Index

A

adaptive algorithm 190
adaptive arrays 354
adaptive beamformer, overview 35
adaptive beamforming assisted receiver 60–81
adaptive beamforming theory 188
adaptive modulation and coding (AMC) 286, 290
adaptive MREC 26
adaptive MSER beamforming 68
adaptive principal component extraction algorithm (APEX) 169
ad hoc networks 500–512
ad hoc networks, and security 402
advanced space-time block codes 107–129
Alamouti code 272
algorithm implementation 164
algorithm properties 166
amount of fading 22
antenna arrays 218
antenna configuration 185
antennas 485
antennas, fixed-beam 404
antennas, multi-beam 398–424
antennas, smart 352–373, 449–473
antenna spacing 226
array gain 11, 22
arrays, adaptive 354
arrays, phased 354
array steering vector (ASV) 34
automatic radio frequency identification (RFID), and smart antennas 449–473
average error probability 24
average far-field beampattern 98
azimuth angle spread models 7

B

barcodes 451
baseband receiver 487
baseband transmitter 486
basic detection 117
beamformer, fully spatial 517
beamformer, space-frequency 516
beamformer, space-time 515
beamformer, wideband spatial 519
beamformer design 265
beamforming, adaptive 537
beamforming, blind adaptive 539
beamforming, sector 536
beamforming, trained adaptive 537
beamforming-decoding interface 87
beamforming algorithm 519
beamforming architectures 185
beamforming matrix, feedback 243
beamforming via sample matrix inversion 84
beampattern 96
beampattern properties 98
Bell Laboratories layered space-time system (BLAST) 226
blind channel estimation 156–182
blind channel estimation, proposed criterion 163
blind channel estimation techniques 162
blind maximum likelihood receiver 162

C

CDMA system 355
channel indeterminacies, solution 168
channel state information (CSI) 156, 375
channel station information 242
cochannel interference (CCI) 82–93
Code Division Multiple Access (CDMA) 352–373
code division multiple access (CDMA) systems 270
collaborative beamforming 94–106
common STBCs 159
compact array antenna 532–544
compact array antenna, DoA 201–216
compact wireless ad hoc network testbed 503
conventional receivers 9
conventional robust adaptive array beamformers 37
correlation matching 169
cumulative distribution function (CDF) 102

Copyright © 2009, IGI Global, distributing in print or electronic forms without written permission of IGI Global is prohibited.

D

data deletion process 428
direction of arrival (DoA) estimation, compact array atenna 201–216
diversity gain 14, 17
diversity order 14

E

eigen-decomposition (EVD) 36
eigencombining 1–32
equivalent weight vector (EWV) method 208
error correction codes (ECC) 130
ESPAR antenna 504
Espar antenna 201, 203, 532
Espar antenna, design of 533
Espar antenna beam pattern 188
Espar antennas 188

F

fading channel model 5
far-field beampattern of random arrays, distribution 99
fast beamforming of compact array antenna 183–200
field programmable gate array (FPGA) 482
frame error rates (FERs) 90
frequency division duplex 240

G

generalized eigenvalue problem (GEV) 163

H

higher-order statistics (HOS) approaches 169
hybrid smart antenna systems 360

I

identifiability analysis 166
IEEE802.15.4/ZigBee 505
intersymbol interference (ISI) channel 130

J

joint beamforming 264–285

K

Karhunen-Loeve transform (KLT) 2

L

least mean square (LMS) algorithm 34
least squares 117
linearly constrained minimum variance (LCMV) beamformer 33
linearly constrained minimum variance array beamformers 37
linear precoding 169
list detection 123
list stack algorithm 123
list stack with restricted branching 124
low complexity near optimal detection 117

M

Massachusetts Institute of Technology (MIT) 450
maximal-ratio combining (MRC) 1, 2
maximal-ratio eigencombining (MREC) 1, 20
maximum-average-SNR (statistical) beamforming (BF) 11
maximum cross-correlation coefficient (MCCC) criterion 183
maximum likelihood sequence estimation (MLSE) decoding 144
MC coded ZF-DFE performance analysis 144
media access protocols, direct 500
MIMO beamforming 240–263
MIMO channel capacity 289
MIMO channel model 287
MIMO transmit and receive beamforming 241
minimum mean square error (MMSE) 118
minimum mean squared error (MMSE) decoding 144
minimum mean square error (MMSE) design 60
minimum mean square error minimum mean square error (MMSE) beamforming design 64
minimum symbol error rate (MSER) design 60
minimum variance distortionless response (MVDR) beamformer 83
minor component analysis (MCA) 39
modulated codes (MC) 130
Monte Carlo simulations 308
MRC numerical complexity 19
MRC performance 18
MSER beamforming design 64
multi-antenna systems 217–239
multi-beam antennas 398–424
multiple-input-multiple-output (MIMO) 226, 375
multiple-input multiple-output (MIMO) systems 107, 156
multiple-input multiple-output antenna system (MIMO) 240–263
multiple antennas 217
multiple input-multiple output (MIMO), and relaxation detection 308–327
multiple input-multiple output (MIMO) 474–499
multiple input-multiple output (MIMO), capacity 477
multiple input-multiple output (MIMO), system 476
multiple input-multiple output (MIMO), testbed 478
multiple input multiple output (MIMO) channels 264–285
multiplexing gain 226
mutual admittance matrix calculation 187
mutual coupling 522

mutual coupling, array antennas 223

N

new high rate STBC 110
non-preamble-based SMI beamforming 85, 86
non-redundant precoding 172
null forming ability 193
numerical complexity comparison 26
numerical experiments 48

O

omniradiation 534
optimal MC design 147
orthogonal space-time block code (O-STBC) 110, 159
outage probability 24

P

parasitic array antennas 184
phased arrays 354
power azimuth spectrum 7
power control scheme 380
power control scheme, 1-bit 381
power control scheme, multi-bit 383
Power Pattern Cross Correlation (PPCC) 202
preamble-based SMI beamforming 86
previous blind decoding approaches 161
principal component analysis (PCA) 39

Q

QRD-stack 120
quadrature amplitude modulation (QAM) schemes 60
quasi-orthogonal space-time block codes (QSTBCs) 160

R

radio systems 513
radio waves 426
random array theory 94–106
random azimuth spread 28
rate-four code for four transmit antennas 110
rate-reduction technique 170
rate-two code for four transmit antennas 111
rate-two code for three transmit antennas 112
rayleigh fading system 73
RD-ESPRIT 206
RD-ESPRIT algorithm 209
RD-MUSIC 206
RD-MUSIC algorithm 208
realistic BF 18
received signal model 4
relaxation detector 316
RFID readers 451
robust adaptive beamforming 33–59
robust beamformer, new uncertainty constraints 44
robust beamforming, based on max-min optimization 39
robust capon beamformer (RCB) 40

S

sample covariance matrix (SCM) 83
sample matrix inversion (SMI) beamforming, employment of 82–93
scalar quantization 244
scanned beam antenna systems 453
scheduling, fair 378
scheduling, greedy 377
scheduling schemes, and channel dynamics 377
SESAM 332
sidelobes 102
signal-to-interference-plus-noise ratio (SINR) 39
signal-to-noise ratio (SNR) 218
signal and channel models 4
signal model 35, 108
signal model and assumptions 191
signal to noise ratio (SNR) 156
simultaneous perturbation stochastic approximation (SPSA) theory 183
single-input single-output (SISO) concept 10
smart antenna, and key generation system 425–448
smart antennas 183, 514, 449–473
smart antennas, and pilot availability 356
smart antennas, channel models for 357
smart antennas, for code division 352–373
smart antennas, hybrid 360
smart antennas, uplink vs. downlink 356
smart antennas, vs. diversity 355
smarter antenna arrays 26
SNR probability density function 23
space-division multiple access (SDMA) 94
space-time block coding (STBC) 107, 156
space-time block coding data model 157
space-time coding 270
space-time MC, information rates 136
space-time MC coded MIMO systems, capacity 136
space-time modulated codes for MIMO channels 130–155
space division multiple access (SDMA) 264
spatial multiplexing (SM) 109
standard LMS beamforming 193
stationary system 70
statistical beamforming (BF) 2
statistical beamforming (BF) procedure 11
STBC data model 158
STBCs, new techniques 170
Stockman, H. 450
structured codebook 248
subspace-based techniques 162

sum rate maximization 333
SWAMP 501
SWAMP OC-mode 506
switched beam antenna system 354
switched beam array antenna 454
system model 61, 83, 96

T

tapped-delay lines (TDLs) 516
TDMA system 355
thermal noise 225
time division duplex 240
trace-orthogonal space-time block codes (TOSTBCs) 161
transmit beamforming 240, 265
trellis coded modulation (TCM) 144

U

uncertainty of steering vector 42
uniformly distributed random array 98
University of Queensland 483
unstructured codebook 247

V

vector quantization 246
vector space illustration 85

W

wideband smart antenna 513–531
wireless communications 217
wireless communication systems 474

Z

zero-forcing decision feedback equalizer (ZF-DFE) decoding 144