88, 93, 97, 131, 162, 164, 177, 183, 223, 224, 295, 296, 298, 302, 304, 308, 311, 318
- receiver, 4, 11, 53, 54, 62, 68, 80, 88, 93, 131, 162, 164, 177, 183, 223, 295, 296, 298, 304, 308, 311, 318
- Random Access Channel (RACH), 113–118, 121
- Rate matching, 11, 12, 165–167, 240, 241, 301, 309, 311
- Rayleigh fading, 51, 162, 313–316, 322, 326 328–331, 340
- RBS, 107
- Real Environment Adapted Linearization (REAL), 6, 156, 230, 232, 240, 246, 263, 264, 271–273, 371
  - approach, 6, 156, 230, 232, 240, 246, 263, 264, 270–273, 371
- Reciprocal code deleting, 149
- Reflection, 162, 302, 304
- Refraction, 162
- Relay channel, 196
- Remaining set, 94
- Reverse
  - access channel, 88–91
  - CDMA channel, 86–88
  - channel, 86, 87, 90, 92
  - link access channel, 89
  - traffic channel, 92
- Rician
  - distribution, 162

- fading, 162
- RLC, 111–113, 116
  - Sub-Layer, 113
- Root-Raised Cosine (RRC), 124, 125
- Run-length property, 144
  
- S**
- Sampling frequency, 72
- Scrambling code, 118, 122–125, 156, 274
- Searching window, 216, 217
- Secondary Common
  - Control Physical Channel (S-CCPCH), 115, 116, 118, 119, 125
  - Pilot Channel (S-CPICH), 118
- Selection adaptive relay, 199
- Sensor network, 195
- Sequence generator, 25, 34–38, 42, 47
- Service Management (SM), 112
- Shadowing, 214
- Shannon's Theory, 33, 153, 182
- Signal to Noise and Interference Ratio (SNIR), 215
- Signal
  - to Interference Ratio (SIR), 127, 128, 159, 160, 223, 296, 319
  - to Noise Ratio (SNR), 28, 29, 54, 158, 162, 185, 196, 326–331, 343, 362–365
- Signature code, 7, 20, 55, 56, 60, 80, 200, 201, 208, 212, 226, 239, 298–301, 304, 306, 319, 320
- SIM, 95
- Slot, 32, 41, 59, 84, 89–91, 97, 111, 120–123, 127, 159, 198, 216, 218
- Slotted ALOHA, 118
- Slow
  - fading, 167, 196
  - Frequency Hopping (SFH), 10, 39, 41
- Smart antenna, 166, 183, 218, 306
- Smooth upgrading, 44, 95
- SMS, 104
- Soft
  - handoff, 79, 80, 94, 178
  - handover, 115, 116, 126, 128, 177
- Space-Time
  - Block Coding (STBC), 7, 212, 225–227, 313–315, 318, 322, 325–332, 343, 345–347
  - coding, 7, 78, 197, 198, 201, 212, 225–227, 313, 314, 331
  - Complementary Coding (STCC), 7, 313–317, 322, 325–337, 339–341, 343, 345–347
  - Differential Coding (STDC), 7, 212, 225
  - DS/CC-CDMA, 7, 313–317, 322, 325–331, 347
  - OS/CC-CDMA, 7, 313, 314, 331–340, 343, 345–347
  - Trellis Coding (STTC), 7, 212, 225, 314, 332
- Spatial diversity, 7, 191, 197, 212, 225, 226, 313, 325, 331, 332, 337, 343, 346, 347
- Spectral
  - encoded, 373
  - Encoding (SE), 372, 373
  - amplitude encoding scheme, 373
  - Phase Encoding, 373
- Spread Spectrum (SS), 9, 15, 17–19, 24, 26, 34, 39, 41, 44, 45, 46, 48, 50, 53, 54, 56, 57, 68, 77, 109, 144, 150, 151, 153, 159, 191, 192, 195, 229, 236
- Multiple Access (SSMA), 26
- Spreading code, 2, 4–8, 11, 13, 15, 16, 24, 60–63, 65, 66, 68, 109, 110, 132, 135, 136, 139, 143, 144, 149, 150, 154–157, 159–161, 164, 166–168, 177, 187, 205, 209, 211, 214–216, 219–223, 227–232, 255, 264, 267, 275, 292, 297, 301, 309, 310, 314, 318, 330, 349, 350, 352, 353, 363–367, 371–373, 376, 401
- Efficiency (SE), 6, 154, 183, 200, 201, 204, 219, 220, 276, 297, 301, 309–311
- Factor (SF), 12, 13, 46, 92, 97, 110, 118, 122, 123, 125, 126, 137–139, 151, 155, 165, 209, 211, 241, 297, 301, 309
- sequence, 4, 19, 20–23, 26, 372, 376
- Start-of-
  - Message (SOM), 84
  - paging-channel-message, 84
- STBC OCC-CDMA, 226
- Sub-
  - carrier, 7, 24, 69, 70–73, 183, 201, 204, 205, 209, 211, 213, 226, 276, 277, 285
  - channel, 68, 71, 132, 163, 185, 194
- Super Complementary Code, 5, 8, 231, 239–242, 244, 246, 249–255, 278–280, 285, 286, 290–292, 298, 310, 367, 427
- Surface Acoustic Wave (SAW), 153
- Symbol duration, 39, 66, 71, 73, 162, 167, 218, 310, 336, 352, 357, 358

- SYNC
  - DL, 217
  - UL, 216
- Synchronization
  - Channel (SCH), 82, 83, 115, 116, 118, 124
  - Shift (SS), 216, 218
- Synchronous, 5, 11, 13, 14, 20, 21, 30, 37, 40–42, 49, 50, 80, 82, 97, 143, 159, 160, 213–216, 230, 236, 239, 241, 254, 278–281, 285, 301, 302, 304, 308, 309, 311, 314, 315, 319, 370
  - Connection Oriented (SCO), 41
- System
  - IDentification (SID), 84
  - Information Block (SIB), 129
- T**
- T1, 96
- T1P1, 103
- TACS, 181, 222
- TD-CDMA, 97, 102, 103
- TDMA/CDMA, 10, 110
- T-DMB, 163
- TD-SCDMA, 1, 4, 5, 9, 10, 12, 13, 31, 75, 95–97, 99, 100, 102, 103, 135, 136, 139–141, 151, 154, 155, 159, 162, 164, 166, 181, 215, 216–218
- Telecommunications
  - Industry Association (TIA), 2, 10, 96, 131, 178, 187
  - Technology Association (TTA), 96, 103
  - Technology Committee (TTC), 96, 103
- Temporary MS Identification (TMSI), 84
- TF, 113
- TFCI, 118
- Three-dimensional spreading, 7, 212, 213, 225, 347
- Throughput, 58, 59, 98, 103, 186, 190, 194, 199, 212, 214, 225, 328, 332, 343
- TIA/EIA
  - IS-634, 79
  - IS-95, 76
- Time
  - based registration, 91
  - dispersive channel, 71
  - diversity, 4, 88, 225
  - Division Duplex (TDD), 95–98, 103, 104, 108, 110–112, 119, 166, 167, 187, 198–200, 218, 296
  - Division Multiple Access (TDMA), 1, 5, 10–12, 31–33, 44, 48, 51, 53, 56, 57, 59, 68, 77, 79, 95, 98–100, 102, 103, 110, 154, 160, 181, 182, 185, 189, 195
  - Division Multiplex (TDM), 97, 276, 296, 314, 335
  - Division Multiplexing (TDM), 43
  - domain, 6, 7, 14, 19–22, 46, 53, 54, 69, 70, 71, 73, 168, 205, 206, 208, 209, 211–213, 292–294, 347, 372, 373
  - domain spreading modulation, 372, 373
  - frequency hopping, 43
  - Hopping (TH), 6, 10, 42, 43, 45, 48, 50, 153
  - Hopping (TH)-CDMA, 10, 11, 17, 32, 42–44, 45
  - Hopping (TH)-SS, 42, 43, 45
  - Hopping (TH)-FH, 45
    - selective fading, 6, 7, 167, 168, 209, 294
    - slot, 59, 111, 122, 198, 216, 218
  - Traffic channel, 82, 85, 86, 92, 93, 114
  - Transmission power, 4, 29, 42, 57, 59, 71, 120, 158, 185, 187, 195, 196, 218, 221, 296
  - Transmit
    - Power Control (TPC), 58, 118, 127, 128, 159
    - registration request, 88
  - Transmitter-diversity system, 78
  - Transport channel, 114, 115, 117–119, 218
  - TSB-74, 76
  - Turbo, 97
  - Turyn, 232, 235, 236, 241, 298
  - Two-code-per-node, 200
  - Two-dimensional spreading, 7, 204–206, 208, 209, 211–213, 225, 292, 347
  - U**
  - Ultra-Wideband (UWB), 10, 43, 45, 151, 163, 192
  - UMTS
    - FDD, 95, 105
    - TDD, 95, 129
    - Terrestrial Radio Access (UTRA), 96, 104, 112, 113, 117, 119, 122–124, 127
    - Terrestrial Radio Access Network (UTRAN), 3, 98, 102, 104–107, 110, 115, 118, 128, 130
    - UTRA, 9, 12, 13, 31, 33, 115, 158
    - UTRA-FDD, 96, 97, 109
    - UTRA-TDD, 96, 97, 109, 111, 166
    - WCDMA, 96, 97, 100, 104, 125

- Unequal-length OOC, 376–379
  - UNII band, 194
  - Unitary
    - code, 4, 5, 131, 135, 143, 150, 161, 192, 204, 205, 223, 231, 240, 241, 255, 264, 269, 273, 274, 283, 284, 292, 318, 379, 380, 392, 396
    - spreading code, 2, 4, 5, 154, 177, 219, 231, 267, 292
  - Universal Mobile Telecommunications System (UMTS), 95–98, 100, 102–108, 110, 112, 114, 119, 122, 127–129, 144
  - Unlicensed National Information Infrastructure (U-NII), 58
  - Uplink
    - channel, 3, 5, 11, 12, 30, 78, 86, 135, 140, 150, 155, 156, 159, 165, 166, 187, 204, 213, 214, 216, 217, 223, 224, 236, 295, 298, 302, 304–306, 309, 319, 349
    - Dedicated Physical Control Channel (UL DPCCH), 117, 122, 123, 128
    - Data Channel (UL DPDCH), 117, 122, 123, 128
  - UpPTS, 216, 217
  - URA, 129
  - User Equipment (UE), 98, 106, 108, 110, 114, 118, 119, 127–130, 158, 159
  - UTRA
    - FDD, 95–97, 103, 108–111, 114, 119–122, 125, 126
    - TDD, 95–98, 103, 108–111, 120–122, 166
  - UTRAN RNC, 110
  - UWC-136, 95, 103
  - UWCC, 95
- V**
- V-BLAST, 225
  - VDSL, 163
  - Vehicle-to-Vehicle (V2V), 6, 31, 168, 190, 208, 294
  - Vehicle-to-Vehicle communication, 31, 168
  - Voice-over-IP (VOIP), 98, 189
- W**
- Walsh
    - code, 80, 82, 83, 85, 88, 92
  - Hadamard code, 5, 49, 50, 135, 136, 140, 150, 155, 201, 214, 219, 222, 229–231, 236, 241, 273, 278, 292, 298, 314
  - Hadamard matrices, 80, 136, 248
  - Hadamard matrix, 80, 136, 139, 259, 261
  - Hadamard sequence, 4, 11, 56, 132, 136, 139, 141–143, 154, 161, 168–172, 175, 205, 216, 273, 318
  - Wavelength Division Multiple Access (WDMA), 370, 372
  - Wavelets-code, 143
  - WCDMA, 9, 12, 13, 44, 75, 95–106, 109, 113, 119, 125, 129, 131, 132, 135–137, 139–141, 180
  - Welch lower bound, 145
  - Wideband, 4, 10, 17, 19–21, 26, 33, 43, 46, 53, 54, 56, 68, 69, 71, 76, 95, 102, 105, 109, 110, 119, 150, 151, 159, 163, 192
  - CDMA (W-CDMA), 1, 2, 4, 5, 31, 44, 68, 75, 95, 102, 109, 131, 151, 154–157, 159, 162, 164–166, 181, 182, 184, 191, 214, 296, 297, 301, 309
  - Wireless
    - Access for the Vehicular Environment (WAVE), 190, 192
    - Local Area Network (WLAN), 3, 31, 71, 143, 153, 159, 184, 189–194, 212
    - Metropolitan Area Network (WMAN), 31, 184
    - Performance Prediction (WPP), 190
    - Personal Area Network (WPAN), 31, 184, 191–193
    - Regional Area Network (WRAN), 31, 184, 193
    - Wide Area Network (WWAN), 184, 191
  - World Radio Conference (WRC), 98, 99, 102, 103
- X**
- X-axis variable, 363
  - XOR gate, 47, 152
- Z**
- Zero
    - auto-correlation side lobe, 236, 393
    - cross-correlation function, 236
    - shift auto-correlation peak, 383
  - Zone-up registration, 91