Index

A
AAA framework 148
accelerometer 69
access services network (ASN) 8
ACC system 62
adaptive cruise control (ACC) 58, 61
Adaptive traffic control systems 331
ad-hoc domain 372
Ad-hoc On-demand Distance Vector (AODV) 80
Advanced Public Transportation Systems (APTS) 35
American Electronic Sign Co (AES) 54
analog-to-digital converter (ADC) 68
Android Market 294
Android/OSGi applications 305, 306, 307
Android platform 290, 291, 292, 294, 296, 299, 300, 301, 304, 307, 308
Android-powered infotainment operating system 292
Android software 292
antilock braking system (ABS) 58, 60
application management 15, 21
application programming interface (APIs) 290
application server (AS) 164
Application Support Sublayer (APS) 77
APS data entity (APSDE) 77
APS management entity (APSME) 77
APTS system 36
architecture framework 144
ASN-anchored mobility 149, 150
Aspect-Oriented Programming (AOP) 298
asynchronous communication 258
Automatic Cargo Identification (ACI) 38
automatic number plate recognition (ANPR) 33
Automatic Vehicle Classification (AVC) 34
automatic vehicle identification (AVI) 34, 38
automatic vehicle locations (AVL) 34, 36, 38
Automatic Vehicle Monitoring (AVM) 36, 38

B
backbone creation 203
backbone member 203
Backbone Member (BM) 202
Back-to-Back UA (B2BUA) 178
base station (BS) 8
beacon-enabled network 79
Bellman-Ford algorithm 135
biometric system 72
blind-spot warning 60
block diagram 64, 65, 66
Bluetooth 167, 181
broadcast protocols 208, 226

C
C2F protocols 48, 49
C2X-applications 248
CAN (Controller Area Network) 1, 2
Car alarm system 124
CAR protocol 211, 212, 213, 214
Center-to-Center (C2C) 32
central processing unit (CPU) 232
changeable message signs (CMS) 33, 34, 35
CIM Object Manager (CIMOM) 315
CIM schema 314, 315
CIM specification 314
Cologne-based project 297
Common Gateway Interface (CGI) 24
common information model object manager (CIMOM) 322
common information module (CIM) 320
communication protocols 160, 161, 162, 167, 171, 173, 174, 175
communications media 51
complex network protocols 230
components-oriented 295
computer vision system 128, 129, 130
computing environment 295
Confidentiality block (CB) 264
connectivity services network (CSN) 8
contention access period (CAP) 78
context-aware multicast routing (CAMR) 264
circuit-aware multicast routing (CAMR) scheme 264
Context-Aware Routing (CAR) protocol 258
circuit information 17, 18, 28
control channel (CCH) 91, 95
Controlled Vehicular Internet Access (CVIA) 185
customer area network (CAN) 2, 5, 20, 75
CVO technologies 38
cyclic redundancy checksum (CRC) 4
D
data encryption mechanism 323
data packets 82, 83
data transmission 23
data transmissions 206, 261
Dedicated short range communications (DSRC) 231
Delay-bounded routing protocol 209
Delay/disruption tolerant networks (DTN) 252
delay model 211
Delay Tolerant Network (DTN) 252, 254
Denial-of-service (DoS) 377
Department of Defense (DoD) 109
diagnosis system 310, 319, 327
Diamond Digital router 339
digital data 61, 68
digital library 133, 135
digital map database 131, 133, 134, 137, 138
digital map library 133, 135
digital multimedia renderer (DMR) 179
digital multimedia server (DMS) 179
Digital Right Management (DRM) 170
Direct Sequence Spread Spectrum (DSSS) 77
Distance-Driven Probabilistic Diffusion (DDPD) 199
D-MinCost algorithm 217
Document Type Definition (DTD) 315
DSRC protocol layer 184
DTN routing algorithms 256
dynamic aspect 119
dynObjIndex 281, 282, 285
E
Earliest Delivery with All Queues (EDAQ) 258
Earliest Delivery with Local Queuing (EDLQ) 258
effective path length (EPL) 259
electronic control unit (ECU) 4, 6, 58, 61, 296
Electronic Emergency Brake Light (EEBL) 372
Electronic Fare Payment (EFP) 36
electronic stability program (ESP) 58, 66
Electronic Toll Collection (ETC) 34, 38
e-map 119
embezzlement 124
emergency-vehicle-approach 225
encounter-based multicast routing (EBMR) 264
delay-to-end communicate 100
delay-to-end paths 232
environmental information 65
Evaluate state 193
Extensible Authentication Protocol (EAP) 148
F
Federal Communications Commission (FCC) 231
Felix framework 304
ferry relaying algorithm (FRA) 259
Fixed Mobile Convergence (FMC) 163
FlexRay protocol 2, 5
full function device (FFD) 76
Function-Driven Probabilistic Diffusion (FDPD) 200
G
GBR (GroupBased Routing) 263
General Packet Radio Service (GPRS) 10
generated-map-based model 350
Generation Telematics Protocol 28, 30
gecast protocol 206, 217, 218, 219
Geographic Information Systems (GIS)
 34, 35, 39
graphic routing protocol 365
Global Positioning Systems (GPS) 15, 35, 247
Global Satellite Positioning System (GPS)
 108, 109
globa system for telematics (GST) 295
Google Earth 356, 358, 359
GPS receiver 109, 110, 111, 113, 115, 116
gross domestic product (GDP) 369
ground-based destinations 236
Group-Based Routing (GBR) 263

H
hardware description language (HDL) 67
Health management server (HMS) 23
Heterogeneous Vehicular Network Diagnosis
System 310
HIGA functional component 181
Highway Advisory Radio (HAR) 35, 39
Home Gateway Initiative (HGI) 160
Home IMS Gateway (HIGA) 160, 177
Home Subscriber Server (HSS) 164
home/vehicular network
 160, 161, 165, 170, 175, 181
hop-by-hop manner 203
HTTP (Hyper Text Transmission Protocol) 162
HTTP-over-DTN 266
HTTP-over-TCP 266
HTTP standard protocol 170
Hudson Valley Transportation Management
Center (HVTMC) 236, 249
human-computer interaction 23
human-machine interface
 131, 133, 136, 137, 138, 291
Human-to-human communications 47
Hybrid Simulation Mode 365
hybrid vehicular communication (HVC) 230
hydraulic modulator 65

I
IC technology 59, 64
IEEE 1609 90, 91, 92, 93, 94, 95, 97, 98,
 100, 103, 104
IMS network 177, 178, 179, 180
Information and Communication Technology
(ICT) 15
information module 320, 321, 322, 323
integrated circuit (IC) 67
intelligent transportation system (ITS) 32, 33,
 206, 246
Inter-agent communication 18
inter-contact time 255
inter-departure time 359
International Organization of Standards (ISO)
 49
Internet Protocol Based (IP-BASED) 318
Internet service provider (ISP) 320
inter-node connections 243
inter-vehicle communication (IVC) 210, 214,
 219, 230, 370
inter-vehicle communications system 225
intra ASN mobility 149
in-vehicle network
 1, 2, 5, 6, 58, 59, 61, 62, 68
in-vehicle network architecture 312
in-vehicle networks 1, 12
In-Vehicle Telematics Systems (IVIS) 18
IP-based home network 317
IP-based multimedia application 160
IP-based multimedia services 160
IP-based network technology 161
IP Multimedia Service Control (ISC) 164
IP Multimedia Subsystem (IMS)
 160, 161, 181
IP service model 144

J
Java Archive (JAR) 295
JINI location 18
JINI middleware 17, 18

K
knowledge-based mechanisms 256, 268
K virtual machine (KVM) 296

L
LAN control module 321, 322, 323
LAN management module
 320, 321, 322, 323, 324, 325
LAN module 320, 321, 322, 323, 324, 325
LDAP (Lightweight Directory Access Protocol) 166
Licklider Transmission Protocol (LTP) 261
LIN (Local Interconnect Network) 1, 2, 312
Linux kernel 291, 292, 294, 299
local interconnect network (LIN) 2, 5, 20
Location centric 243
LR-WPAN 74, 75, 76

M
machine interaction 72
MAC protocols 183, 184, 185, 195, 204, 253
macro-scale levels 356
MAC sublayer management entity (MLME) 91, 92
management information base (MIB) 95, 271
management object format (MOF) 322, 327, 329
MANET simulation 349
map-based Activities 307
map-matching algorithm 119
map-matching function 134, 135, 137
map-matching module 133
map-matching process 131, 133, 134, 137
media oriented systems transport (MOST) 5
media streaming 161
medium access control (MAC) 230
mesh node 339, 341, 342, 345
metropolitan-area wireless mesh networks (MAWMN) 332
metropolitan-scale WMN 331
microcontroller unit (MCU) 11
microelectrical mechanical system (MEMS) 69
mobile ad hoc networks (MANETs) 206, 207, 229, 230, 369, 371
mobile agents 25, 26
mobile device 161, 170, 179, 180
mobile navigation assistant (MNA) 137
mobile network node 7
mobile networks 2
mobile router 24
mobile station (MS) 8
Mobile telematics computing environment 24
mobile vehicular network 62
mobility model 348, 349, 352, 353, 355, 356, 357, 360, 361, 363, 364, 365, 366, 367, 368
MOST (Media Oriented Systems Transport) 1, 2
MRT environment 158
multicast packets 207, 217, 226
multicast tree 263
multi-hop 370, 371, 372, 375, 377
multi-hop communication 185, 207
multi-hop forwarding 206, 209, 210, 211, 216, 217
multi-hop manner 183, 185
multi-hop transmission 209
multi-hop wireless transmission 207
multimedia contents 71
multimedia data 176, 177, 180, 181
multimedia data sharing 177, 181
multimedia file 169, 170, 180
multimedia storage 161
multiple routes (MURA) 259

N
navigation routing algorithm 119
navigation system 119, 125, 126, 127, 128
Network Access Provider (NAP) 144
network architecture 1, 2, 3, 7, 8, 9
Network Attached Storage (NAS) 179
network devices 161, 171
network environment 160, 167, 174
network fragmentation 206, 207, 208, 214, 217, 218, 219, 221, 222, 225
network framework 163, 170, 171, 181
network-layer packet 377
Network Management Framework 271
Network-Management Systems (NMSs) 317
network monitoring 7
network on wheels (NoW) 371
Network protocol conversion 321, 322
network protocol conversion module 321, 322, 324
network reference model 144, 145, 146
Network Service Provider (NSP) 144
network simulator 349, 354
Network Surveillance 288
Index

network topology 253, 258
Next Generation Network (NGN) 162, 163
Node centric 243
Node-Initiated MF (NIMF) 259
non-beacon-enabled network 79
non-real-time applications 331, 335
non-recurring engineering (NRE) 67
non-stationary solutions 242
Normal Vehicle (NV) 202
NTCIP-based system 49
NTCIP-compatible traffic 41
NTCIP protocols 42, 44, 49, 53, 54

O
object-oriented schema 314
on-board computers 1, 9
on-board computers (OBC) 298
onboard units (OBU) 38, 371
one-hop delay 196
one-hop transmission 195
One Zero Flooding (OZF) 199
Open Service Gateway Initiative (OSGi) 160, 181,
Open Service Gateway Initiative Service Platform (OSGi SP) 160
operating system (OS) 6, 67
operation environment 63
Opportunistic forwarding 243
Original Equipment Manufacture (OEM) platforms 290
orthogonal frequency division multiplex (OFDM) 231
OSEK Implementation Language (OIL) 21
OSEK/VDX operating system 2
OSGi framework 295, 299, 300, 301, 302, 303, 305, 307, 313, 314, 325
OSGi platform 161, 165, 171, 174, 310, 311, 312, 325, 326
out-vehicle network 1, 2, 3
out-vehicle network architecture 1, 2, 3
OZF 199

P
peer-to-peer topology 79
Personal Digital Assistant (PDA) 372
Physical Layer (PHY) 184, 204
Point-to-Point Protocol (PPP) 41, 52
position-based fashion 210
Post Crash Notification (PCN) 372
Practical Expected Delays (PEDs) 262
prepaid server (PPS) 158
probabilistic-based MAC protocol 185
Probe Surveillance 288
programmable logic device (PLD) 67
Protocol data unit (PDU) 279
protocol stack 45, 48, 52
prototype model 6
push-to-talk (PTT) 84
PXE network 345

Q
QoS-based accounting 157, 158

R
radio-frequency ID (RFID) 72
radio frequency (RF) 69
RADIUS Server 158
random waypoint (RWP) 232, 349
real-time map 365
real-time road information selections 243
Received Channel Power Indicator (RCPI) 95
reduced function device (RFD) 76
regional computers (RC) 332
Regional Traffic Control 288
Remote Access Client (RAC) 178
Remote Access Discovery Agent (RADA) 178
Remote Access Server (RAS) 178
Remote Access Transport Agent (RATA) 178
remote alarm system 123
remote transmission request (RTR) 4
Road Feature Notification (RFN) 372
Road Hazard Condition Notification (RHCN) 372
Road-Look-Ahead (RLA) 17
roadside-to-vehicle communication systems (RVC) 230
roadside to vehicle (R2V) 213
Road Side Unit (RSU) 183, 371, 372
ROMSGP protocol 213
route discovery table (RDT) 82
route guidance process 131, 133, 135, 136, 137
route planning process 131, 133, 134, 135, 136, 137
routing protocols 206, 207, 208, 209, 210, 218, 220, 222, 223, 226
routing table (RT) 82
RREP packets 82, 215
RTA wireless network 334

S
Sami Network Connectivity (SNC) 254
satellite technology 125
SDP parameters 179
service-based architecture 18
service channel (SCH) 95
service environments 23
service-integrated platform 160, 161
service-oriented architecture (SOA) 295
ServiceReference array 304
shortest expected path routing (SEPR) 259
Short-range radars (SRR) 69
Simple Network Management Protocol (SNMP) 42, 317, 318
Simple Transportation Management Framework (STMF) 271
Simple Transportation Management Protocol (STMP) 42, 271
simulation model 352
SIP Proxy Server 171
SIP Service Bundle 171, 172, 173, 174, 175
sleep mode 74, 78, 79, 87
Slow Vehicle Alert (SVA) 372
Smart Probe Data 288
smart vehicle management system (SVMS) 20
SNMP manager 317
social networking 253
source-to-destination path 207, 208
sparse RVC (SRVC) 231
spatiotemporary coordination 220
SPER protocol 259
SRVC system 231, 234, 236
start-of-frame (SOF) 4
state-of-the-art 266
STMP 271, 272, 274, 275, 280, 281, 283, 284, 285, 286, 287, 289
Street RAndom Waypoint (STRAW) 365
sub-network 320, 321, 322, 323, 324, 325, 326, 328

Sub-network 321
sub-network agent 320, 321, 323, 325
sub-network information 320, 321
sub-network instruction 322
Sydney Coordinated Adaptive Traffic System (SCATS) 333
system architecture 325
system-on-chip (SoC) 67
system platform 131, 137

T
TCP-based convergence layer (TCPCL) 262
TCPCL connection 262
TCP protocol 95
TDMA-based MAC protocols 183, 185, 204
TDMA system 185
Telecommunications Management Network (TMN) 311
telematics protocol 15, 28
telematics service 2
telematics system 17
telemetric applications 15
TIGER maps 359, 364
topology 206, 207, 208, 210, 217, 219, 349, 357, 361, 363, 366
trace-based 349
traction control system (TCS) 58, 61, 65
traffic control system 365
traffic information center (TIC) 137
traffic management centre (TMC) 333
traffic quality 207
Transmission Control Protocol (TCP) 262
travel network 242
TSPs (Telematics Service Providers) 2

U
Ubiquiti wireless cards 339
Unwired network 341, 342, 345
URVC (Ubiquitous Roadside-to-Vehicle Communication) 235
Usage Data Records (UDR) 158
USB-to-serial link 345
User Agent Client (UAC) 162
User Agent Server (UAS) 162
Index

V
VADD protocol 211
VANET 185, 190, 193, 196, 202, 204
VANET embedded system 291
VANET environment 364, 365, 366
VANET protocol design 355
VANET simulations 355, 356, 357, 366
VANETs technologies 183
Variable Message Sign (VMS) 54
variable valve timing (VVT) 71
Vehicle Ad Hoc Networks (VANETs) 229, 230
vehicle dispatch server (VDS) 23
vehicle management program (VMP) 20
vehicle navigation system 131, 132, 133, 134, 135, 136, 137, 139, 141
Vehicle Navigation System (VNS) 131
vehicle to infrastructure (V2I) 91, 229, 230
vehicle to infrastructure (V2I) communication 229, 230
vehicle-to-roadside 90
vehicle-to-vehicle 90
vehicle to vehicle (V2V) 91, 229, 230
vehicle to vehicle (V2V) communication 229, 230, 253
vehicle tracking system 139
Vehicular ad hoc network (VANET) 136, 183, 206, 252, 356, 370
Vehicular Communication (VC) system 369
vehicular environment 160
vehicular network application 15
vehicular network environment 311, 312
vehicular network middleware 310
vehicular networks 348, 365
vehicular router 24
very-large-scale integration (VLSI) 67
VeSOMAC allocation 190
video-broadcasting service 167
Video on demand (VOD) 158
Virtual TMC 288
voice over IP (VoIP) 84
voronoi-based mobility model 365, 368
WAVE management messages 90, 91, 97
WAVE multi-channel operations 90, 91
WAVE network services 91, 94, 95
WAVE resource management 91
WAVE short message protocol (WSMP) 92, 95, 96
WAVE short message (WSM) 91, 94
WAVE systems 185
WBEM-based Remote Management 310
WBEM-based Remote Vehicular Network Management 311, 326, 327
WBEM protocols 311
web-based communication protocol 167
web-based enterprise management (WBEM) 311, 322
Weigh-in-Motion (WIM) 34
wide area network (WAN) 319
WiMAX 144, 145, 147, 148, 149, 150, 153, 154, 155, 156, 157, 158, 159
WiMAX core network 144, 149, 150, 155, 158
Windows Management Instrumentation (WMI) 316
Wired Equivalent Privacy (WEP) 377
wireless access in vehicular environment (WAVE) 7, 90, 91
wireless ad-hoc network 371
Wireless channels 337
wireless communication 20
wireless mesh 331, 332, 333, 335, 340, 345
Wireless mesh networks (WMN) 331, 332, 340
wireless personal area network (WPAN) 75
wireless sensor network (WSN) 74
X
x-by-wire 5
XML document 168
XML format 169, 175, 176
Z
ZigBee 74, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 86, 87, 88, 89
ZigBee topology 81
zone of relevance (ZOR) 219, 233

WAN (Wide Area Network) 10, 12
WAVE Basic Service Set (WBSS) 95, 96