
**Information technology —
Telecommunications and information
exchange between systems — Local and
metropolitan area networks — Specific
requirements —**

Part 11:
**Wireless LAN medium access control
(MAC) and physical layer (PHY)
specifications**

*Technologies de l'information — Télécommunications et échange
d'information entre systèmes — Réseaux locaux et métropolitains —
Exigences spécifiques —*

*Partie 11: Spécifications du contrôle d'accès du milieu sans fil (MAC) et
de la couche physique (PHY)*





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- *Part 11: Wireless LAN medium access control (MAC) and physical layer (PHY) specifications*
- *Part 15-4: Wireless medium access control (MAC) and physical layer (PHY) specifications for low-rate wireless personal area networks (WPANs)*

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**IEEE Standard for Information technology—
Telecommunications and information exchange between systems
Local and metropolitan area networks—
Specific requirements**

Part 11: Wireless LAN Medium Access Control (MAC) and Physical Layer (PHY) Specifications

IEEE Computer Society

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Part 11: Wireless LAN Medium Access Control (MAC) and Physical Layer (PHY) Specifications

Sponsor

**LAN/MAN Standards Committee
of the
IEEE Computer Society**

Approved 6 February 2012

IEEE-SA Standards Board

Abstract: This revision specifies technical corrections and clarifications to IEEE Std 802.11 for wireless local area networks (WLANS) as well as enhancements to the existing medium access control (MAC) and physical layer (PHY) functions. It also incorporates Amendments 1 to 10 published in 2008 to 2011.

Keywords: 2.4 GHz, 3650 MHz, 4.9 GHz, 5 GHz, 5.9 GHz, advanced encryption standard, AES, carrier sense multiple access/collision avoidance, CCMP, channel switching, Counter mode with Cipher-block chaining Message authentication code Protocol, confidentiality, CSMA/CA, DFS, direct link, dynamic frequency selection, E911, emergency alert system, emergency services, forwarding, generic advertisement service, high throughput, IEEE 802.11, interface, international roaming, interworking, interworking with external networks, LAN, local area network, MAC, measurement, medium access control, media-independent handover, medium access controller, mesh, MIH, MIMO, MIMO-OFDM, multi-hop, multiple input multiple output, network advertisement, network discovery, network management, network selection, off-channel direct link, path-selection, PHY, physical layer, power saving, QoS, quality of service, PHY, physical layer, QoS mapping, radio, radio frequency, RF, radio resource, radio management, SSP, SSPN, subscriber service provider, temporal key integrity protocol, TKIP, TPC, transmit power control, tunneled direct link setup, wireless access in vehicular environments, wireless LAN, wireless local area network, WLAN, wireless network management, zero-knowledge proof

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Introduction

This introduction is not part of IEEE Std 802.11-2012, IEEE Standard for Information technology—Telecommunications and information exchange between systems—Local and metropolitan area network—Specific requirements—Part 11: Wireless LAN Medium Access Control (MAC) and Physical Layer (PHY) specifications.

This revision gives users, in one document, the IEEE 802.11 standard for wireless local area networks (WLANS) with all the amendments that have been published to date.

Incorporating published amendments

The original standard was published in 1999 and reaffirmed in 2003. A revision was published in 2007, which incorporated into the 1999 edition the following amendments: IEEE Std 802.11aTM-1999, IEEE Std 802.11bTM-1999, IEEE Std 802.11b-1999/Corrigendum 1-2001, IEEE Std 802.11dTM-2001, IEEE Std 802.11gTM-2003, IEEE Std 802.11hTM-2003, IEEE Std 802.11iTM-2004, IEEE Std 802.11jTM-2004 and IEEE Std 802.11eTM-2005.

The current revision, IEEE Std 802.11-2012, incorporates the following amendments into the 2007 revision:

- IEEE Std 802.11kTM-2008: Radio Resource Measurement of Wireless LANs (Amendment 1)
- IEEE Std 802.11rTM-2008: Fast Basic Service Set (BSS) Transition (Amendment 2)
- IEEE Std 802.11yTM-2008: 3650–3700 MHz Operation in USA (Amendment 3)
- IEEE Std 802.11wTM-2009: Protected Management Frames (Amendment 4)
- IEEE Std 802.11nTM-2009: Enhancements for Higher Throughput (Amendment 5)
- IEEE Std 802.11pTM-2010: Wireless Access in Vehicular Environments (Amendment 6)
- IEEE Std 802.11zTM-2010: Extensions to Direct-Link Setup (DLS) (Amendment 7)
- IEEE Std 802.11vTM-2011: IEEE 802.11 Wireless Network Management (Amendment 8)
- IEEE Std 802.11uTM-2011: Interworking with External Networks (Amendment 9)
- IEEE Std 802.11sTM-2011: Mesh Networking (Amendment 10)

As a result of publishing this revision, all of the previously published amendments and revisions are now retired.

Technical corrections, clarifications, and enhancements

In addition, this revision specifies technical corrections and clarifications to IEEE Std 802.11 as well as enhancements to the existing medium access control (MAC) and physical layer (PHY) functions. Such enhancements include incorporated interpretation requests.

Revised clause and annex numbering

In IEEE Std 802.11-2012, the order of clauses and annexes has also been revised. The result of this revised order on the numbering of clauses and annexes is summarized in Figure A.

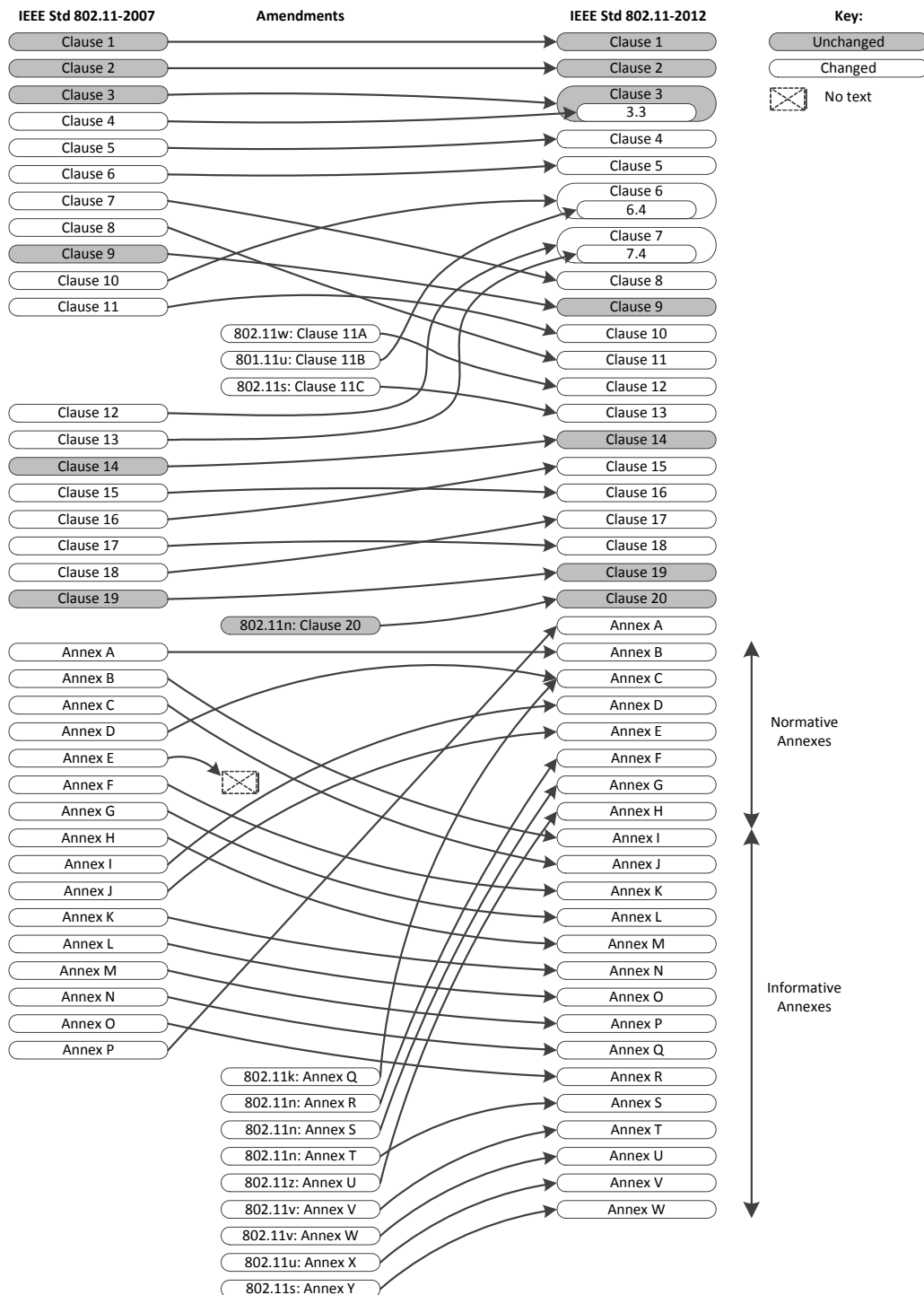


Figure A—Changes in clause numbers and annex letters from 2007 revision to 2012 revision

Contents

1.	Overview.....	1
1.1	Scope.....	1
1.2	Purpose.....	1
1.3	Supplementary information on purpose.....	1
1.4	Word Usage	2
2.	Normative references.....	2
3.	Definitions, acronyms, and abbreviations.....	5
3.1	Definitions	5
3.2	Definitions specific to IEEE 802.11	24
3.3	Abbreviations and acronyms	34
4.	General description	44
4.1	General description of the architecture.....	44
4.2	How WLAN systems are different	44
4.2.1	Introduction.....	44
4.2.2	Wireless station (STA).....	44
4.2.3	Media impact on design and performance.....	44
4.2.4	The impact of handling mobile STAs.....	45
4.2.5	Interaction with other IEEE 802® layers.....	45
4.2.6	Interaction with non-IEEE-802 protocols.....	45
4.3	Components of the IEEE 802.11 architecture	45
4.3.1	General.....	45
4.3.2	The independent BSS (IBSS) as an ad hoc network.....	46
4.3.3	STA membership in a BSS is dynamic.....	46
4.3.4	Distribution system (DS) concepts	46
4.3.4.1	Overview	46
4.3.4.2	Extended service set (ESS): The large coverage network	47
4.3.4.3	Robust security network association (RSNA)	48
4.3.5	Area concepts.....	49
4.3.6	Integration with wired LANs.....	50
4.3.7	QoS BSS: The QoS network.....	51
4.3.8	Wireless LAN Radio Measurements	52
4.3.8.1	General.....	52
4.3.8.2	Beacon.....	53
4.3.8.3	Measurement Pilot	53
4.3.8.4	Frame	53
4.3.8.5	Channel load	54
4.3.8.6	Noise histogram	54
4.3.8.7	STA statistics	54
4.3.8.8	Location	54
4.3.8.9	Measurement pause.....	54
4.3.8.10	Neighbor report.....	54
4.3.8.11	Link measurement.....	54
4.3.8.12	Transmit stream/category measurement	55
4.3.9	Operation in licensed frequency bands.....	55
4.3.9.1	General.....	55
4.3.9.2	Dynamic STA enablement (DSE) in licensed bands	55

	4.3.9.3	Contention-Based Protocol (CBP) in nonexclusively licensed bands ..	55
	4.3.9.4	Using DSE STA identification to resolve interference	55
	4.3.9.5	Further coexistence enhancements in nonexclusively licensed bands ..	55
4.3.10		High-throughput (HT) STA	56
4.3.11		STA transmission of data frames outside the context of a BSS	56
4.3.12		Tunneled direct-link setup	57
4.3.13		Wireless network management	57
	4.3.13.1	Overview	57
	4.3.13.2	BSS Max idle period management	58
	4.3.13.3	BSS transition management	58
	4.3.13.4	Channel usage	58
	4.3.13.5	Collocated interference reporting	58
	4.3.13.6	Diagnostic reporting	58
	4.3.13.7	Directed multicast service (DMS)	58
	4.3.13.8	Event reporting	58
	4.3.13.9	FMS	59
	4.3.13.10	Location services	59
	4.3.13.11	Multicast diagnostic reporting	59
	4.3.13.12	Multiple BSSID capability	59
	4.3.13.13	Proxy ARP	59
	4.3.13.14	QoS traffic capability	59
	4.3.13.15	SSID list	59
	4.3.13.16	Triggered STA statistics	59
	4.3.13.17	TIM broadcast	60
	4.3.13.18	Timing measurement	60
	4.3.13.19	Traffic filtering service	60
	4.3.13.20	U-APSD Coexistence	60
	4.3.13.21	WNM-Notification	60
	4.3.13.22	WNM-Sleep mode	60
4.3.14		Subscription service provider network (SSPN) interface	60
4.3.15		Mesh BSS: IEEE 802.11 wireless mesh network	61
	4.3.15.1	General	61
	4.3.15.2	Overview of the mesh BSS	61
	4.3.15.3	Mesh STA	62
	4.3.15.4	IEEE 802.11 components and mesh BSS	62
	4.3.15.5	Introduction to mesh functions	64
4.4		Logical service interfaces	67
	4.4.1	General	67
	4.4.2	SS	68
	4.4.3	DSS	68
4.5		Overview of the services	69
	4.5.1	General	69
	4.5.2	Distribution of messages within a DS	70
	4.5.2.1	Distribution	70
	4.5.2.2	Integration	70
	4.5.2.3	QoS traffic scheduling	71
4.5.3		Services that support the distribution service	71
	4.5.3.1	General	71
	4.5.3.2	Mobility types	71
	4.5.3.3	Association	71
	4.5.3.4	Reassociation	72
	4.5.3.5	Disassociation	72
4.5.4		Access control and data confidentiality services	73
	4.5.4.1	General	73

4.5.4.2	Authentication	73
4.5.4.3	Deauthentication	74
4.5.4.4	Data confidentiality	75
4.5.4.5	Key management	75
4.5.4.6	Data origin authenticity	75
4.5.4.7	Replay detection	76
4.5.4.8	Fast BSS transition	76
4.5.4.9	Robust management frame protection	76
4.5.5	Spectrum management services	76
4.5.5.1	General	76
4.5.5.2	TPC	76
4.5.5.3	DFS	77
4.5.6	Traffic differentiation and QoS support	77
4.5.7	Support for higher layer timer synchronization	77
4.5.8	Radio Measurement service	78
4.5.9	Interworking with external networks	78
4.6	Multiple logical address spaces	79
4.7	Differences between ESS and IBSS LANs	79
4.8	Differences between ESS and MBSS LANs	81
4.9	Reference model	81
4.9.1	General	81
4.9.2	Interworking reference model	82
4.10	IEEE Std 802.11 and IEEE Std 802.1X-2004	83
4.10.1	General	83
4.10.2	IEEE 802.11 usage of IEEE Std 802.1X-2004	83
4.10.3	Infrastructure functional model overview	84
4.10.3.1	General	84
4.10.3.2	AKM operations with AS	84
4.10.3.3	AKM Operations with a Password or PSK	86
4.10.3.4	Alternate operations with PSK	87
4.10.3.5	Disassociation	88
4.10.4	IBSS functional model description	88
4.10.4.1	General	88
4.10.4.2	Key usage	88
4.10.4.3	Sample IBSS 4-Way Handshakes	88
4.10.4.4	IBSS IEEE 802.1X example	90
4.10.5	Authenticator-to-AS protocol	90
4.10.6	PMKSA caching	91
4.10.7	Protection of group addressed robust management frames	91
4.11	Generic advertisement service (GAS)	91
5.	MAC service definition	92
5.1	Overview of MAC services	92
5.1.1	Data service	92
5.1.1.1	General	92
5.1.1.2	Determination of UP	92
5.1.1.3	Determination of UP of received frames at the AP sent by other STAs in the BSS	92
5.1.1.4	Interpretation of priority parameter in MAC service primitives	93
5.1.1.5	Interpretation of service class parameter in MAC service primitives in a STA	93
5.1.2	Security services	94
5.1.3	MSDU ordering	95

5.1.4	MSDU format	95
5.1.5	MAC data service architecture	95
5.2	MAC data service specification	97
5.2.1	General	97
5.2.2	MA-UNITDATA.request	97
5.2.2.1	Function	97
5.2.2.2	Semantics of the service primitive	97
5.2.2.3	When generated	97
5.2.2.4	Effect of receipt	98
5.2.3	MA-UNITDATA.indication	99
5.2.3.1	Function	99
5.2.3.2	Semantics of the service primitive	99
5.2.3.3	When generated	100
5.2.3.4	Effect of receipt	100
5.2.4	MA-UNITDATA-STATUS.indication	101
5.2.4.1	Function	101
5.2.4.2	Semantics of the service primitive	102
5.2.4.3	When generated	103
5.2.4.4	Effect of receipt	103
6.	Layer management	104
6.1	Overview of management model	104
6.2	Generic management primitives	105
6.3	MLME SAP interface	105
6.3.1	Introduction	105
6.3.2	Power management	106
6.3.2.1	Introduction	106
6.3.2.2	MLME-POWERMGT.request	106
6.3.2.3	MLME-POWERMGT.confirm	106
6.3.3	Scan	107
6.3.3.1	Introduction	107
6.3.3.2	MLME-SCAN.request	107
6.3.3.3	MLME-SCAN.confirm	109
6.3.4	Synchronization	115
6.3.4.1	Introduction	115
6.3.4.2	MLME-JOIN.request	115
6.3.4.3	MLME-JOIN.confirm	117
6.3.5	Authenticate	117
6.3.5.1	Introduction	117
6.3.5.2	MLME-AUTHENTICATE.request	117
6.3.5.3	MLME-AUTHENTICATE.confirm	118
6.3.5.4	MLME-AUTHENTICATE.indication	119
6.3.5.5	MLME-AUTHENTICATE.response	120
6.3.6	Deauthenticate	121
6.3.6.1	Introduction	121
6.3.6.2	MLME-DEAUTHENTICATE.request	121
6.3.6.3	MLME-DEAUTHENTICATE.confirm	122
6.3.6.4	MLME-DEAUTHENTICATE.indication	123
6.3.7	Associate	123
6.3.7.1	Introduction	123
6.3.7.2	MLME-ASSOCIATE.request	123
6.3.7.3	MLME-ASSOCIATE.confirm	125
6.3.7.4	MLME-ASSOCIATE.indication	128

	6.3.7.5	MLME-ASSOCIATE.response	130
6.3.8		Reassociate.....	133
	6.3.8.1	Introduction	133
	6.3.8.2	MLME-REASSOCIATE.request.....	133
	6.3.8.3	MLME-REASSOCIATE.confirm.....	135
	6.3.8.4	MLME-REASSOCIATE.indication	138
	6.3.8.5	MLME-REASSOCIATE.response	141
6.3.9		Disassociate	144
	6.3.9.1	MLME-DISASSOCIATE.request	144
	6.3.9.2	MLME-DISASSOCIATE.confirm	145
	6.3.9.3	MLME-DISASSOCIATE.indication	146
6.3.10		Reset.....	146
	6.3.10.1	Introduction	146
	6.3.10.2	MLME-RESET.request.....	146
6.3.11		Start.....	147
	6.3.11.1	Introduction	147
	6.3.11.2	MLME-START.request	147
	6.3.11.3	MLME-START.confirm	151
6.3.12		Stop	152
	6.3.12.1	General	152
	6.3.12.2	MLME-STOP.request.....	152
6.3.13		Protocol layer model for spectrum management and radio measurement.....	153
6.3.14		Measurement request	156
	6.3.14.1	Introduction	156
	6.3.14.2	MLME-MREQUEST.request	156
	6.3.14.3	MLME-MREQUEST.indication	157
6.3.15		Channel measurement.....	158
	6.3.15.1	Introduction	158
	6.3.15.2	MLME-MEASURE.request.....	158
	6.3.15.3	MLME-MEASURE.confirm.....	158
6.3.16		Measurement report	159
	6.3.16.1	Introduction	159
	6.3.16.2	MLME-MREPORT.request.....	159
	6.3.16.3	MLME-MREPORT.indication	160
6.3.17		Channel switch.....	161
	6.3.17.1	MLME-CHANNELSWITCH.request	161
	6.3.17.2	MLME-CHANNELSWITCH.confirm	162
	6.3.17.3	MLME-CHANNELSWITCH.indication.....	163
	6.3.17.4	MLME-CHANNELSWITCH.response.....	164
6.3.18		TPC request.....	164
	6.3.18.1	Introduction	164
	6.3.18.2	MLME-TPCADAPT.request	165
	6.3.18.3	MLME-TPCADAPT.confirm	165
6.3.19		SetKeys	166
	6.3.19.1	MLME-SETKEYS.request	166
6.3.20		DeleteKeys.....	167
	6.3.20.1	MLME-DELETEKEYS.request	167
6.3.21		MIC (Michael) failure event	168
	6.3.21.1	MLME-MICHAELMICFAILURE.indication.....	168
6.3.22		EAPOL.....	169
	6.3.22.1	MLME-EAPOL.request.....	169
	6.3.22.2	MLME-EAPOL.confirm	169
6.3.23		MLME-PeerKeySTART	170
	6.3.23.1	MLME- PeerKeySTART.request	170

6.3.24	SetProtection	171
6.3.24.1	MLME-SETPROTECTION.request	171
6.3.25	MLME-PROTECTEDFRAMEDROPPED	172
6.3.25.1	MLME- PROTECTEDFRAMEDROPPED.indication	172
6.3.26	TS management interface	172
6.3.26.1	General	172
6.3.26.2	MLME-ADDTS.request	173
6.3.26.3	MLME-ADDTS.confirm	174
6.3.26.4	MLME-ADDTS.indication	176
6.3.26.5	MLME-ADDTS.response	177
6.3.26.6	MLME-DELTS.request	179
6.3.26.7	MLME-DELTS.indication	180
6.3.27	Management of direct links	181
6.3.27.1	Introduction	181
6.3.27.2	MLME-DLS.request	181
6.3.27.3	MLME-DLS.confirm	182
6.3.27.4	MLME-DLS.indication	183
6.3.27.5	MLME-DLSTeardown.request	184
6.3.27.6	MLME-DLSTeardown.indication	185
6.3.28	Higher layer synchronization support	186
6.3.28.1	Introduction	186
6.3.28.2	MLME-HL-SYNC.request	186
6.3.28.3	MLME-HL-SYNC.indication	186
6.3.29	Block Ack	187
6.3.29.1	General	187
6.3.29.2	MLME-ADDBA.request	187
6.3.29.3	MLME-ADDBA.confirm	188
6.3.29.4	MLME-ADDBA.indication	189
6.3.29.5	MLME-ADDBA.response	190
6.3.29.6	MLME-DELBA.request	191
6.3.29.7	MLME-DELBA.indication	192
6.3.30	Schedule element management	193
6.3.30.1	Introduction	193
6.3.30.2	MLME-SCHEDULE.request	193
6.3.30.3	MLME-SCHEDULE.indication	193
6.3.31	Vendor-specific action	194
6.3.31.1	Introduction	194
6.3.31.2	MLME-VSPECIFIC.request	194
6.3.31.3	MLME-VSPECIFIC.indication	195
6.3.32	Neighbor report request	196
6.3.32.1	General	196
6.3.32.2	MLME-NEIGHBORPREP.request	196
6.3.32.3	MLME-NEIGHBORPREP.indication	197
6.3.33	Neighbor report response	198
6.3.33.1	General	198
6.3.33.2	MLME-NEIGHBORPREP.request	198
6.3.33.3	MLME-NEIGHBORPREP.indication	199
6.3.34	Link Measure Request	199
6.3.34.1	General	199
6.3.34.2	MLME-LINKMEASURE.request	200
6.3.34.3	MLME-LINKMEASURE.confirm	200
6.3.35	MLME SAP interface for resource request	202
6.3.35.1	MLME-RESOURCE-REQUEST.request	202
6.3.35.2	MLME-RESOURCE-REQUEST.indication	202

6.3.35.3	MLME-RESOURCE-REQUEST.response	203
6.3.35.4	MLME-RESOURCE-REQUEST.confirm	204
6.3.35.5	MLME-RESOURCE-REQUEST-LOCAL.request	204
6.3.35.6	MLME-RESOURCE-REQUEST-LOCAL.confirm	205
6.3.36	MLME SAP interface for remote requests	206
6.3.36.1	MLME-REMOTE-REQUEST.request	206
6.3.36.2	MLME-REMOTE-REQUEST.indication	206
6.3.37	Extended channel switch announcement	207
6.3.37.1	General	207
6.3.37.2	MLME-EXTCHANNELSWITCH.request	207
6.3.37.3	MLME-EXTCHANNELSWITCH.confirm	208
6.3.37.4	MLME-EXTCHANNELSWITCH.indication	209
6.3.37.5	MLME-EXTCHANNELSWITCH.response	210
6.3.38	DSE power constraint announcement	210
6.3.38.1	General	210
6.3.38.2	MLME-DSETPC.request	211
6.3.38.3	MLME-DSETPC.confirm	211
6.3.38.4	MLME-DSETPC.indication	212
6.3.38.5	MLME-DSETPC.response	213
6.3.39	Enablement	214
6.3.39.1	General	214
6.3.39.2	MLME-ENABLEMENT.request	214
6.3.39.3	MLME-ENABLEMENT.confirm	215
6.3.39.4	MLME-ENABLEMENT.indication	216
6.3.39.5	MLME-ENABLEMENT.response	217
6.3.40	Deenablement	218
6.3.40.1	MLME-DEENABLEMENT.request	218
6.3.40.2	MLME-DEENABLEMENT.indication	219
6.3.41	SA Query support	220
6.3.41.1	MLME-SAQuery.request	220
6.3.41.2	MLME-SAQuery.confirm	220
6.3.41.3	MLME-SAQuery.indication	221
6.3.41.4	MLME-SAQuery.response	221
6.3.42	Get TSF timer	222
6.3.42.1	General	222
6.3.42.2	MLME-GETTSFTIME.request	222
6.3.42.2	MLME-GETTSFTIME.confirm	223
6.3.43	Timing Advertisement	223
6.3.43.1	General	223
6.3.43.2	MLME-TIMING_ADVERTISEMENT.request	223
6.3.43.3	MLME-TIMING_ADVERTISEMENT.indication	224
6.3.44	TDLS Discovery	226
6.3.44.1	General	226
6.3.44.2	MLME-TDLSDISCOVERY.request	226
6.3.44.3	MLME-TDLSDISCOVERY.confirm	226
6.3.44.4	MLME-TDLSDISCOVERY.indication	227
6.3.44.5	MLME-TDLSDISCOVERY.response	228
6.3.45	TDLS direct-link establishment	229
6.3.45.1	General	229
6.3.45.2	MLME-TDLSSETUPREQUEST.request	230
6.3.45.3	MLME-TDLSSETUPREQUEST.indication	230
6.3.45.4	MLME-TDLSSETUPRESPONSE.request	231
6.3.45.5	MLME-TDLSSETUPRESPONSE.indication	231
6.3.45.6	MLME-TDLSSETUPCONFIRM.request	232

	6.3.45.7	MLME-TDLSSETUPCONFIRM.indication	232
	6.3.45.8	MLME-TDLSPOTENTIALPEERSTA.request	233
	6.3.45.9	MLME-TDLSPOTENTIALPEERSTA.confirm	234
6.3.46		TDLS direct-link teardown	235
	6.3.46.1	General	235
	6.3.46.2	MLME-TDLSSTEARDOWN.request	235
	6.3.46.3	MLME-TDLSSTEARDOWN.indication	236
6.3.47		TDLS Peer U-APSD	237
	6.3.47.1	General	237
	6.3.47.2	MLME-TDLSPTI.request	237
	6.3.47.3	MLME-TDLSPTI.confirm	238
	6.3.47.4	MLME-TDLSPTI.indication	239
	6.3.47.5	MLME-TDLSPTI.response	239
6.3.48		TDLS channel switching	240
	6.3.48.1	General	240
	6.3.48.2	MLME-TDLSCHANNELSWITCH.request	241
	6.3.48.3	MLME-TDLSCHANNELSWITCH.confirm	241
	6.3.48.4	MLME-TDLSCHANNELSWITCH.indication	242
	6.3.48.5	MLME-TDLSCHANNELSWITCH.response	243
6.3.49		TDLS Peer PSM	244
	6.3.49.1	General	244
	6.3.49.2	MLME-TDLSPEERPSM.request	244
	6.3.49.3	MLME-TDLSPEERPSM.confirm	245
	6.3.49.4	MLME-TDLSPEERPSM.indication	246
	6.3.49.5	MLME-TDLSPEERPSM.response	246
6.3.50		Event request	247
	6.3.50.1	General	247
	6.3.50.2	MLME-EVLREQUEST.request	248
	6.3.50.3	MLME-EVLREQUEST.indication	248
6.3.51		Event report	249
	6.3.51.1	General	249
	6.3.51.2	MLME-EVLREPORT.request	249
	6.3.51.3	MLME-EVLREPORT.indication	250
6.3.52		Event	250
	6.3.52.1	General	250
	6.3.52.2	MLME-EVLOG.request	250
	6.3.52.3	MLME-EVLOG.confirm	251
6.3.53		Diagnostic request	252
	6.3.53.1	General	252
	6.3.53.2	MLME-DIAGREQUEST.request	252
	6.3.53.3	MLME-DIAGREQUEST.indication	253
6.3.54		Diagnostic report	254
	6.3.54.1	MLME-DIAGREPORT.request	254
	6.3.54.2	MLME-DIAGREPORT.indication	254
6.3.55		Location Configuration request	255
	6.3.55.1	General	255
	6.3.55.2	MLME-LOCATIONCFG.request	256
	6.3.55.3	MLME-LOCATIONCFG.confirm	256
	6.3.55.4	MLME-LOCATIONCFG.indication	257
	6.3.55.5	MLME-LOCATIONCFG.response	258
6.3.56		Location track notification	259
	6.3.56.1	General	259
	6.3.56.2	MLME-LOCATIONTRACKNOTIF.request	259
	6.3.56.3	MLME-LOCATIONTRACKNOTIF.indication	260

6.3.57	Timing measurement	261
6.3.57.1	General	261
6.3.57.2	MLME-TIMINGMSMT.request	261
6.3.57.3	MLME-TIMINGMSMT.confirm	262
6.3.57.4	MLME-TIMINGMSMT.indication	263
6.3.58	BSS Transition Management	265
6.3.58.1	BSS Transition Management procedure	265
6.3.58.2	MLME-BTMQUERY.request	265
6.3.58.3	MLME-BTMQUERY.indication	266
6.3.58.4	MLME-BTM.request	267
6.3.58.5	MLME-BTM.indication	268
6.3.58.6	MLME-BTM.response	269
6.3.58.7	MLME-BTM.confirm	270
6.3.59	FMS setup	272
6.3.59.1	General	272
6.3.59.2	MLME-FMS.request	272
6.3.59.3	MLME-FMS.confirm	273
6.3.59.4	MLME-FMS.indication	273
6.3.59.5	MLME-FMS.response	274
6.3.60	Collocated Interference request	275
6.3.60.1	General	275
6.3.60.2	MLME-CLINTERFERENCEREQUEST.request	276
6.3.60.3	MLME-CLINTERFERENCEREQUEST.indication	276
6.3.61	Collocated Interference report	277
6.3.61.1	General	277
6.3.61.2	MLME-CLINTERFERENCEREPORT.request	277
6.3.61.3	MLME-CLINTERFERENCEREPORT.indication	278
6.3.62	TFS Setup	279
6.3.62.1	General	279
6.3.62.2	MLME-TFS.request	279
6.3.62.3	MLME-TFS.confirm	280
6.3.62.4	MLME-TFS.indication	281
6.3.62.5	MLME-TFS.response	281
6.3.63	Sleep Mode request	283
6.3.63.1	General	283
6.3.63.2	MLME-SLEEPMODE.request	283
6.3.63.3	MLME-SLEEPMODE.indication	284
6.3.63.4	MLME-SLEEPMODE.response	285
6.3.63.5	MLME-SLEEPMODE.confirm	286
6.3.64	TIM broadcast setup	287
6.3.64.1	General	287
6.3.64.2	MLME-TIMBROADCAST.request	287
6.3.64.3	MLME-TIMBROADCAST.confirm	288
6.3.64.4	MLME-TIMBROADCAST.indication	289
6.3.64.5	MLME-TIMBROADCAST.response	289
6.3.65	QoS Traffic Capability Update	290
6.3.65.1	MLME-QOSTRAFFICCAPUPDATE.request	290
6.3.65.2	MLME-QOSTRAFFICCAPUPDATE.indication	291
6.3.66	Channel Usage request	292
6.3.66.1	General	292
6.3.66.2	MLME-CHANNELUSAGE.request	292
6.3.66.3	MLME-CHANNELUSAGE.confirm	293
6.3.66.4	MLME-CHANNELUSAGE.indication	294
6.3.66.5	MLME-CHANNELUSAGE.response	295

6.3.67	DMS request and response procedure	296
6.3.67.1	General	296
6.3.67.2	MLME-DMS.request	297
6.3.67.3	MLME-DMS.confirm	297
6.3.67.4	MLME-DMS.indication	298
6.3.67.5	MLME-DMS.response	299
6.3.67.6	MLME-DMS-TERM.request	299
6.3.67.7	MLME-DMS-TERM.indication	300
6.3.68	Timing Measurement Request	301
6.3.68.1	General	301
6.3.68.2	MLME-TIMINGMSMTRQ.request	301
6.3.68.3	MLME-TIMINGMSMTRQ.indication	301
6.3.69	WNM-Notification request	302
6.3.69.1	General	302
6.3.69.2	MLME-WNMNOTIFICATIONREQUEST.request	302
6.3.69.3	MLME-WNMNOTIFICATIONREQUEST.indication	303
6.3.70	WNM-Notification response	303
6.3.70.1	MLME-WNMNOTIFICATIONRESPONSE.request	303
6.3.70.2	MLME-WNMNOTIFICATIONRESPONSE.indication	304
6.3.71	Network discovery and selection support	305
6.3.71.1	General	305
6.3.71.2	MLME-GAS.request	305
6.3.71.3	MLME-GAS.confirm	306
6.3.71.4	MLME-GAS.indication	307
6.3.71.5	MLME-GAS.response	308
6.3.72	QoS Map Set element management	309
6.3.72.1	General	309
6.3.72.2	MLME-QoSMap.request	310
6.3.72.3	MLME-QoSMap.indication	310
6.3.73	Mesh peering management	311
6.3.73.1	Introduction	311
6.3.73.2	MLME-MESHPEERINGMANAGEMENT.request	311
6.3.73.3	MLME-MESHPEERINGMANAGEMENT.confirm	312
6.3.73.4	MLME-MESHPEERINGMANAGEMENT.indication	312
6.3.73.5	MLME-MESHPEERINGMANAGEMENT.response	313
6.3.74	Mesh power management	314
6.3.74.1	Introduction	314
6.3.74.2	MLME-MESHPOWERMGT.request	314
6.3.74.3	MLME-MESHPOWERMGT.confirm	314
6.3.75	Mesh neighbor offset synchronization	315
6.3.75.1	Introduction	315
6.3.75.2	MLME-MESHNEIGHBOROFFSETSINCSTART.request	315
6.3.75.3	MLME-MESHNEIGHBOROFFSETSINCSTART.confirm	315
6.3.75.4	MLME-MESHNEIGHBOROFFSETCALCULATE.request	316
6.3.75.5	MLME-MESHNEIGHBOROFFSETCALCULATE.confirm	317
6.3.75.6	MLME-MESHNEIGHBOROFFSETSINCSTOP.request	317
6.3.75.7	MLME-MESHNEIGHBOROFFSETSINCSTOP.confirm	318
6.3.76	Mesh TBTT adjustment	318
6.3.76.1	Introduction	318
6.3.76.2	MLME-MESHTBTTADJUSTMENT.request	318
6.3.76.3	MLME-MESHTBTTADJUSTMENT.confirm	319
6.3.76.4	MLME-MESHTBTTADJUSTMENT.indication	320
6.3.76.5	MLME-MESHTBTTADJUSTMENT.response	321

6.3.77	MCCA management interface	322
6.3.77.1	Introduction	322
6.3.77.2	MLME-ACTIVATEMCCA.request	322
6.3.77.3	MLME-MCCASETUP.request	323
6.3.77.4	MLME-MCCASETUP.confirm	323
6.3.77.5	MLME-MCCASETUP.indication	324
6.3.77.6	MLME-MCCASETUP.response	325
6.3.77.7	MLME-MCCAADVERTISEMENT.request	326
6.3.77.8	MLME-MCCAADVERTISEMENT.confirm	326
6.3.77.9	MLME-MCCAADVERTISEMENT.indication	327
6.3.77.10	MLME-MCCAADVERTISEMENT.response	328
6.3.77.11	MLME-MCCATEARDOWN.request	328
6.3.77.12	MLME-MCCATEARDOWN.indication	329
6.3.78	MBSS congestion control	330
6.3.78.1	Introduction	330
6.3.78.2	MLME-MBSSCONGESTIONCONTROL.request	330
6.3.78.3	MLME-MBSSCONGESTIONCONTROL.indication	330
6.3.79	MBSS proxy update	331
6.3.79.1	Introduction	331
6.3.79.2	MLME-MBSSPROXYUPDATE.request	331
6.3.79.3	MLME-MBSSPROXYUPDATE.confirm	332
6.3.79.4	MLME-MBSSPROXYUPDATE.indication	333
6.3.79.5	MLME-MBSSPROXYUPDATE.response	333
6.3.80	MBSS mesh gate announcement	334
6.3.80.1	Introduction	334
6.3.80.2	MLME-MBSSGATEANNOUNCEMENT.request	334
6.3.80.3	MLME-MBSSGATEANNOUNCEMENT.indication	335
6.3.81	Mesh link metric	336
6.3.81.1	Introduction	336
6.3.81.2	MLME-MESHLINKMETRICREAD.request	336
6.3.81.3	MLME-MESHLINKMETRICREAD.confirm	336
6.3.81.4	MLME-MESHLINKMETRICREPORT.request	337
6.3.81.5	MLME-MESHLINKMETRICREPORT.indication	338
6.3.82	HWMP mesh path selection	339
6.3.82.1	Introduction	339
6.3.82.2	MLME-HWMPMESHPATHSELECTION.request	339
6.3.82.3	MLME-HWMPMESHPATHSELECTION.indication	340
6.4	MAC state generic convergence function (MSGCF)	341
6.4.1	Overview of the convergence function	341
6.4.2	Overview of convergence function state machine	341
6.4.3	Convergence function state list	341
6.4.3.1	ESS_CONNECTED	341
6.4.3.2	ESS_DISCONNECTED	341
6.4.3.3	ESS_DISENGAGING	342
6.4.3.4	STANDBY	342
6.4.4	Convergence function state transitions	343
6.4.4.1	Transitions to ESS_CONNECTED	343
6.4.4.2	Transitions to ESS_DISCONNECTED	343
6.4.4.3	Transitions to ESS_DISENGAGING	343
6.4.4.4	Transitions to STANDBY	343
6.4.5	Convergence function informational events	344
6.4.6	MAC state generic convergence SAP	344
6.4.7	ESS status reporting	344
6.4.7.1	MSGCF-ESS-Link-Up	344

	6.4.7.2	MSGCF-ESS-Link-Down.indication	345
	6.4.7.3	MSGCF-ESS-Link-Going-Down.....	346
	6.4.7.4	MSGCF-ESS-Link-Event-Rollback.indication.....	348
	6.4.7.5	MSGCF-ESS-Link-Detected.indication	348
	6.4.7.6	MSGCF-ESS-Link-Scan.request	350
	6.4.7.7	MSGCF-ESS-Link-Scan.confirm	350
6.4.8		Network configuration	351
	6.4.8.1	MSGCF-ESS-Link-Capability.request	351
	6.4.8.2	MSGCF-ESS-Link-Capability.confirm	352
	6.4.8.3	MSGCF-Set-ESS-Link-Parameters.request.....	353
	6.4.8.4	MSGCF-Set-ESS-Link-Parameters.confirm.....	355
	6.4.8.5	MSGCF-Get-ESS-Link-Parameters.request	356
	6.4.8.6	MSGCF-Get-ESS-Link-Parameters.confirm	356
6.4.9		Network events	357
	6.4.9.1	MSGCF-ESS-Link-Threshold-Report.indication	357
6.4.10		Network command interface.....	358
	6.4.10.1	MSGCF-ESS-Link-Command.request	358
6.4.11		MAC state SME SAP—mobility management	359
	6.4.11.1	MSSME-ESS-Link-Down-Predicted.indication	359
6.5		PLME SAP interface	360
	6.5.1	General.....	360
	6.5.2	PLME-RESET.request.....	360
	6.5.2.1	Function	360
	6.5.2.2	Semantics of the service primitive	360
	6.5.2.3	When generated.....	360
	6.5.2.4	Effect of receipt.....	360
	6.5.3	PLME-CHARACTERISTICS.request	360
	6.5.3.1	Function	360
	6.5.3.2	Semantics of the service primitive	360
	6.5.3.3	When generated.....	360
	6.5.3.4	Effect of receipt.....	360
	6.5.4	PLME-CHARACTERISTICS.confirm	360
	6.5.4.1	Function	360
	6.5.4.2	Semantics of the service primitive	361
	6.5.4.3	When generated.....	364
	6.5.4.4	Effect of receipt.....	364
	6.5.5	PLME-DSSSTESTMODE.request	364
	6.5.5.1	Function	364
	6.5.5.2	Semantics of the service primitive	364
	6.5.5.3	When generated.....	365
	6.5.5.4	Effect of receipt.....	365
	6.5.6	PLME-DSSSTESTOUTPUT.request	365
	6.5.6.1	Function	365
	6.5.6.2	Semantics of the service primitive	365
	6.5.6.3	When generated.....	366
	6.5.6.4	Effect of receipt.....	366
	6.5.7	PLME-TXTIME.request.....	366
	6.5.7.1	Function	366
	6.5.7.2	Semantics of the service primitive	366
	6.5.7.3	When generated.....	366
	6.5.7.4	Effect of receipt.....	366
	6.5.8	PLME-TXTIME.confirm.....	367
	6.5.8.1	Function	367
	6.5.8.2	Semantics of the service primitive	367

6.5.8.3	When generated.....	367
6.5.8.4	Effect of receipt.....	367
7.	PHY service specification.....	368
7.1	Scope.....	368
7.2	PHY functions.....	368
7.3	Detailed PHY service specifications.....	368
7.3.1	Scope and field of application	368
7.3.2	Overview of the service	368
7.3.3	Overview of interactions.....	368
7.3.4	Basic service and options.....	368
7.3.4.1	General	368
7.3.4.2	PHY-SAP peer-to-peer service primitives.....	369
7.3.4.3	PHY-SAP sublayer-to-sublayer service primitives.....	369
7.3.4.4	PHY-SAP service primitives parameters.....	369
7.3.4.5	Vector descriptions	370
7.3.5	PHY-SAP detailed service specification	371
7.3.5.1	Introduction	371
7.3.5.2	PHY-DATA.request.....	371
7.3.5.3	PHY-DATA.indication	371
7.3.5.4	PHY-DATA.confirm.....	372
7.3.5.5	PHY-TXSTART.request.....	372
7.3.5.6	PHY-TXSTART.confirm.....	373
7.3.5.7	PHY-TXEND.request	373
7.3.5.8	PHY-TXEND.confirm	374
7.3.5.9	PHY-CCARESET.request	374
7.3.5.10	PHY-CCARESET.confirm	375
7.3.5.11	PHY-CCA.indication	375
7.3.5.12	PHY-RXSTART.indication	376
7.3.5.13	PHY-RXEND.indication.....	377
7.3.5.14	PHY-CONFIG.request.....	378
7.3.5.15	PHY-CONFIG.confirm.....	378
7.4	PHY management.....	379
8.	Frame formats	380
8.1	General requirements.....	380
8.2	MAC frame formats.....	380
8.2.1	Basic components	380
8.2.2	Conventions	380
8.2.3	General frame format.....	381
8.2.4	Frame fields	382
8.2.4.1	Frame Control field.....	382
8.2.4.2	Duration/ID field.....	386
8.2.4.3	Address fields.....	387
8.2.4.4	Sequence Control field.....	388
8.2.4.5	QoS Control field	389
8.2.4.6	HT Control field.....	394
8.2.4.7	Frame Body field	398
8.2.4.8	FCS field	400
8.2.5	Duration/ID field (QoS STA)	401
8.2.5.1	General	401

	8.2.5.2	Setting for single and multiple protection under enhanced distributed channel access (EDCA)	401
	8.2.5.3	Setting for QoS CF-Poll frames	402
	8.2.5.4	Setting for frames sent by a TXOP holder under HCCA	402
	8.2.5.5	Settings within a PSMP sequence	403
	8.2.5.6	Settings within a dual CTS sequence	403
	8.2.5.7	Setting for control response frames	403
	8.2.5.8	Setting for other response frames	404
8.3		Format of individual frame types	404
	8.3.1	Control frames	404
	8.3.1.1	Format of control frames	404
	8.3.1.2	RTS frame format	404
	8.3.1.3	CTS frame format	405
	8.3.1.4	ACK frame format	405
	8.3.1.5	PS-Poll frame format	406
	8.3.1.6	CF-End frame format	406
	8.3.1.7	CF-End+CF-Ack frame format	407
	8.3.1.8	BlockAckReq frame format	407
	8.3.1.9	BlockAck frame format	410
	8.3.1.10	Control Wrapper frame	413
	8.3.2	Data frames	413
	8.3.2.1	Data frame format	413
	8.3.2.2	A-MSDU format	416
	8.3.3	Management frames	417
	8.3.3.1	Format of management frames	417
	8.3.3.2	Beacon frame format	419
	8.3.3.3	ATIM frame format	423
	8.3.3.4	Disassociation frame format	423
	8.3.3.5	Association Request frame format	423
	8.3.3.6	Association Response frame format	425
	8.3.3.7	Reassociation Request frame format	426
	8.3.3.8	Reassociation Response frame format	428
	8.3.3.9	Probe Request frame format	429
	8.3.3.10	Probe Response frame format	430
	8.3.3.11	Authentication frame format	434
	8.3.3.12	Deauthentication	436
	8.3.3.13	Action frame format	436
	8.3.3.14	Action No Ack frame format	436
	8.3.3.15	Timing Advertisement frame format	437
8.4		Management frame body components	437
	8.4.1	Fields that are not information elements	437
	8.4.1.1	Authentication Algorithm Number field	437
	8.4.1.2	Authentication Transaction Sequence Number field	438
	8.4.1.3	Beacon Interval field	438
	8.4.1.4	Capability Information field	438
	8.4.1.5	Current AP Address field	441
	8.4.1.6	Listen Interval field	442
	8.4.1.7	Reason Code field	442
	8.4.1.8	AID field	445
	8.4.1.9	Status Code field	445
	8.4.1.10	Timestamp field	449
	8.4.1.11	Action field	449
	8.4.1.12	Dialog Token field	451
	8.4.1.13	DLS Timeout Value field	451

8.4.1.14	Block Ack Parameter Set field.....	451
8.4.1.15	Block Ack Timeout Value field.....	452
8.4.1.16	DELBA Parameter Set field.....	452
8.4.1.17	QoS Info field.....	452
8.4.1.18	Measurement Pilot Interval field.....	454
8.4.1.19	Max Transmit Power field.....	454
8.4.1.20	Transmit Power Used field.....	454
8.4.1.21	Channel Width field.....	455
8.4.1.22	SM Power Control field.....	455
8.4.1.23	PCO Phase Control field.....	455
8.4.1.24	PSMP Parameter Set field.....	456
8.4.1.25	PSMP STA Info field.....	456
8.4.1.26	MIMO Control field.....	458
8.4.1.27	CSI Report field.....	459
8.4.1.28	Noncompressed Beamforming Report field.....	461
8.4.1.29	Compressed Beamforming Report field.....	463
8.4.1.30	Antenna Selection Indices field.....	466
8.4.1.31	Organization Identifier field.....	467
8.4.1.32	Rate Identification field.....	467
8.4.1.33	GAS Query Response Fragment ID field.....	468
8.4.1.34	Venue Info field.....	468
8.4.1.35	Target Channel.....	471
8.4.1.36	Operating Class.....	471
8.4.1.37	Send-Confirm field.....	472
8.4.1.38	Anti-Clogging Token field.....	472
8.4.1.39	Scalar field.....	472
8.4.1.40	Element field.....	472
8.4.1.41	Confirm field.....	473
8.4.1.42	Finite Cyclic Group field.....	473
8.4.2	Information elements.....	474
8.4.2.1	General.....	474
8.4.2.2	SSID element.....	478
8.4.2.3	Supported Rates element.....	478
8.4.2.4	FH Parameter Set element.....	479
8.4.2.5	DSSS Parameter Set element.....	480
8.4.2.6	CF Parameter Set element.....	480
8.4.2.7	TIM element.....	480
8.4.2.8	IBSS Parameter Set element.....	482
8.4.2.9	Challenge Text element.....	483
8.4.2.10	Country element.....	483
8.4.2.11	Hopping Pattern Parameters element.....	485
8.4.2.12	Hopping Pattern Table element.....	486
8.4.2.13	Request element.....	486
8.4.2.14	ERP element.....	487
8.4.2.15	Extended Supported Rates element.....	487
8.4.2.16	Power Constraint element.....	488
8.4.2.17	Power Capability element.....	488
8.4.2.18	TPC Request element.....	489
8.4.2.19	TPC Report element.....	489
8.4.2.20	Supported Channels element.....	490
8.4.2.21	Channel Switch Announcement element.....	490
8.4.2.22	Secondary Channel Offset element.....	491
8.4.2.23	Measurement Request element.....	492
8.4.2.24	Measurement Report element.....	519

8.4.2.25	Quiet element	553
8.4.2.26	IBSS DFS element	554
8.4.2.27	RSNE	555
8.4.2.28	Vendor Specific element	562
8.4.2.29	Extended Capabilities element	562
8.4.2.30	BSS Load element	566
8.4.2.31	EDCA Parameter Set element	567
8.4.2.32	TSPEC element	569
8.4.2.33	TCLAS element	573
8.4.2.34	TS Delay element	578
8.4.2.35	TCLAS Processing element	578
8.4.2.36	Schedule element	579
8.4.2.37	QoS Capability element	580
8.4.2.38	AP Channel Report element	580
8.4.2.39	Neighbor Report element	580
8.4.2.40	RCPI element	585
8.4.2.41	BSS Average Access Delay element	586
8.4.2.42	Antenna element	587
8.4.2.43	RSNI element	588
8.4.2.44	Measurement Pilot Transmission element	588
8.4.2.45	BSS Available Admission Capacity element	589
8.4.2.46	BSS AC Access Delay element	590
8.4.2.47	RM Enabled Capabilities element	592
8.4.2.48	Multiple BSSID element	594
8.4.2.49	Mobility Domain element (MDE)	596
8.4.2.50	Fast BSS Transition element (FTE)	596
8.4.2.51	Timeout Interval element (TIE)	599
8.4.2.52	RIC Data element (RDE)	599
8.4.2.53	RIC Descriptor element	600
8.4.2.54	DSE Registered Location element	600
8.4.2.55	Extended Channel Switch Announcement element	602
8.4.2.56	Supported Operating Classes element	603
8.4.2.57	Management MIC element	603
8.4.2.58	HT Capabilities element	604
8.4.2.59	HT Operation element	613
8.4.2.60	20/40 BSS Intolerant Channel Report element	617
8.4.2.61	Overlapping BSS Scan Parameters element	618
8.4.2.62	20/40 BSS Coexistence element	618
8.4.2.63	Time Advertisement element	619
8.4.2.64	Link Identifier element	621
8.4.2.65	Wakeup Schedule element	621
8.4.2.66	Channel Switch Timing element	622
8.4.2.67	PTI Control element	622
8.4.2.68	TPU Buffer Status element	623
8.4.2.69	Event Request element	624
8.4.2.70	Event Report element	630
8.4.2.71	Diagnostic Request element	636
8.4.2.72	Diagnostic Report element	647
8.4.2.73	Location Parameters element	649
8.4.2.74	Nontransmitted BSSID Capability element	657
8.4.2.75	SSID List element	657
8.4.2.76	Multiple BSSID-Index element	658
8.4.2.77	FMS Descriptor element	658
8.4.2.78	FMS Request element	659

8.4.2.79	FMS Response element.....	661
8.4.2.80	QoS Traffic Capability element	663
8.4.2.81	BSS Max Idle Period element.....	665
8.4.2.82	TFS Request element	665
8.4.2.83	TFS Response element.....	667
8.4.2.84	WNM-Sleep Mode element	668
8.4.2.85	TIM Broadcast Request element.....	670
8.4.2.86	TIM Broadcast Response element	670
8.4.2.87	Collocated Interference Report element	671
8.4.2.88	Channel Usage element.....	673
8.4.2.89	Time Zone element	674
8.4.2.90	DMS Request element	674
8.4.2.91	DMS Response element	676
8.4.2.92	Destination URI element	678
8.4.2.93	U-APSD Coexistence element	679
8.4.2.94	Interworking element	680
8.4.2.95	Advertisement Protocol element.....	681
8.4.2.96	Expedited Bandwidth Request element	683
8.4.2.97	QoS Map Set element	684
8.4.2.98	Roaming Consortium element	685
8.4.2.99	Emergency Alert Identifier element.....	686
8.4.2.100	Mesh Configuration element.....	686
8.4.2.101	Mesh ID element.....	690
8.4.2.102	Mesh Link Metric Report element.....	691
8.4.2.103	Congestion Notification element	691
8.4.2.104	Mesh Peering Management element.....	692
8.4.2.105	Mesh Channel Switch Parameters element.....	693
8.4.2.106	Mesh Awake Window element.....	694
8.4.2.107	Beacon Timing element	695
8.4.2.108	MCCAOP Setup Request element	696
8.4.2.109	MCCAOP Setup Reply element	697
8.4.2.110	MCCAOP Advertisement Overview element.....	698
8.4.2.111	MCCAOP Advertisement element.....	699
8.4.2.112	MCCAOP Teardown element.....	701
8.4.2.113	GANN element	701
8.4.2.114	RANN element.....	702
8.4.2.115	PREQ element.....	703
8.4.2.116	PREP element	705
8.4.2.117	PERR element.....	707
8.4.2.118	PXU element.....	708
8.4.2.119	PXUC element	709
8.4.2.120	Authenticated Mesh Peering Exchange element.....	710
8.4.2.121	MIC element	711
8.4.3	Information Subelements.....	711
8.4.4	Access Network Query Protocol (ANQP) elements.....	712
8.4.4.1	General	712
8.4.4.2	Query List ANQP-element.....	713
8.4.4.3	Capability List ANQP-element.....	713
8.4.4.4	Venue Name ANQP-element	714
8.4.4.5	Emergency Call Number ANQP-element	715
8.4.4.6	Network Authentication Type ANQP-element	715
8.4.4.7	Roaming Consortium ANQP-element	717
8.4.4.8	Vendor Specific ANQP-element.....	717
8.4.4.9	IP Address Type Availability ANQP-element	718

8.4.4.10	NAI Realm ANQP-element	719
8.4.4.11	3GPP Cellular Network ANQP-element.....	722
8.4.4.12	AP Geospatial Location ANQP-element	723
8.4.4.13	AP Civic Location ANQP-element.....	723
8.4.4.14	AP Location Public Identifier URI ANQP-element	723
8.4.4.15	Domain Name ANQP-element	724
8.4.4.16	Emergency Alert URI ANQP-element	724
8.4.4.17	Emergency NAI ANQP-element	725
8.4.4.18	TDLs Capability ANQP-element	725
8.4.4.19	Neighbor Report ANQP-element	726
8.5	Action frame format details	726
8.5.1	Introduction.....	726
8.5.2	Spectrum management Action frames.....	726
8.5.2.1	General	726
8.5.2.2	Measurement Request frame format	727
8.5.2.3	Measurement Report frame format	727
8.5.2.4	TPC Request frame format	728
8.5.2.5	TPC Report frame format	728
8.5.2.6	Channel Switch Announcement frame format.....	728
8.5.3	QoS Action frame details.....	729
8.5.3.1	General	729
8.5.3.2	ADDTS Request frame format	729
8.5.3.3	ADDTS Response frame format	730
8.5.3.4	DELTS frame format	731
8.5.3.5	Schedule frame format	732
8.5.3.6	QoS Map Configure frame format	732
8.5.4	DLS Action frame details	733
8.5.4.1	General	733
8.5.4.2	DLS Request frame format	733
8.5.4.3	DLS Response frame format.....	734
8.5.4.4	DLS Teardown frame format.....	735
8.5.5	Block Ack Action frame details.....	735
8.5.5.1	General	735
8.5.5.2	ADDBA Request frame format.....	736
8.5.5.3	ADDBA Response frame format	736
8.5.5.4	DELBA frame format	737
8.5.6	Vendor-specific action details	737
8.5.7	Radio Measurement action details	738
8.5.7.1	General	738
8.5.7.2	Radio Measurement Request frame format	738
8.5.7.3	Radio Measurement Report frame format	739
8.5.7.4	Link Measurement Request frame format	739
8.5.7.5	Link Measurement Report frame format	740
8.5.7.6	Neighbor Report Request frame format.....	742
8.5.7.7	Neighbor Report Response frame format	743
8.5.8	Public Action details	743
8.5.8.1	Public Action frames.....	743
8.5.8.2	20/40 BSS Coexistence Management frame format	744
8.5.8.3	Measurement Pilot frame format	744
8.5.8.4	DSE Enablement frame format.....	746
8.5.8.5	DSE Deenablement frame format	747
8.5.8.6	DSE Registered Location Announcement frame format	748
8.5.8.7	Extended Channel Switch Announcement frame format.....	748
8.5.8.8	DSE Measurement Request frame format	748

8.5.8.9	DSE Measurement Report frame format	749
8.5.8.10	DSE Power Constraint frame format	751
8.5.8.11	Vendor Specific Public Action frame format	752
8.5.8.12	GAS Initial Request frame format	752
8.5.8.13	GAS Initial Response frame format	753
8.5.8.14	GAS Comeback Request frame format	754
8.5.8.15	GAS Comeback Response frame format	755
8.5.8.16	TDLS Discovery Response frame format	756
8.5.8.17	Location Track Notification frame format	757
8.5.9	FT Action frame details	758
8.5.9.1	General	758
8.5.9.2	FT Request frame	758
8.5.9.3	FT Response frame	759
8.5.9.4	FT Confirm frame	760
8.5.9.5	FT Ack frame	761
8.5.10	SA Query Action frame details	761
8.5.10.1	General	761
8.5.10.2	SA Query Request frame	762
8.5.10.3	SA Query Response frame	762
8.5.11	Protected Dual of Public Action frames	763
8.5.12	HT Action frame details	763
8.5.12.1	HT Action field	763
8.5.12.2	Notify Channel Width frame format	764
8.5.12.3	SM Power Save frame format	764
8.5.12.4	PSMP frame format	765
8.5.12.5	Set PCO Phase frame format	765
8.5.12.6	CSI frame format	766
8.5.12.7	Noncompressed Beamforming frame format	766
8.5.12.8	Compressed Beamforming frame format	767
8.5.12.9	Antenna Selection Indices Feedback frame format	767
8.5.13	TDLS Action field formats	768
8.5.13.1	General	768
8.5.13.2	TDLS Setup Request Action field format	768
8.5.13.3	TDLS Setup Response Action field format	769
8.5.13.4	TDLS Setup Confirm Action field format	771
8.5.13.5	TDLS Teardown Action field format	772
8.5.13.6	TDLS Peer Traffic Indication Action field format	772
8.5.13.7	TDLS Channel Switch Request Action field format	773
8.5.13.8	TDLS Channel Switch Response Action field format	773
8.5.13.9	TDLS Peer PSM Request Action field format	774
8.5.13.10	TDLS Peer PSM Response Action field format	774
8.5.13.11	TDLS Peer Traffic Response Action field format	775
8.5.13.12	TDLS Discovery Request Action field format	775
8.5.14	WNM Action details	776
8.5.14.1	WNM Action fields	776
8.5.14.2	Event Request frame format	777
8.5.14.3	Event Report frame format	777
8.5.14.4	Diagnostic Request frame format	778
8.5.14.5	Diagnostic Report frame format	778
8.5.14.6	Location Configuration Request frame format	778
8.5.14.7	Location Configuration Response frame format	779
8.5.14.8	BSS Transition Management Query frame format	780
8.5.14.9	BSS Transition Management Request frame format	781
8.5.14.10	BSS Transition Management Response frame format	783

8.5.14.11	FMS Request frame format	784
8.5.14.12	FMS Response frame format	785
8.5.14.13	Collocated Interference Request frame format	785
8.5.14.14	Collocated Interference Report frame format	786
8.5.14.15	TFS Request frame format	787
8.5.14.16	TFS Response frame format	787
8.5.14.17	TFS Notify frame format	788
8.5.14.18	WNM-Sleep Mode Request frame format	788
8.5.14.19	WNM-Sleep Mode Response frame format	789
8.5.14.20	TIM Broadcast Request frame format	791
8.5.14.21	TIM Broadcast Response frame format	791
8.5.14.22	QoS Traffic Capability Update frame format	791
8.5.14.23	Channel Usage Request frame format	792
8.5.14.24	Channel Usage Response frame format	793
8.5.14.25	DMS Request frame format	793
8.5.14.26	DMS Response frame format	794
8.5.14.27	Timing Measurement Request frame format	794
8.5.14.28	WNM-Notification Request frame format	795
8.5.14.29	WNM-Notification Response frame format	796
8.5.15	Unprotected WNM Action details	797
8.5.15.1	Unprotected WNM Action fields	797
8.5.15.2	TIM frame format	797
8.5.15.3	Timing Measurement frame format	798
8.5.16	Self-protected Action frame details	799
8.5.16.1	Self-protected Action fields	799
8.5.16.2	Mesh Peering Open frame format	799
8.5.16.3	Mesh Peering Confirm frame format	801
8.5.16.4	Mesh Peering Close frame format	802
8.5.16.5	Mesh Group Key Inform frame format	803
8.5.16.6	Mesh Group Key Acknowledge frame format	804
8.5.17	Mesh Action frame details	804
8.5.17.1	Mesh Action fields	804
8.5.17.2	Mesh Link Metric Report frame format	805
8.5.17.3	HWMP Mesh Path Selection frame format	805
8.5.17.4	Gate Announcement frame format	806
8.5.17.5	Congestion Control Notification frame format	807
8.5.17.6	MCCA Setup Request frame format	807
8.5.17.7	MCCA Setup Reply frame format	807
8.5.17.8	MCCA Advertisement Request frame format	808
8.5.17.9	MCCA Advertisement frame format	808
8.5.17.10	MCCA Teardown frame format	809
8.5.17.11	TBTT Adjustment Request frame format	809
8.5.17.12	TBTT Adjustment Response frame format	810
8.5.18	Multihop Action frame details	811
8.5.18.1	Multihop Action fields	811
8.5.18.2	Proxy Update frame format	811
8.5.18.3	Proxy Update Confirmation frame format	811
8.6	Aggregate MPDU (A-MPDU)	812
8.6.1	A-MPDU format	812
8.6.2	MPDU delimiter CRC field	813
8.6.3	A-MPDU contents	814

9.	MAC sublayer functional description	818
9.1	Introduction	818
9.2	MAC architecture	818
9.2.1	General	818
9.2.2	DCF	818
9.2.3	PCF	819
9.2.4	Hybrid coordination function (HCF)	819
9.2.4.1	General	819
9.2.4.2	HCF contention-based channel access (EDCA)	820
9.2.4.3	HCF controlled channel access (HCCA)	821
9.2.5	Mesh coordination function (MCF)	822
9.2.6	Combined use of DCF, PCF, and HCF	822
9.2.7	Fragmentation/defragmentation overview	822
9.2.8	MAC data service	823
9.3	DCF	824
9.3.1	General	824
9.3.2	Procedures common to the DCF and EDCAF	825
9.3.2.1	CS mechanism	825
9.3.2.2	MAC-Level Acknowledgements	825
9.3.2.3	IFS	826
9.3.2.4	Setting and resetting the NAV	828
9.3.2.5	RTS/CTS with fragmentation	829
9.3.2.6	CTS procedure	831
9.3.2.7	Dual CTS protection	831
9.3.2.8	ACK procedure	833
9.3.2.9	BlockAck procedure	834
9.3.2.10	Duplicate detection and recovery	834
9.3.2.11	NAV distribution	836
9.3.2.12	Operation of aSlotTime	836
9.3.3	Random backoff time	836
9.3.4	DCF access procedure	838
9.3.4.1	Introduction	838
9.3.4.2	Basic access	838
9.3.4.3	Backoff procedure for DCF	838
9.3.4.4	Recovery procedures and retransmit limits	840
9.3.4.5	Control of the channel	840
9.3.5	Individually addressed MPDU transfer procedure	842
9.3.6	Group addressed MPDU transfer procedure	842
9.3.7	DCF timing relations	843
9.3.8	Signal Extension	844
9.3.9	Determination of PLME aCWmin characteristics	844
9.4	PCF	844
9.4.1	General	844
9.4.2	CFP structure and timing	845
9.4.3	PCF access procedure	847
9.4.3.1	General	847
9.4.3.2	Fundamental access	847
9.4.3.3	NAV operation during the CFP	847
9.4.4	PCF transfer procedure	848
9.4.4.1	General	848
9.4.4.2	PCF transfers when the PC STA is transmitter or recipient	849
9.4.4.3	Operation with overlapping point-coordinated BSSs	850
9.4.4.4	CFPMaxDuration limit	850

9.4.4.5	CF usage rules	851
9.4.5	CF polling list	851
9.4.5.1	General	851
9.4.5.2	Polling list processing	852
9.4.5.3	Polling list update procedure	852
9.5	Fragmentation	852
9.6	Defragmentation	853
9.7	Multirate support	854
9.7.1	Overview	854
9.7.2	Basic MCS Set field	854
9.7.3	Basic STBC MCS	854
9.7.4	Basic Rate Set and Basic MCS Set for mesh STA	855
9.7.5	Rate selection for data and management frames	855
9.7.5.1	Rate selection for non-STBC Beacon and non-STBC PSMP frames	855
9.7.5.2	Rate selection for STBC group addressed data and management frames	855
9.7.5.3	Rate selection for other group addressed data and management frames	855
9.7.5.4	Rate selection for polling frames	856
9.7.5.5	Rate selection for +CF-Ack frames	856
9.7.5.6	Rate selection for other data and management frames	856
9.7.6	Rate selection for control frames	856
9.7.6.1	General rules for rate selection for control frames	856
9.7.6.2	Rate selection for control frames that initiate a TXOP	857
9.7.6.3	Rate selection for CF_End frames	858
9.7.6.4	Rate selection for control frames that are not control response frames	858
9.7.6.5	Rate selection for control response frames	859
9.7.6.6	Channel Width selection for control frames	862
9.7.6.7	Control frame TXVECTOR parameter restrictions	862
9.7.7	Multiple BSSID Rate Selection	862
9.7.8	Modulation classes	862
9.7.9	Non-HT basic rate calculation	863
9.8	MSDU transmission restrictions	864
9.9	HT Control field operation	865
9.10	Control Wrapper operation	865
9.11	A-MSDU operation	865
9.12	A-MPDU operation	866
9.12.1	A-MPDU contents	866
9.12.2	A-MPDU length limit rules	866
9.12.3	Minimum MPDU Start Spacing field	866
9.12.4	A-MPDU aggregation of group addressed data frames	867
9.12.5	Transport of A-MPDU by the PHY data service	867
9.13	PPDU duration constraint	867
9.14	LDPC operation	867
9.15	STBC operation	868
9.16	Short GI operation	868
9.17	Greenfield operation	868
9.18	Operation across regulatory domains	868
9.18.1	General	868
9.18.2	Operation upon entering a regulatory domain	869
9.18.3	Determination of hopping patterns for FH PHYs	869

9.18.4	Hopping sequence generation using the Frequency Hopping and Hopping Pattern Table elements	872
9.18.5	Operation with operating classes	873
9.18.6	Operation with coverage classes	873
9.19	HCF	873
9.19.1	General	873
9.19.2	HCF contention-based channel access (EDCA)	874
9.19.2.1	Reference implementation	874
9.19.2.2	EDCA TXOPs	874
9.19.2.3	Obtaining an EDCA TXOP	875
9.19.2.4	Multiple frame transmission in an EDCA TXOP	877
9.19.2.5	EDCA backoff procedure	878
9.19.2.6	Retransmit procedures	879
9.19.2.7	Truncation of TXOP	880
9.19.3	HCCA	881
9.19.3.1	General	881
9.19.3.2	HCCA procedure	882
9.19.3.3	TXOP structure and timing	884
9.19.3.4	NAV operation during a TXOP	885
9.19.3.5	HCCA transfer rules	886
9.19.4	Admission Control at the HC	888
9.19.4.1	General	888
9.19.4.2	Contention-based admission control procedures	888
9.19.4.3	Controlled-access admission control	890
9.20	Mesh coordination function (MCF)	892
9.20.1	General	892
9.20.2	MCF contention-based channel access	892
9.20.3	MCF controlled channel access (MCCA)	892
9.20.3.1	General	892
9.20.3.2	MCCA activation	893
9.20.3.3	MCCAOP reservations	893
9.20.3.4	Neighborhood MCCAOP periods at a mesh STA	895
9.20.3.5	MCCA access fraction (MAF)	895
9.20.3.6	MCCAOP setup procedure	896
9.20.3.7	MCCAOP advertisement	897
9.20.3.8	MCCAOP teardown	901
9.20.3.9	Access during MCCAOPs	902
9.20.3.10	Interaction with time synchronization	903
9.21	Block Acknowledgment (Block Ack)	904
9.21.1	Introduction	904
9.21.2	Setup and modification of the Block Ack parameters	905
9.21.3	Data and acknowledgment transfer using immediate Block Ack policy and delayed Block Ack policy	905
9.21.4	Receive buffer operation	908
9.21.5	Teardown of the Block Ack mechanism	909
9.21.6	Selection of BlockAck and BlockAckReq variants	909
9.21.7	HT-immediate Block Ack extensions	909
9.21.7.1	Introduction to HT-immediate Block Ack extensions	909
9.21.7.2	HT-immediate Block Ack architecture	910
9.21.7.3	Scoreboard context control during full-state operation	911
9.21.7.4	Scoreboard context control during partial-state operation	912
9.21.7.5	Generation and transmission of BlockAck by an HT STA	913
9.21.7.6	Receive reordering buffer control operation	913
9.21.7.7	Originator's behavior	915

9.21.7.8	Maintaining BlockAck state at the originator	916
9.21.7.9	Originator's support of recipient's partial state	916
9.21.8	HT-delayed Block Ack extensions	916
9.21.8.1	Introduction	916
9.21.8.2	HT-delayed Block Ack negotiation	916
9.21.8.3	Operation of HT-delayed Block Ack	916
9.21.9	Protected Block Ack Agreement	917
9.22	No Acknowledgment (No Ack)	917
9.23	Protection mechanisms	918
9.23.1	Introduction	918
9.23.2	Protection mechanism for non-ERP receivers	918
9.23.3	Protection mechanisms for transmissions of HT PPDUs	920
9.23.3.1	General	920
9.23.3.2	Protection rules for HT STA operating a direct link	922
9.23.3.3	RIFS protection	923
9.23.3.4	Use of OBSS Non-HT STAs Present field	923
9.23.3.5	Protection rules for an HT mesh STA in an MBSS	923
9.23.4	L_LENGTH and L_DATARATE parameter values for HT-mixed format PPDUs	924
9.23.5	L-SIG TXOP protection	926
9.23.5.1	General rules	926
9.23.5.2	L-SIG TXOP protection rules at the TXOP holder	927
9.23.5.3	L-SIG TXOP protection rules at the TXOP responder	928
9.23.5.4	L-SIG TXOP protection NAV update rule	929
9.24	MAC frame processing	929
9.24.1	Introduction	929
9.24.2	Revision level field processing	929
9.24.3	Duration/ID field processing	929
9.24.4	Response to an invalid Action frame	929
9.24.5	Operation of the Dialog Token field	929
9.24.6	Element parsing	930
9.24.7	Vendor specific element parsing	930
9.24.8	Extensible element parsing	930
9.24.9	Extensible subelement parsing	930
9.25	Reverse Direction Protocol	930
9.25.1	Reverse direction (RD) exchange sequence	930
9.25.2	Support for RD	931
9.25.3	Rules for RD initiator	931
9.25.4	Rules for RD responder	932
9.26	PSMP Operation	933
9.26.1	Frame transmission mechanism during PSMP	933
9.26.1.1	PSMP frame transmission (PSMP-DTT and PSMP-UTT)	933
9.26.1.2	PSMP downlink transmission (PSMP-DTT)	934
9.26.1.3	PSMP uplink transmission (PSMP-UTT)	934
9.26.1.4	PSMP burst	937
9.26.1.5	Resource allocation within a PSMP burst	938
9.26.1.6	PSMP-UTT retransmission	939
9.26.1.7	PSMP acknowledgment rules	939
9.26.1.8	PSMP group addressed transmission rules	941
9.26.2	Scheduled PSMP	941
9.26.3	Unscheduled PSMP	942
9.27	Sounding PPDUs	942
9.28	Link adaptation	943
9.28.1	Introduction	943

	9.28.2 Link adaptation using the HT Control field.....	943
9.29	Transmit beamforming	945
	9.29.1 General.....	945
	9.29.2 Transmit beamforming with implicit feedback	946
	9.29.2.1 General.....	946
	9.29.2.2 Unidirectional implicit transmit beamforming	947
	9.29.2.3 Bidirectional implicit transmit beamforming.....	948
	9.29.2.4 Calibration.....	949
	9.29.3 Explicit feedback beamforming.....	954
9.30	Antenna selection (ASEL).....	958
	9.30.1 Introduction.....	958
	9.30.2 Procedure	958
9.31	Null data packet (NDP) sounding.....	962
	9.31.1 NDP rules.....	962
	9.31.2 Transmission of an NDP.....	963
	9.31.3 Determination of NDP destination	963
	9.31.4 Determination of NDP source.....	964
9.32	Mesh forwarding framework	964
	9.32.1 General.....	964
	9.32.2 Forwarding information.....	964
	9.32.3 Frame addressing in an MBSS.....	965
	9.32.4 Addressing and forwarding of individually addressed Mesh Data frames.....	966
	9.32.4.1 At source mesh STAs (individually addressed).....	966
	9.32.4.2 At intermediate and destination mesh STAs (individually addressed).....	967
	9.32.5 Addressing and forwarding of group addressed Mesh Data frames	968
	9.32.5.1 At source mesh STAs (group addressed).....	968
	9.32.5.2 At recipient mesh STAs (group addressed)	969
	9.32.6 Addressing of Management frames and MMPDU forwarding	970
	9.32.6.1 General.....	970
	9.32.6.2 MMPDU forwarding using individually addressed Multihop Action frames.....	970
	9.32.6.3 MMPDU forwarding using group addressed Multihop Action frames.....	970
	9.32.7 Detection of duplicate MSDUs/MMPDUs.....	971
	9.32.8 Mesh STAs that do not forward.....	971
	9.32.9 Frame forwarding and unknown destination	972
10.	MLME	973
	10.1 Synchronization	973
	10.1.1 General.....	973
	10.1.2 Basic approach.....	973
	10.1.2.1 TSF for infrastructure networks.....	973
	10.1.2.2 TSF for an IBSS.....	973
	10.1.2.3 TSF for an MBSS.....	973
	10.1.3 Maintaining synchronization	974
	10.1.3.1 General.....	974
	10.1.3.2 Beacon generation in infrastructure networks	974
	10.1.3.3 Beacon generation in an IBSS	974
	10.1.3.4 Beacon generation in an MBSS	975
	10.1.3.5 Beacon reception.....	975
	10.1.3.6 Multiple BSSID procedure.....	976
	10.1.3.7 TSF timer accuracy	977

10.1.4	Acquiring synchronization, scanning	977
10.1.4.1	General	977
10.1.4.2	Passive scanning	978
10.1.4.3	Active scanning	978
10.1.4.4	Initializing a BSS	981
10.1.4.5	Synchronizing with a BSS	981
10.1.4.6	Operation of Supported Rates and Extended Supported Rates elements	982
10.1.5	Adjusting STA timers	983
10.1.6	Timing synchronization for FH PHYs	983
10.1.7	Terminating a BSS	983
10.1.8	Supported rates and extended supported rates advertisement	983
10.2	Power management	984
10.2.1	Power management in an infrastructure network	984
10.2.1.1	General	984
10.2.1.2	STA Power Management modes	985
10.2.1.3	AP TIM transmissions	985
10.2.1.4	TIM types	986
10.2.1.5	Power management with APSD	986
10.2.1.6	AP operation during the CP	989
10.2.1.7	AP operation during the CFP	992
10.2.1.8	Receive operation for STAs in PS mode during the CP	993
10.2.1.9	Receive operation for STAs in PS mode during the CFP	994
10.2.1.10	Receive operation using APSD	994
10.2.1.11	STAs operating in the Active mode	995
10.2.1.12	AP aging function	995
10.2.1.13	PSMP power management	995
10.2.1.14	TDLS Peer Power Save Mode	996
10.2.1.15	TDLS Peer U-APSD	998
10.2.1.16	FMS power management	1000
10.2.1.17	TIM Broadcast	1003
10.2.1.18	WNM-Sleep mode	1005
10.2.2	Power management in an IBSS	1006
10.2.2.1	Introduction	1006
10.2.2.2	Basic approach	1006
10.2.2.3	Initialization of power management within an IBSS	1008
10.2.2.4	STA power state transitions	1008
10.2.2.5	ATIM and frame transmission	1009
10.2.3	Power management in an MBSS	1010
10.2.4	SM power save	1010
10.3	STA authentication and association	1011
10.3.1	State variables	1011
10.3.2	State transition diagram for nonmesh STAs	1012
10.3.3	Frame filtering based on STA state	1012
10.3.4	Authentication and deauthentication	1013
10.3.4.1	General	1013
10.3.4.2	Authentication—originating STA	1014
10.3.4.3	Authentication—destination STA	1014
10.3.4.4	Deauthentication—originating STA	1015
10.3.4.5	Deauthentication—destination STA	1015
10.3.5	Association, reassociation, and disassociation	1016
10.3.5.1	General	1016
10.3.5.2	Non-AP STA association initiation procedures	1016
10.3.5.3	AP association receipt procedures	1017

	10.3.5.4	Non-AP STA reassociation initiation procedures	1019
	10.3.5.5	AP reassociation receipt procedures	1020
	10.3.5.6	Non-AP STA disassociation initiation procedures	1021
	10.3.5.7	Non-AP STA disassociation receipt procedure	1021
	10.3.5.8	AP disassociation initiation procedure.....	1022
	10.3.5.9	AP disassociation receipt procedure	1022
	10.3.6	Additional mechanisms for an AP collocated with a mesh STA.....	1023
10.4	TS operation.....		1023
	10.4.1	Introduction.....	1023
	10.4.2	TSPEC construction.....	1024
	10.4.3	TS life cycle	1024
	10.4.4	TS setup	1025
	10.4.5	TS setup by resource request during a fast BSS transition	1028
	10.4.6	PSMP management.....	1028
	10.4.7	Failed TS setup	1029
	10.4.8	Data transfer.....	1029
	10.4.9	TS deletion.....	1030
	10.4.10	TS timeout.....	1031
	10.4.11	TS suspension	1032
	10.4.12	TS Reinstatement	1032
10.5	Block Ack operation		1032
	10.5.1	Introduction.....	1032
	10.5.2	Setup and modification of the Block Ack parameters	1032
	10.5.2.1	General	1032
	10.5.2.2	Procedure at the originator	1032
	10.5.2.3	Procedure at the recipient.....	1034
	10.5.2.4	Procedure common to both originator and recipient.....	1035
	10.5.3	Teardown of the Block Ack mechanism.....	1035
	10.5.3.1	General	1035
	10.5.3.2	Procedure at the initiator of the Block Ack teardown.....	1035
	10.5.3.3	Procedure at the recipient of the DELBA frame	1036
	10.5.4	Error recovery upon a peer failure	1036
10.6	Higher layer timer synchronization		1036
	10.6.1	Introduction.....	1036
	10.6.2	Procedure at the STA	1038
10.7	DLS operation.....		1038
	10.7.1	General	1038
	10.7.2	DLS procedures	1039
	10.7.2.1	General	1039
	10.7.2.2	Setup procedure at the QoS STA	1039
	10.7.2.3	Setup procedure at the AP.....	1040
	10.7.2.4	Operation of the DLS Timeout Value field	1041
	10.7.3	Data transfer after setup.....	1041
	10.7.4	DLS teardown	1041
	10.7.4.1	General	1041
	10.7.4.2	STA-initiated DLS teardown procedure	1041
	10.7.4.3	Teardown procedure at the AP.....	1043
	10.7.4.4	AP-initiated DLS teardown procedure.....	1043
	10.7.5	Error recovery upon a peer failure	1043
	10.7.6	Secure DLS operation	1043
10.8	TPC procedures.....		1044
	10.8.1	General	1044
	10.8.2	Association based on transmit power capability.....	1045
	10.8.3	Peering based on transmit power capability	1045

10.8.4	Specification of regulatory and local maximum transmit power levels	1045
10.8.5	Selection of a transmit power	1046
10.8.6	Adaptation of the transmit power	1046
10.9	DFS procedures	1046
10.9.1	General	1046
10.9.2	Association based on supported channels	1047
10.9.3	Quieting channels for testing	1048
10.9.4	Testing channels for radars	1048
10.9.5	Discontinuing operations after detecting radars	1048
10.9.6	Detecting radars	1048
10.9.7	Requesting and reporting of measurements	1048
10.9.8	Selecting and advertising a new channel	1050
10.9.8.1	General	1050
10.9.8.2	Selecting and advertising a new channel in an infrastructure BSS	1050
10.9.8.3	Selecting and advertising a new channel in an IBSS	1050
10.9.8.4	MBSS channel switching	1052
10.9.8.5	HT-greenfield transmissions in operating classes with behavior limits set of 16	1054
10.9.9	Channel Switch Announcement element operation	1055
10.10	Extended channel switching (ECS)	1055
10.10.1	General	1055
10.10.2	Advertising supported operating classes	1055
10.10.3	Selecting and advertising a new channel and/or operating class	1056
10.10.3.1	General	1056
10.10.3.2	Selecting and advertising a new channel in an infrastructure BSS	1056
10.10.3.3	Selecting and advertising a new channel in an IBSS	1057
10.10.3.4	Selecting and advertising a new channel in an MBSS	1057
10.11	Radio measurement procedures	1058
10.11.1	General	1058
10.11.2	Measurement on operating and nonoperating channels	1058
10.11.3	Measurement start time	1058
10.11.4	Measurement Duration	1059
10.11.5	Station responsibility for conducting measurements	1060
10.11.6	Requesting and reporting of measurements	1060
10.11.7	Repeated measurement request frames	1063
10.11.8	Triggered autonomous reporting	1063
10.11.9	Specific measurement usage	1065
10.11.9.1	Beacon Report	1065
10.11.9.2	Frame Report	1067
10.11.9.3	Channel Load Report	1068
10.11.9.4	Noise Histogram Report	1069
10.11.9.5	STA Statistics Report	1070
10.11.9.6	Location Configuration Information Report	1071
10.11.9.7	Measurement pause	1072
10.11.9.8	Transmit Stream/Category Measurement Report	1073
10.11.9.9	Location Civic report	1075
10.11.9.10	Location Identifier Report	1076
10.11.10	Usage of the neighbor report	1077
10.11.10.1	General	1077
10.11.10.2	Requesting a neighbor report	1078
10.11.10.3	Receiving a neighbor report	1078
10.11.11	Link Measurement	1078
10.11.12	Measurement of the RPI histogram	1078
10.11.13	Operation of the Max Transmit Power field	1079

10.11.14	Multiple BSSID Set	1079
10.11.15	Measurement Pilot generation and usage	1079
10.11.15.1	General	1079
10.11.15.2	Measurement Pilot generation by an AP	1080
10.11.15.3	Measurement Pilot usage by a STA	1082
10.11.16	Access Delay Measurement	1082
10.11.17	BSS Available Admission Capacity	1082
10.11.18	AP Channel Report	1083
10.11.19	Multicast diagnostic reporting	1083
10.12	DSE procedures	1084
10.12.1	General	1084
10.12.2	Enablement and deenablement	1085
10.12.2.1	General	1085
10.12.2.2	Enablement requester STA	1085
10.12.2.3	Enablement responder STA	1086
10.12.2.4	Deenablement requester STA	1086
10.12.2.5	Deenablement responder STA	1087
10.12.3	Registered STA operation	1087
10.12.4	Enabling STA operation with DSE	1087
10.12.5	Dependent STA operation with DSE	1088
10.13	Group addressed robust management frame procedures	1090
10.14	SA Query procedures	1090
10.15	20/40 MHz BSS operation	1090
10.15.1	Rules for operation in 20/40 MHz BSS	1090
10.15.2	Basic 20/40 MHz BSS functionality	1091
10.15.3	Channel selection methods for 20/40 MHz operation	1091
10.15.3.1	General	1091
10.15.3.2	Scanning requirements for a 20/40 MHz BSS	1091
10.15.3.3	Channel management at the AP and in an IBSS	1093
10.15.4	40 MHz PPDU transmission restrictions	1095
10.15.4.1	Fields used to determine 40 MHz PPDU transmission restrictions ..	1095
10.15.4.2	Infrastructure non-AP STA restrictions	1096
10.15.4.3	AP restrictions	1097
10.15.4.4	Restrictions on non-AP STAs that are not infrastructure BSS members	1098
10.15.5	Scanning requirements for 40-MHz-capable STA	1098
10.15.6	Exemption from OBSS scanning	1099
10.15.7	Communicating 20/40 BSS coexistence information	1100
10.15.8	Support of DSSS/CCK in 40 MHz	1100
10.15.9	STA CCA sensing in a 20/40 MHz BSS	1100
10.15.10	NAV assertion in 20/40 MHz BSS	1101
10.15.11	Signaling 40 MHz intolerance	1101
10.15.12	Switching between 40 MHz and 20 MHz	1101
10.16	Phased coexistence operation (PCO)	1103
10.16.1	General description of PCO	1103
10.16.2	Operation at a PCO active AP	1104
10.16.3	Operation at a PCO active non-AP STA	1106
10.17	20/40 BSS Coexistence Management frame usage	1106
10.18	RSNA A-MSDU procedures	1107
10.19	Public Action frame addressing	1107
10.20	STAs communicating data frames outside the context of a BSS	1107
10.21	Timing Advertisement	1109
10.21.1	Introduction	1109
10.21.2	Timing advertisement frame procedures	1109

10.21.3	UTC TSF Offset procedures	1109
10.22	Tunneled direct-link setup	1109
10.22.1	General	1109
10.22.2	TDLS payload	1111
10.22.3	TDLS Discovery	1111
10.22.4	TDLS direct-link establishment	1111
10.22.5	TDLS direct-link teardown	1113
10.22.6	TDLS channel switching	1114
10.22.6.1	General behavior on the off-channel	1116
10.22.6.2	Setting up a 40 MHz direct link	1117
10.22.6.3	TDLS channel switching and power saving	1118
10.23	Wireless network management procedures	1118
10.23.1	Wireless network management dependencies	1118
10.23.2	Event request and report procedures	1118
10.23.2.1	Event request and event report	1118
10.23.2.2	Transition event request and report	1120
10.23.2.3	RSNA event request and report	1121
10.23.2.4	Peer-to-Peer Link event request and report	1121
10.23.2.5	WNM Log event request and report	1122
10.23.2.6	Vendor Specific event request and report	1122
10.23.3	Diagnostic request and report procedures	1122
10.23.3.1	Diagnostic request and diagnostic report	1122
10.23.3.2	Configuration Profile report	1124
10.23.3.3	Manufacturer information STA report	1124
10.23.3.4	Association diagnostic	1124
10.23.3.5	IEEE 802.1X authentication diagnostic	1125
10.23.4	Location track procedures	1126
10.23.4.1	Location track configuration procedures	1126
10.23.4.2	Location track notification procedures	1128
10.23.5	Timing measurement procedure	1130
10.23.6	BSS transition management for network load balancing	1132
10.23.6.1	BSS Transition capability	1132
10.23.6.2	BSS transition management query	1132
10.23.6.3	BSS transition management request	1133
10.23.6.4	BSS transition management response	1134
10.23.7	FMS multicast rate processing	1136
10.23.8	Collocated interference reporting	1136
10.23.9	QoS Traffic capability procedure	1137
10.23.10	AC Station Count	1138
10.23.11	TFS procedures	1138
10.23.11.1	TFS capability	1138
10.23.11.2	TFS non-AP STA operation	1139
10.23.11.3	TFS AP operation	1139
10.23.12	BSS Max idle period management	1140
10.23.13	Proxy ARP (including Proxy Neighbor Discovery) service	1140
10.23.14	Channel usage procedures	1141
10.23.15	DMS procedures	1142
10.23.16	WNM-Notification	1144
10.24	WLAN interworking with external networks procedures	1144
10.24.1	General	1144
10.24.2	Interworking capabilities and information	1144
10.24.3	Interworking procedures: generic advertisement service (GAS)	1145
10.24.3.1	GAS Protocol	1145
10.24.3.2	ANQP procedures	1153

10.24.4	Interworking procedures: IEEE 802.21 MIH support	1156
10.24.5	Interworking procedures: interactions with SSPN.....	1157
10.24.5.1	General operation.....	1157
10.24.5.2	Authentication and cipher suites selection with SSPN	1157
10.24.5.3	Reporting and session control with SSPN	1158
10.24.6	Interworking procedures: emergency services support	1159
10.24.7	Interworking procedures: emergency alert system (EAS) support.....	1160
10.24.8	Interworking procedures: support for the advertisement of roaming consortiums.....	1161
10.24.9	Interworking procedures: support for QoS mapping from external networks.....	1161
11.	Security	1163
11.1	Framework.....	1163
11.1.1	Classes of security algorithm.....	1163
11.1.2	Security methods.....	1163
11.1.3	RSNA equipment and RSNA capabilities	1163
11.1.4	RSNA establishment.....	1163
11.1.5	RSNA PeerKey Support	1165
11.1.6	RSNA assumptions and constraints.....	1165
11.1.7	Requirements for robust management frame protection.....	1166
11.1.8	Emergency service establishment in an RSN	1166
11.2	Pre-RSNA security methods.....	1167
11.2.1	Status of Pre-RSNA security methods.....	1167
11.2.2	Wired equivalent privacy (WEP).....	1167
11.2.2.1	WEP overview	1167
11.2.2.2	WEP MPDU format.....	1167
11.2.2.3	WEP state.....	1168
11.2.2.4	WEP procedures.....	1168
11.2.3	Pre-RSNA authentication	1170
11.2.3.1	Overview.....	1170
11.2.3.2	Open System authentication.....	1170
11.2.3.3	Shared Key authentication	1171
11.3	Authentication using a password.....	1174
11.3.1	SAE overview	1174
11.3.2	Assumptions on SAE.....	1175
11.3.3	Representation of a password	1175
11.3.4	Finite cyclic groups.....	1176
11.3.4.1	General.....	1176
11.3.4.2	Elliptic curve cryptography (ECC) groups	1176
11.3.4.3	Finite field cryptography (FFC) groups.....	1178
11.3.5	SAE protocol.....	1179
11.3.5.1	Message exchanges.....	1179
11.3.5.2	PWE and secret generation	1180
11.3.5.3	Construction of a Commit Message.....	1180
11.3.5.4	Processing of a peer's Commit Message	1180
11.3.5.5	Construction of a Confirm Message	1181
11.3.5.6	Processing of a peer's Confirm Message.....	1181
11.3.6	Anti-clogging tokens.....	1181
11.3.7	Framing of SAE.....	1182
11.3.7.1	General.....	1182
11.3.7.2	Data type conversion.....	1182
11.3.7.3	Authentication transaction sequence number for SAE	1183
11.3.7.4	Encoding and decoding of Commit Messages.....	1183

	11.3.7.5	Encoding and decoding of Confirm Messages	1184
	11.3.7.6	Status codes	1184
11.3.8	SAE finite state machine		1184
	11.3.8.1	General	1184
	11.3.8.2	States	1185
	11.3.8.3	Events and output	1186
	11.3.8.4	Timers	1186
	11.3.8.5	Variables	1187
	11.3.8.6	Behavior of state machine	1187
11.4	RSNA confidentiality and integrity protocols		1191
	11.4.1	Overview	1191
	11.4.2	Temporal Key Integrity Protocol (TKIP)	1191
	11.4.2.1	TKIP overview	1191
	11.4.2.2	TKIP MPDU formats	1193
	11.4.2.3	TKIP MIC	1194
	11.4.2.4	TKIP countermeasures procedures	1197
	11.4.2.5	TKIP mixing function	1201
	11.4.2.6	TKIP replay protection procedures	1205
	11.4.3	CTR with CBC-MAC Protocol (CCMP)	1205
	11.4.3.1	General	1205
	11.4.3.2	CCMP MPDU format	1206
	11.4.3.3	CCMP cryptographic encapsulation	1207
	11.4.3.4	CCMP decapsulation	1210
	11.4.4	Broadcast/Multicast Integrity Protocol (BIP)	1212
	11.4.4.1	BIP overview	1212
	11.4.4.2	BIP MMPDU format	1212
	11.4.4.3	BIP AAD construction	1212
	11.4.4.4	BIP replay protection	1213
	11.4.4.5	BIP transmission	1213
	11.4.4.6	BIP reception	1213
11.5	RSNA security association management		1214
	11.5.1	Security associations	1214
	11.5.1.1	Security association definitions	1214
	11.5.1.2	TPKSA	1219
	11.5.1.3	Security association life cycle	1219
	11.5.2	RSNA selection	1222
	11.5.3	RSNA policy selection in an ESS	1222
	11.5.4	TSN policy selection in an ESS	1224
	11.5.5	RSNA policy selection in an IBSS and for DLS	1224
	11.5.6	TSN policy selection in an IBSS	1225
	11.5.7	RSNA policy selection in an MBSS	1226
	11.5.8	RSN management of the IEEE 802.1X Controlled Port	1226
	11.5.9	RSNA authentication in an ESS	1227
	11.5.9.1	General	1227
	11.5.9.2	Preauthentication and RSNA key management	1227
	11.5.9.3	Cached PMKSAs and RSNA key management	1228
	11.5.10	RSNA authentication in an IBSS	1228
	11.5.11	RSNA authentication in an MBSS	1230
	11.5.12	RSNA key management in an ESS	1230
	11.5.13	RSNA key management in an IBSS	1231
	11.5.14	RSNA key management in an MBSS	1231
	11.5.15	RSNA security association termination	1232
	11.5.16	Protection of robust management frames	1232
	11.5.17	Robust management frame selection procedure	1233

11.6	Keys and key distribution	1234
11.6.1	Key hierarchy.....	1234
11.6.1.1	General	1234
11.6.1.2	PRF.....	1235
11.6.1.3	Pairwise key hierarchy	1236
11.6.1.4	Group key hierarchy.....	1237
11.6.1.5	Integrity group key hierarchy.....	1238
11.6.1.6	PeerKey key hierarchy	1239
11.6.1.7	FT key hierarchy	1240
11.6.2	EAPOL-Key frames.....	1244
11.6.3	EAPOL-Key frame construction and processing.....	1252
11.6.4	EAPOL-Key frame notation	1253
11.6.5	Nonce generation	1254
11.6.6	4-Way Handshake.....	1254
11.6.6.1	General	1254
11.6.6.2	4-Way Handshake Message 1	1255
11.6.6.3	4-Way Handshake Message 2	1256
11.6.6.4	4-Way Handshake Message 3	1258
11.6.6.5	4-Way Handshake Message 4	1260
11.6.6.6	4-Way Handshake implementation considerations.....	1261
11.6.6.7	Sample 4-Way Handshake	1262
11.6.6.8	4-Way Handshake analysis	1262
11.6.7	Group Key Handshake.....	1264
11.6.7.1	General	1264
11.6.7.2	Group Key Handshake Message 1	1265
11.6.7.3	Group Key Handshake Message 2	1266
11.6.7.4	Group Key Handshake implementation considerations	1267
11.6.7.5	Sample Group Key Handshake	1267
11.6.8	PeerKey Handshake.....	1268
11.6.8.1	General	1268
11.6.8.2	SMK Handshake	1268
11.6.8.3	PeerKey setup and handshake error conditions	1274
11.6.8.4	STKSA rekeying.....	1274
11.6.8.5	Error Reporting	1275
11.6.9	TDLS Peer Key security protocol.....	1276
11.6.9.1	General	1276
11.6.9.2	TDLS Peer Key Handshake	1277
11.6.9.3	TDLS Peer Key Handshake security assumptions.....	1278
11.6.9.4	TDLS Peer Key (TPK) Security Protocol Handshake messages	1279
11.6.9.5	Supplicant state machine procedures	1282
11.6.9.6	Supplicant PeerKey state machine states	1284
11.6.9.7	Supplicant PeerKey state machine variables	1286
11.6.10	RSNA Supplicant key management state machine.....	1287
11.6.10.1	General	1287
11.6.10.2	Supplicant state machine states.....	1287
11.6.10.3	Supplicant state machine variables	1288
11.6.11	RSNA Authenticator key management state machine.....	1289
11.6.11.1	General	1289
11.6.11.2	Authenticator state machine states.....	1292
11.6.11.3	Authenticator state machine variables	1293
11.6.11.4	Authenticator state machine procedures	1295
11.7	Mapping EAPOL keys to IEEE 802.11 keys.....	1295
11.7.1	Mapping PTK to TKIP keys	1295
11.7.2	Mapping GTK to TKIP keys	1295

11.7.3	Mapping PTK to CCMP keys	1295
11.7.4	Mapping GTK to CCMP keys	1296
11.7.5	Mapping GTK to WEP-40 keys	1296
11.7.6	Mapping GTK to WEP-104 keys	1296
11.7.7	Mapping IGTK to BIP keys	1296
11.8	Per-frame pseudo-code	1296
11.8.1	WEP frame pseudo-code	1296
11.8.2	RSNA frame pseudo-code	1298
11.8.2.1	General	1298
11.8.2.2	Per-MSDU/Per-A-MSDU Tx pseudo-code	1298
11.8.2.3	Per-MMPDU Tx pseudo-code	1299
11.8.2.4	Per-MPDU Tx pseudo-code	1300
11.8.2.5	Per-MPDU Tx pseudo-code for MMPDU	1301
11.8.2.6	Per-MPDU Rx pseudo-code	1301
11.8.2.7	Per-MPDU Rx pseudo-code for an MMPDU	1302
11.8.2.8	Per-MSDU/Per-A-MSDU Rx pseudo-code	1305
11.8.2.9	Per-MMPDU Rx pseudo-code	1306
11.9	Authenticated mesh peering exchange (AMPE)	1307
12.	Fast BSS transition	1308
12.1	Overview	1308
12.2	Key holders	1308
12.2.1	Introduction	1308
12.2.2	Authenticator key holders	1309
12.2.3	Supplicant key holders	1310
12.3	Capability and policy advertisement	1310
12.4	FT initial mobility domain association	1311
12.4.1	Overview	1311
12.4.2	FT initial mobility domain association in an RSN	1311
12.4.3	FT initial mobility domain association in a non-RSN	1314
12.5	FT Protocol	1315
12.5.1	Overview	1315
12.5.2	Over-the-air FT Protocol authentication in an RSN	1315
12.5.3	Over-the-DS FT Protocol authentication in an RSN	1316
12.5.4	Over-the-air FT Protocol authentication in a non-RSN	1319
12.5.5	Over-the-DS FT Protocol authentication in a non-RSN	1320
12.6	FT Resource Request Protocol	1321
12.6.1	Overview	1321
12.6.2	Over-the-air fast BSS transition with resource request	1321
12.6.3	Over-the-DS fast BSS transition with resource request	1323
12.7	FT reassociation	1325
12.7.1	FT reassociation in an RSN	1325
12.7.2	FT reassociation in a non-RSN	1327
12.8	FT authentication sequence	1328
12.8.1	Overview	1328
12.8.2	FT authentication sequence: contents of first message	1329
12.8.3	FT authentication sequence: contents of second message	1329
12.8.4	FT authentication sequence: contents of third message	1330
12.8.5	FT authentication sequence: contents of fourth message	1330
12.9	FT security architecture state machines	1332
12.9.1	Introduction	1332
12.9.2	R0KH state machine	1332
12.9.2.1	General	1332

12.9.2.2	R0KH state machine states	1333
12.9.2.3	R0KH state machine variables	1334
12.9.2.4	R0KH state machine procedures	1334
12.9.3	RIKH state machine	1334
12.9.3.1	General	1334
12.9.3.2	RIKH state machine states	1336
12.9.3.3	RIKH state machine variables	1337
12.9.3.4	RIKH state machine procedures	1338
12.9.4	S0KH state machine	1338
12.9.4.1	General	1338
12.9.4.2	S0KH state machine states	1339
12.9.4.3	S0KH state machine variables	1339
12.9.4.4	S0KH state machine procedures	1339
12.9.5	S1KH state machine	1339
12.9.5.1	General	1339
12.9.5.2	S1KH state machine states	1342
12.9.5.3	S1KH state machine variables	1343
12.9.5.4	S1KH state machine procedures	1343
12.10	Remote request broker (RRB) communication	1343
12.10.1	Overview	1343
12.10.2	Remote request broker (RRB)	1344
12.10.3	Remote Request/Response frame definition	1344
12.11	Resource request procedures	1345
12.11.1	General	1345
12.11.2	Resource information container (RIC)	1346
12.11.3	Creation and handling of a resource request	1348
12.11.3.1	FTO procedures	1348
12.11.3.2	AP procedures	1349
13.	MLME mesh procedures	1352
13.1	Mesh STA dependencies	1352
13.2	Mesh discovery	1352
13.2.1	General	1352
13.2.2	Mesh identifier	1352
13.2.3	Mesh profile	1353
13.2.4	Mesh STA configuration	1353
13.2.5	Supplemental information for the mesh discovery	1353
13.2.6	Scanning mesh BSSs	1354
13.2.7	Candidate peer mesh STA	1354
13.2.8	Establishing or becoming a member of a mesh BSS	1354
13.2.9	Establishing mesh peerings	1355
13.3	Mesh peering management (MPM)	1356
13.3.1	General	1356
13.3.2	State variable management	1357
13.3.3	Mesh authentication	1357
13.3.4	Mesh peering instance controller	1358
13.3.4.1	Overview	1358
13.3.4.2	Creating a new mesh peering instance	1358
13.3.4.3	Deleting mesh peering instances	1359
13.3.5	Mesh peering instance selection	1359
13.3.6	Mesh peering open	1360
13.3.6.1	Generating Mesh Peering Open frames	1360
13.3.6.2	Mesh Peering Open frame processing	1360

13.3.7	Mesh peering confirm	1361
13.3.7.1	Generating Mesh Peering Confirm frames	1361
13.3.7.2	Mesh Peering Confirm frame processing	1361
13.3.8	Mesh peering close	1361
13.3.8.1	Generating Mesh Peering Close frames	1361
13.3.8.2	Mesh Peering Close frame processing	1361
13.4	Mesh peering management finite state machine (MPM FSM)	1361
13.4.1	General	1361
13.4.2	States	1361
13.4.3	Events and actions	1362
13.4.4	Timers	1363
13.4.5	State transitions	1364
13.4.6	IDLE state	1365
13.4.7	OPN_SNT state	1366
13.4.8	CNF_RCVD state	1366
13.4.9	OPN_RCVD state	1367
13.4.10	ESTAB state	1368
13.4.11	HOLDING state	1368
13.5	Authenticated mesh peering exchange (AMPE)	1368
13.5.1	Overview	1368
13.5.2	Security capabilities selection	1369
13.5.2.1	Instance Pairwise Cipher Suite selection	1369
13.5.2.2	Group cipher suite selection	1369
13.5.3	Construction and processing AES-SIV-protected Mesh Peering Management frames	1370
13.5.4	Distribution of group transient keys in an MBSS	1371
13.5.5	Mesh Peering Management frames for AMPE	1371
13.5.5.1	General	1371
13.5.5.2	Mesh peering open for AMPE	1371
13.5.5.3	Mesh peering confirm for AMPE	1372
13.5.5.4	Mesh peering close for AMPE	1372
13.5.6	AMPE finite state machine	1373
13.5.6.1	Overview	1373
13.5.6.2	Additional events and actions to MPM FSM	1373
13.5.6.3	State transitions	1374
13.5.7	Keys and key derivation algorithm for the authenticated mesh peering exchange (AMPE)	1376
13.6	Mesh group key handshake	1377
13.6.1	General	1377
13.6.2	Protection on mesh group key handshake frames	1377
13.6.3	Mesh Group Key Inform frame construction and processing	1378
13.6.4	Mesh Group Key Acknowledge frame construction and processing	1379
13.6.5	Mesh group key implementation considerations	1380
13.7	Mesh security	1380
13.8	Mesh path selection and metric framework	1380
13.8.1	General	1380
13.8.2	Extensible path selection framework	1380
13.8.3	Link metric reporting	1381
13.9	Airtime link metric	1381
13.10	Hybrid wireless mesh protocol (HWMP)	1382
13.10.1	General	1382
13.10.2	Terminology	1383
13.10.3	On-demand path selection mode	1385
13.10.4	Proactive tree building mode	1386

13.10.4.1	General	1386
13.10.4.2	Proactive PREQ mechanism	1386
13.10.4.3	Proactive RANN mechanism	1386
13.10.5	Collocated STAs	1387
13.10.6	Parameters for extensible path selection framework	1387
13.10.7	Addressing of HWMP Mesh Path Selection frame	1387
13.10.8	General rules for processing HWMP elements.....	1389
13.10.8.1	General	1389
13.10.8.2	HWMP propagation	1389
13.10.8.3	HWMP sequence numbering	1389
13.10.8.4	Forwarding information	1390
13.10.8.5	Repeated attempts at path discovery	1391
13.10.8.6	Limiting the rate of HWMP SN increments	1392
13.10.9	Path request (PREQ).....	1392
13.10.9.1	General	1392
13.10.9.2	Function	1392
13.10.9.3	Conditions for generating and sending a PREQ element.....	1392
13.10.9.4	PREQ element processing.....	1400
13.10.10	Path reply (PREP).....	1402
13.10.10.1	General	1402
13.10.10.2	Function	1402
13.10.10.3	Conditions for generating and sending a PREP element	1402
13.10.10.4	PREP element processing	1405
13.10.11	Path error (PERR).....	1406
13.10.11.1	General	1406
13.10.11.2	Function	1406
13.10.11.3	Conditions for generating and sending a PERR element.....	1406
13.10.11.4	PERR element processing.....	1410
13.10.12	Root announcement (RANN)	1410
13.10.12.1	General	1410
13.10.12.2	Function	1411
13.10.12.3	Conditions for generating and sending a RANN element.....	1411
13.10.12.4	RANN element reception.....	1412
13.10.13	Considerations for support of STAs without mesh functionality	1413
13.11	Interworking with the DS	1413
13.11.1	Overview of interworking between a mesh BSS and a DS	1413
13.11.2	Gate announcement (GANN)	1414
13.11.2.1	General	1414
13.11.2.2	Function	1414
13.11.2.3	Conditions for generating and sending a GANN element	1414
13.11.2.4	GANN element processing	1415
13.11.3	Data forwarding at proxy mesh gates	1416
13.11.3.1	General	1416
13.11.3.2	Forwarding of MSDUs from the MBSS to the DS	1416
13.11.3.3	Forwarding of MSDUs from the DS to the MBSS	1416
13.11.4	Proxy information and proxy update	1418
13.11.4.1	General	1418
13.11.4.2	Proxy information	1418
13.11.4.3	Proxy update (PXU).....	1419
13.11.4.4	Proxy update confirmation (PXUC)	1421
13.11.5	Mesh STA collocation	1422
13.12	Intra-mesh congestion control	1422
13.12.1	General.....	1422
13.12.2	Congestion control signaling protocol.....	1422

13.13	Synchronization and beaconing in MBSSs.....	1423
13.13.1	TSF for MBSSs.....	1423
13.13.2	Extensible synchronization framework	1423
13.13.2.1	General	1423
13.13.2.2	Neighbor offset synchronization method	1423
13.13.3	Beaconing	1426
13.13.3.1	Beacon generation in MBSSs	1426
13.13.3.2	Beacon reception for mesh STA	1426
13.13.4	Mesh beacon collision avoidance (MBCA).....	1426
13.13.4.1	Overview	1426
13.13.4.2	Beacon timing advertisement	1427
13.13.4.3	TBTT selection	1430
13.13.4.4	TBTT adjustment	1430
13.13.4.5	Frame transmission across reported TBTT	1432
13.13.4.6	Delayed beacon transmissions	1432
13.14	Power save in a mesh BSS.....	1432
13.14.1	General.....	1432
13.14.2	Mesh power modes	1433
13.14.2.1	General	1433
13.14.2.2	Peer-specific mesh power modes	1433
13.14.2.3	Nonpeer mesh power modes	1434
13.14.3	Mesh power mode indications and transitions.....	1434
13.14.3.1	General	1434
13.14.3.2	Transition to a higher activity level	1435
13.14.3.3	Transition to a lower activity level	1435
13.14.4	TIM transmissions in an MBSS.....	1435
13.14.5	TIM types.....	1435
13.14.6	Mesh awake window	1436
13.14.7	Power save support	1436
13.14.8	Operation in peer-specific and nonpeer mesh power modes	1437
13.14.8.1	General	1437
13.14.8.2	Operation in active mode	1437
13.14.8.3	Operation in deep sleep mode for nonpeer mesh STAs	1437
13.14.8.4	Operation in light sleep mode for a mesh peering	1438
13.14.8.5	Operation in deep sleep mode for a mesh peering	1438
13.14.8.6	Conditions for Doze state.....	1438
13.14.9	Mesh peer service periods.....	1439
13.14.9.1	General	1439
13.14.9.2	Initiation of a mesh peer service period	1439
13.14.9.3	Operation during a mesh peer service period.....	1440
13.14.9.4	Termination of a mesh peer service period.....	1440
13.14.10	MCCA use by power saving mesh STA.....	1441
14.	Frequency-Hopping spread spectrum (FHSS) PHY specification for the 2.4 GHz industrial, scientific, and medical (ISM) band.....	1442
14.1	Status of the Frequency Hopping PHY.....	1442
14.2	Overview.....	1442
14.2.1	Overview of FHSS PHY	1442
14.2.2	FHSS PHY functions	1442
14.2.2.1	General	1442
14.2.2.2	PLCP sublayer.....	1442
14.2.2.3	PLME	1442
14.2.2.4	PMD sublayer	1442

14.2.3	Service specification method and notation	1443
14.3	FHSS PHY-specific service parameter lists	1443
14.3.1	Overview	1443
14.3.2	TXVECTOR parameters	1443
14.3.2.1	General	1443
14.3.2.2	TXVECTOR LENGTH	1443
14.3.2.3	TXVECTOR DATARATE	1444
14.3.3	RXVECTOR parameters	1444
14.3.3.1	General	1444
14.3.3.2	TRXVECTOR LENGTH	1444
14.3.3.3	RXVECTOR RSSI	1444
14.4	FHSS PLCP sublayer	1444
14.4.1	Overview	1444
14.4.2	State diagram notation	1444
14.4.3	PLCP frame format	1446
14.4.3.1	General	1446
14.4.3.2	PLCP Preamble field	1446
14.4.3.3	PLCP Header field	1446
14.4.3.4	PLCP data whitener	1447
14.4.4	PLCP state machines	1448
14.4.4.1	General	1448
14.4.4.2	Transmit PLCP	1448
14.4.4.3	CS/CCA procedure	1452
14.4.4.4	Receive PLCP	1455
14.5	PLME SAP layer management	1458
14.5.1	Overview	1458
14.5.2	FH PHY specific MLME procedures	1458
14.5.2.1	Overview	1458
14.5.2.2	FH synchronization	1458
14.5.3	FH PLME state machines	1458
14.5.3.1	Overview	1458
14.5.3.2	PLME state machine	1458
14.5.3.3	PLME management primitives	1460
14.6	FHSS PMD sublayer services	1461
14.6.1	Scope and field of application	1461
14.6.2	Overview of services	1461
14.6.3	Overview of interactions	1461
14.6.4	Basic service and options	1461
14.6.4.1	General	1461
14.6.4.2	PMD_SAP peer-to-peer service primitives	1461
14.6.4.3	PMD_SAP sublayer-to-sublayer service primitives	1462
14.6.4.4	PMD_SAP service primitives parameters	1462
14.6.5	PMD_SAP detailed service specification	1462
14.6.5.1	Introduction	1462
14.6.5.2	PMD_DATA.request	1462
14.6.5.3	PMD_DATA.indication	1463
14.6.5.4	PMD_TXRX.request	1463
14.6.5.5	PMD_PA_RAMP.request	1464
14.6.5.6	PMD_ANTSEL.request	1464
14.6.5.7	PMD_TXPWRLVL.request	1465
14.6.5.8	PMD_FREQ.request	1466
14.6.5.9	PMD_RSSI.indication	1466
14.6.5.10	PMD_PWRMGMT.request	1467

14.7	FHSS PMD sublayer, 1.0 Mb/s	1467
14.7.1	1 Mb/s PMD operating specifications, general.....	1467
14.7.2	Regulatory requirements.....	1467
14.7.3	Operating frequency range.....	1468
14.7.4	Number of operating channels.....	1468
14.7.5	Operating channel center frequency	1468
14.7.6	Occupied channel bandwidth.....	1471
14.7.7	Minimum hop rate	1471
14.7.8	Hop sequences	1471
14.7.9	Unwanted emissions	1473
14.7.10	Modulation.....	1473
14.7.11	Channel data rate	1475
14.7.12	Channel switching/settling time.....	1475
14.7.13	Receive to transmit switch time.....	1475
14.7.14	PMD transmit specifications.....	1475
14.7.14.1	Introduction.....	1475
14.7.14.2	Nominal transmit power.....	1475
14.7.14.3	Transmit power levels.....	1475
14.7.14.4	Transmit power level control	1475
14.7.14.5	Transmit spectrum shape	1475
14.7.14.6	Transmit center frequency tolerance.....	1476
14.7.14.7	Transmitter ramp periods.....	1476
14.7.15	PMD receiver specifications.....	1476
14.7.15.1	Introduction.....	1476
14.7.15.2	Input signal range.....	1476
14.7.15.3	Receive center frequency acceptance range.....	1476
14.7.15.4	CCA power threshold.....	1476
14.7.15.5	Receiver sensitivity	1477
14.7.15.6	Intermodulation.....	1477
14.7.15.7	Desensitization (Dp)	1477
14.7.15.8	Receiver radiation	1477
14.8	FHSS PMD sublayer, 2.0 Mb/s	1478
14.8.1	Overview.....	1478
14.8.2	4GFSK modulation	1478
14.8.3	Frame structure for HS FHSS PHY	1479
14.8.4	Channel data rate	1479
14.8.5	Input dynamic range	1480
14.8.6	Receiver sensitivity.....	1480
14.8.7	IMp.....	1480
14.8.8	Dp.....	1480
14.9	FHSS PHY MIB	1480
14.9.1	FH PHY attributes	1480
14.9.2	FH PHY attribute definitions.....	1482
14.9.2.1	dot11PHYType	1482
14.9.2.2	dot11RegDomainsImplementedValue	1482
14.9.2.3	dot11CurrentRegDomain	1483
14.9.2.4	dot11CurrentPowerState	1483
14.9.2.5	dot11SupportedDataRatesTX	1483
14.9.2.6	dot11SupportedDataRatesRX	1483
14.9.2.7	aMPDUMaxLength.....	1483
14.9.2.8	dot11TxAntennaImplemented	1484
14.9.2.9	dot11CurrentTxAntenna	1484
14.9.2.10	dot11RxAntennaImplemented	1484
14.9.2.11	dot11DiversitySupportImplemented	1485

14.9.2.12	dot11DiversitySelectionRxImplemented	1485
14.9.2.13	dot11NumberSupportedPowerLevelsImplemented	1485
14.9.2.14	dot11TxPowerLevel1-8	1485
14.9.2.15	dot11CurrentTxPowerLevel.....	1486
14.9.2.16	dot11HopTime	1486
14.9.2.17	dot11CurrentChannelNumber	1486
14.9.2.18	dot11MaxDwellTime	1486
14.9.2.19	dot11CurrentSet	1486
14.9.2.20	dot11CurrentPattern	1486
14.9.2.21	dot11CurrentIndex	1487
14.9.2.22	dot11CurrentPowerState	1487
14.10	FH PHY characteristics	1487
15.	Infrared (IR) PHY specification	1489
15.1	Status of the Infrared PHY.....	1489
15.2	Overview.....	1489
15.2.1	General.....	1489
15.2.2	Scope.....	1490
15.2.3	IR PHY functions.....	1490
15.2.3.1	General.....	1490
15.2.3.2	PLCP sublayer.....	1490
15.2.3.3	PMD sublayer	1490
15.2.3.4	PLME	1490
15.2.4	Service specification method and notation	1490
15.3	IR PLCP sublayer	1491
15.3.1	General.....	1491
15.3.2	Overview.....	1491
15.3.3	PLCP frame format.....	1491
15.3.4	PLCP modulation and rate change.....	1491
15.3.5	PLCP field definitions	1492
15.3.5.1	PLCP SYNC field	1492
15.3.5.2	PLCP SFD field	1492
15.3.5.3	PLCP DR field	1492
15.3.5.4	PLCP DCLA field	1492
15.3.5.5	PLCP LENGTH field.....	1493
15.3.5.6	PLCP CRC field.....	1493
15.3.5.7	PSDU field	1493
15.3.6	PLCPs	1493
15.3.6.1	Transmit PLCP.....	1493
15.3.6.2	Receive PLCP	1494
15.3.6.3	CCA procedure	1494
15.3.6.4	PMD_SAP peer-to-peer service primitive parameters.....	1494
15.4	IR PMD sublayer	1495
15.4.1	General.....	1495
15.4.2	Overview.....	1495
15.4.3	PMD operating specifications, general.....	1495
15.4.3.1	General.....	1495
15.4.3.2	Modulation and channel data rates.....	1495
15.4.3.3	Octet partition and PPM symbol generation procedure	1496
15.4.3.4	Operating environment	1496
15.4.4	PMD transmit specifications.....	1497
15.4.4.1	Introduction.....	1497
15.4.4.2	Transmitted peak optical power	1497

15.4.4.3	Basic pulse shape and parameters	1497
15.4.4.4	Emitter radiation pattern mask	1498
15.4.4.5	Optical emitter peak wavelength.....	1500
15.4.4.6	Transmit spectrum mask	1500
15.4.5	PMD receiver specifications	1500
15.4.5.1	Introduction	1500
15.4.5.2	Receiver sensitivity	1500
15.4.5.3	Receiver dynamic range	1501
15.4.5.4	Receiver field of view (FOV)	1501
15.4.6	ED, CS, and CCA definitions	1501
15.4.6.1	ED signal	1501
15.4.6.2	CS signal	1501
15.4.6.3	CCA	1502
15.4.6.4	CHNL_ID.....	1502
15.5	PHY attributes.....	1502
16.	DSSS PHY specification for the 2.4 GHz band designated for ISM applications	1504
16.1	Overview.....	1504
16.1.1	General	1504
16.1.2	Scope.....	1504
16.1.3	DSSS PHY functions	1504
16.1.3.1	General	1504
16.1.3.2	PLCP sublayer.....	1504
16.1.3.3	PMD sublayer	1504
16.1.3.4	PLME	1504
16.1.4	Service specification method and notation	1505
16.2	DSSS PLCP sublayer.....	1505
16.2.1	Overview.....	1505
16.2.2	PLCP frame format	1505
16.2.3	PLCP field definitions	1505
16.2.3.1	General	1505
16.2.3.2	PLCP SYNC field	1505
16.2.3.3	PLCP SFD.....	1506
16.2.3.4	PLCP IEEE 802.11 SIGNAL field	1506
16.2.3.5	PLCP IEEE 802.11 SERVICE field	1506
16.2.3.6	PLCP LENGTH field.....	1506
16.2.3.7	PLCP CRC field.....	1506
16.2.4	PLCP/DSSS PHY data scrambler and descrambler	1508
16.2.5	PLCP data modulation and modulation rate change	1508
16.2.6	Transmit PLCP	1508
16.2.7	Receive PLCP	1510
16.3	DSSS PLME	1513
16.3.1	PLME_SAP sublayer management primitives	1513
16.3.2	DSSS PHY MIB	1513
16.3.3	DS PHY characteristics	1514
16.4	DSSS PMD sublayer.....	1515
16.4.1	Scope and field of application	1515
16.4.2	Overview of service	1515
16.4.3	Overview of interactions.....	1516
16.4.4	Basic service and options.....	1516
16.4.4.1	General	1516
16.4.4.2	PMD_SAP peer-to-peer service primitives.....	1516
16.4.4.3	PMD_SAP peer-to-peer service primitive parameters.....	1516

	16.4.4.4	PMD_SAP sublayer-to-sublayer service primitives	1518
	16.4.4.5	PMD_SAP service primitive parameters	1518
16.4.5		PMD_SAP detailed service specification	1519
	16.4.5.1	Introduction	1519
	16.4.5.2	PMD_DATA.request	1519
	16.4.5.3	PMD_DATA.indication	1519
	16.4.5.4	PMD_TXSTART.request	1520
	16.4.5.5	PMD_TXEND.request	1520
	16.4.5.6	PMD_ANTSEL.request	1520
	16.4.5.7	PMD_ANTSEL.indication	1521
	16.4.5.8	PMD_TXPWRLVL.request	1521
	16.4.5.9	PMD_RATE.request	1522
	16.4.5.10	PMD_RATE.indication	1523
	16.4.5.11	PMD_RSSI.indication	1523
	16.4.5.12	PMD_SQ.indication	1524
	16.4.5.13	PMD_CS.indication	1524
	16.4.5.14	PMD_ED.indication	1525
	16.4.5.15	PMD_ED.request	1525
	16.4.5.16	PHY-CCA.indication	1526
	16.4.5.17	PMD_RCPI.indication	1526
16.4.6		PMD operating specifications, general	1527
	16.4.6.1	General	1527
	16.4.6.2	Operating frequency range	1527
	16.4.6.3	Channel Numbering of operating channels	1527
	16.4.6.4	Spreading sequence	1528
	16.4.6.5	Modulation and channel data rates	1528
	16.4.6.6	Transmit and receive in-band and out-of-band spurious emissions ..	1528
	16.4.6.7	TX-to-RX turnaround time	1528
	16.4.6.8	RX-to-TX turnaround time	1529
	16.4.6.9	Slot time	1529
	16.4.6.10	Transmit and receive antenna port impedance	1529
16.4.7		PMD transmit specifications	1529
	16.4.7.1	Introduction	1529
	16.4.7.2	Transmit power levels	1529
	16.4.7.3	Minimum transmitted power level	1529
	16.4.7.4	Transmit power level control	1529
	16.4.7.5	Transmit spectrum mask	1529
	16.4.7.6	Transmit center frequency tolerance	1530
	16.4.7.7	Chip clock frequency tolerance	1530
	16.4.7.8	Transmit power-on and power-down ramp	1530
	16.4.7.9	RF carrier suppression	1531
	16.4.7.10	Transmit modulation accuracy	1531
	16.4.7.11	Time of Departure accuracy	1533
16.4.8		PMD receiver specifications	1534
	16.4.8.1	Introduction	1534
	16.4.8.2	Receiver minimum input level sensitivity	1534
	16.4.8.3	Receiver maximum input level	1534
	16.4.8.4	Receiver adjacent channel rejection	1534
	16.4.8.5	CCA	1534
	16.4.8.6	Received Channel Power Indicator Measurement	1535

17.	High Rate direct sequence spread spectrum (HR/DSSS) PHY specification	1536
17.1	Overview	1536
17.1.1	General	1536
17.1.2	Scope	1536
17.1.3	High Rate PHY functions	1537
17.1.3.1	General	1537
17.1.3.2	PLCP sublayer	1537
17.1.3.3	PMD sublayer	1537
17.1.3.4	PLME	1537
17.1.4	Service specification method and notation	1537
17.2	High Rate PLCP sublayer	1537
17.2.1	Overview	1537
17.2.2	PPDU format	1538
17.2.2.1	General	1538
17.2.2.2	Long PPDU format	1538
17.2.2.3	Short PPDU format	1538
17.2.3	PPDU field definitions	1539
17.2.3.1	General	1539
17.2.3.2	Long PLCP SYNC field	1539
17.2.3.3	Long PLCP SFD	1539
17.2.3.4	Long PLCP SIGNAL field	1539
17.2.3.5	Long PLCP SERVICE field	1540
17.2.3.6	Long PLCP LENGTH field	1540
17.2.3.7	PLCP CRC (CRC-16) field	1542
17.2.3.8	Long PLCP data modulation and modulation rate change	1544
17.2.3.9	Short PLCP synchronization (shortSYNC)	1544
17.2.3.10	Short PLCP SFD field (shortSFD)	1544
17.2.3.11	Short PLCP SIGNAL field (shortSIGNAL)	1545
17.2.3.12	Short PLCP SERVICE field (shortSERVICE)	1545
17.2.3.13	Short PLCP LENGTH field (shortLENGTH)	1545
17.2.3.14	Short CRC-16 field (shortCRC)	1545
17.2.3.15	Short PLCP data modulation and modulation rate change	1545
17.2.4	PLCP/High Rate PHY data scrambler and descrambler	1545
17.2.5	Transmit PLCP	1546
17.2.6	Receive PLCP	1548
17.3	High Rate PLME	1551
17.3.1	PLME_SAP sublayer management primitives	1551
17.3.2	High Rate PHY MIB	1551
17.3.3	DS PHY characteristics	1552
17.3.4	High Rate TXTIME calculation	1553
17.3.5	Vector descriptions	1553
17.4	High Rate PMD sublayer	1554
17.4.1	Scope and field of application	1554
17.4.2	Overview of service	1555
17.4.3	Overview of interactions	1555
17.4.4	Basic service and options	1555
17.4.4.1	General	1555
17.4.4.2	PMD_SAP peer-to-peer service primitives	1555
17.4.4.3	PMD_SAP sublayer-to-sublayer service primitives	1556
17.4.5	PMD_SAP detailed service specification	1556
17.4.5.1	Introduction	1556
17.4.5.2	PMD_DATA.request	1556
17.4.5.3	PMD_DATA.indication	1557

17.4.5.4	PMD_MODULATION.request	1557
17.4.5.5	PMD_PREAMBLE.request	1558
17.4.5.6	PMD_PREAMBLE.indication	1559
17.4.5.7	PMD_TXSTART.request	1559
17.4.5.8	PMD_TXEND.request	1560
17.4.5.9	PMD_ANTSEL.request	1560
17.4.5.10	PMD_TXPWRLVL.request	1560
17.4.5.11	PMD_RATE.request	1561
17.4.5.12	PMD_RSSI.indication	1562
17.4.5.13	PMD_SQ.indication	1562
17.4.5.14	PMD_CS.indication	1563
17.4.5.15	PMD_ED.indication	1564
17.4.5.16	PMD_ED.request	1564
17.4.5.17	PMD_RCPI.indication	1565
17.4.6	PMD operating specifications, general	1565
17.4.6.1	General	1565
17.4.6.2	Operating frequency range	1566
17.4.6.3	Channel Numbering of operating channels	1566
17.4.6.4	Modulation and channel data rates	1566
17.4.6.5	Spreading sequence and modulation for 1 Mb/s and 2 Mb/s	1567
17.4.6.6	Spreading sequences and modulation for CCK modulation at 5.5 Mb/s and 11 Mb/s	1567
17.4.6.7	DSSS/PBCC data modulation and modulation rate (optional)	1569
17.4.6.8	Channel Agility (optional)	1572
17.4.6.9	Transmit and receive in-band and out-of-band spurious emissions ..	1575
17.4.6.10	TX-to-RX turnaround time	1575
17.4.6.11	RX-to-TX turnaround time	1575
17.4.6.12	Slot time	1575
17.4.6.13	Channel switching/settling time	1575
17.4.6.14	Transmit and receive antenna port impedance	1575
17.4.7	PMD transmit specifications	1575
17.4.7.1	Introduction	1575
17.4.7.2	Transmit power levels	1575
17.4.7.3	Transmit power level control	1576
17.4.7.4	Transmit spectrum mask	1576
17.4.7.5	Transmit center frequency tolerance	1576
17.4.7.6	Chip clock frequency tolerance	1576
17.4.7.7	Transmit power-on and power-down ramp	1577
17.4.7.8	RF carrier suppression	1577
17.4.7.9	Transmit modulation accuracy	1578
17.4.7.10	Time of Departure accuracy	1580
17.4.8	PMD receiver specifications	1580
17.4.8.1	Introduction	1580
17.4.8.2	Receiver minimum input level sensitivity	1580
17.4.8.3	Receiver maximum input level	1580
17.4.8.4	Receiver adjacent channel rejection	1581
17.4.8.5	CCA	1581
17.4.8.6	Received Channel Power Indicator Measurement	1582
18.	Orthogonal frequency division multiplexing (OFDM) PHY specification	1583
18.1	Introduction	1583
18.1.1	General	1583
18.1.2	Scope	1583

18.1.3	OFDM PHY functions	1583
18.1.3.1	General	1583
18.1.3.2	PLCP sublayer	1583
18.1.3.3	PMD sublayer	1584
18.1.3.4	PLME	1584
18.1.3.5	Service specification method	1584
18.2	OFDM PHY specific service parameter list	1584
18.2.1	Introduction	1584
18.2.2	TXVECTOR parameters	1584
18.2.2.1	General	1584
18.2.2.2	TXVECTOR LENGTH	1584
18.2.2.3	TXVECTOR DATARATE	1584
18.2.2.4	TXVECTOR SERVICE	1585
18.2.2.5	TXVECTOR TXPWR_LEVEL	1585
18.2.2.6	TIME_OF_DEPARTURE_REQUESTED	1585
18.2.3	RXVECTOR parameters	1585
18.2.3.1	General	1585
18.2.3.2	RXVECTOR LENGTH	1586
18.2.3.3	RXVECTOR RSSI	1586
18.2.3.4	DATARATE	1587
18.2.3.5	SERVICE	1587
18.2.3.6	RXVECTOR RCPI	1587
18.2.4	TXSTATUS parameters	1587
18.2.4.1	General	1587
18.2.4.2	TXSTATUS TIME_OF_DEPARTURE	1587
18.2.4.3	TXSTATUS TIME_OF_DEPARTURE_ClockRate	1588
18.3	OFDM PLCP sublayer	1588
18.3.1	Introduction	1588
18.3.2	PLCP frame format	1588
18.3.2.1	General	1588
18.3.2.2	Overview of the PPDU encoding process	1588
18.3.2.3	Modulation-dependent parameters	1590
18.3.2.4	Timing related parameters	1590
18.3.2.5	Mathematical conventions in the signal descriptions	1591
18.3.2.6	Discrete time implementation considerations	1593
18.3.3	PLCP preamble (SYNC)	1593
18.3.4	SIGNAL field	1595
18.3.4.1	General	1595
18.3.4.2	RATE field	1595
18.3.4.3	PLCP LENGTH field	1596
18.3.4.4	Parity (P), Reserved (R), and SIGNAL TAIL fields	1596
18.3.5	DATA field	1596
18.3.5.1	General	1596
18.3.5.2	SERVICE field	1596
18.3.5.3	PPDU TAIL field	1596
18.3.5.4	Pad bits (PAD)	1596
18.3.5.5	PLCP DATA scrambler and descrambler	1597
18.3.5.6	Convolutional encoder	1597
18.3.5.7	Data interleaving	1598
18.3.5.8	Subcarrier modulation mapping	1600
18.3.5.9	Pilot subcarriers	1603
18.3.5.10	OFDM modulation	1603
18.3.6	CCA	1604
18.3.7	PLCP data modulation and modulation rate change	1604

18.3.8	PMD operating specifications (general)	1605
18.3.8.1	General	1605
18.3.8.2	Outline description	1605
18.3.8.3	Regulatory requirements	1606
18.3.8.4	Operating channel frequencies	1606
18.3.8.5	Transmit and receive in-band and out-of-band spurious emissions..	1607
18.3.8.6	TX RF delay	1607
18.3.8.7	Slot time	1607
18.3.8.8	Transmit and receive antenna port impedance	1607
18.3.9	PMD transmit specifications	1607
18.3.9.1	General	1607
18.3.9.2	Transmit power levels	1607
18.3.9.3	Transmit spectrum mask	1607
18.3.9.4	Transmission spurious	1608
18.3.9.5	Transmit center frequency tolerance	1609
18.3.9.6	Symbol clock frequency tolerance	1609
18.3.9.7	Modulation accuracy	1609
18.3.9.8	Transmit modulation accuracy test	1610
18.3.9.9	Time of Departure accuracy	1611
18.3.10	PMD receiver specifications	1612
18.3.10.1	Introduction	1612
18.3.10.2	Receiver minimum input sensitivity	1612
18.3.10.3	Adjacent channel rejection	1613
18.3.10.4	Nonadjacent channel rejection	1613
18.3.10.5	Receiver maximum input level	1614
18.3.10.6	CCA requirements	1614
18.3.10.7	Received Channel Power Indicator Measurement	1614
18.3.11	Transmit PLCP	1615
18.3.12	Receive PLCP	1618
18.4	OFDM PLME	1619
18.4.1	PLME_SAP sublayer management primitives	1619
18.4.2	OFDM PHY MIB	1620
18.4.3	OFDM TXTIME calculation	1622
18.4.4	OFDM PHY characteristics	1622
18.5	OFDM PMD sublayer	1624
18.5.1	Scope and field of application	1624
18.5.2	Overview of service	1624
18.5.3	Overview of interactions	1624
18.5.4	Basic service and options	1624
18.5.4.1	General	1624
18.5.4.2	PMD_SAP peer-to-peer service primitives	1624
18.5.4.3	PMD_SAP sublayer-to-sublayer service primitives	1625
18.5.4.4	PMD_SAP service primitive parameters	1625
18.5.5	PMD_SAP detailed service specification	1626
18.5.5.1	Introduction	1626
18.5.5.2	PMD_DATA.request	1626
18.5.5.3	PMD_DATA.indication	1626
18.5.5.4	PMD_TXSTART.request	1627
18.5.5.5	PMD_TXEND.request	1627
18.5.5.6	PMD_TXPWRLVL.request	1628
18.5.5.7	PMD_RATE.request	1628
18.5.5.8	PMD_RSSI.indication	1629
18.5.5.9	PMD_RCPI.indication	1629

19.	Extended Rate PHY (ERP) specification.....	1631
19.1	Overview.....	1631
19.1.1	General.....	1631
19.1.2	Introduction.....	1631
19.1.3	Operational modes.....	1631
19.1.4	Scope.....	1632
19.1.5	ERP functions.....	1632
19.2	PHY-specific service parameter list.....	1633
19.3	Extended Rate PLCP sublayer.....	1635
19.3.1	Introduction.....	1635
19.3.2	PPDU format.....	1635
19.3.2.1	General.....	1635
19.3.2.2	Long preamble PPDU format.....	1636
19.3.2.3	Short preamble PPDU format.....	1638
19.3.2.4	ERP-OFDM PPDU format.....	1638
19.3.2.5	DSSS-OFDM long preamble PPDU format.....	1638
19.3.2.6	DSSS-OFDM PLCP length field calculation.....	1639
19.3.2.7	Short DSSS-OFDM PLCP PPDU format.....	1640
19.3.3	PLCP data modulation and rate change.....	1640
19.3.3.1	Long and short preamble formats.....	1640
19.3.3.2	ERP-PBCC 22 Mb/s and 33 Mb/s formats.....	1641
19.3.3.3	ERP-OFDM format.....	1643
19.3.3.4	Long and short DSSS-OFDM PLCP format.....	1643
19.3.4	PLCP transmit procedure.....	1644
19.3.5	CCA.....	1644
19.3.6	PLCP receive procedure.....	1644
19.4	ERP PMD operating specifications (general).....	1645
19.4.1	Introduction.....	1645
19.4.2	Regulatory requirements.....	1645
19.4.3	Operating channel frequencies.....	1645
19.4.4	Transmit and receive in-band and out-of-band spurious emissions.....	1645
19.4.5	Slot time.....	1645
19.4.6	SIFS value.....	1645
19.4.7	CCA performance.....	1645
19.4.8	PMD transmit specifications.....	1646
19.4.8.1	General.....	1646
19.4.8.2	Transmit power levels.....	1646
19.4.8.3	Transmit center frequency tolerance.....	1646
19.4.8.4	Symbol clock frequency tolerance.....	1646
19.4.8.5	Time of Departure accuracy.....	1646
19.5	ERP operation specifications.....	1647
19.5.1	General.....	1647
19.5.2	Receiver minimum input level sensitivity.....	1647
19.5.3	Adjacent channel rejection.....	1647
19.5.4	Receive maximum input level capability.....	1647
19.5.5	Transmit spectral mask.....	1647
19.6	ERP-PBCC operation specifications.....	1647
19.6.1	General.....	1647
19.6.2	Receiver minimum input level sensitivity.....	1648
19.6.3	Receiver adjacent channel rejection.....	1648
19.7	DSSS-OFDM operation specifications.....	1648
19.7.1	General.....	1648
19.7.2	Overview.....	1648

19.7.3	Single carrier to multicarrier transition requirements	1648
19.7.3.1	General	1648
19.7.3.2	Spectral binding requirement	1649
19.7.3.3	Sample-power matching requirement	1655
19.7.3.4	Transition time alignment	1655
19.7.3.5	Single carrier termination.....	1657
19.7.3.6	Transition carrier frequency requirement	1657
19.7.3.7	Transition carrier phase requirement	1658
19.7.3.8	Transmit modulation accuracy requirement	1659
19.8	ERP PLME	1659
19.8.1	PLME SAP	1659
19.8.2	MIB.....	1659
19.8.3	TXTIME	1661
19.8.3.1	General	1661
19.8.3.2	ERP-OFDM TXTIME calculations	1661
19.8.3.3	ERP-PBCC TXTIME calculations.....	1662
19.8.3.4	DSSS-OFDM TXTIME calculations	1662
19.8.4	ERP-OFDM PLCP PSDU definition	1663
19.9	Extended rate PMD sublayer	1664
19.9.1	Scope and field of application	1664
19.9.2	Overview of service	1664
19.9.3	Overview of Interactions	1664
19.9.4	Basic service and options.....	1664
19.9.4.1	General	1664
19.9.4.2	PMD_SAP peer-to-peer service primitives.....	1664
19.9.4.3	PMD_SAP sublayer-to-sublayer service primitives	1665
19.9.4.4	PMD_SAP service primitive parameters	1665
19.9.5	PMD_SAP detailed service specification	1667
19.9.5.1	Introduction	1667
19.9.5.2	PMD_DATA.request	1667
19.9.5.3	PMD_DATA.indication	1667
19.9.5.4	PMD_MODULATION.request	1667
19.9.5.5	PMD_PREAMBLE.request	1667
19.9.5.6	PMD_TXSTART.request	1668
19.9.5.7	PMD_TXEND.request.....	1668
19.9.5.8	PMD_ANTSEL.request	1668
19.9.5.9	PMD_TXPRWLVL.request.....	1668
19.9.5.10	PMD_RATE.request	1668
19.9.5.11	PMD_RSSI.indication.....	1668
19.9.5.12	PMD_SQ.indication	1668
19.9.5.13	PMD_CS.indication	1668
19.9.5.14	PMD_ED.indication.....	1668
19.9.5.15	PMD_RCPI.indication	1668
20.	High Throughput (HT) PHY specification	1669
20.1	Introduction.....	1669
20.1.1	Introduction to the HT PHY	1669
20.1.2	Scope.....	1669
20.1.3	HT PHY functions	1669
20.1.3.1	General	1669
20.1.3.2	HT PLCP sublayer	1670
20.1.3.3	HT PMD sublayer	1670
20.1.3.4	PHY management entity (PLME).....	1670

	20.1.3.5	Service specification method	1670
	20.1.4	PPDU formats	1670
20.2	HT PHY	service interface	1671
	20.2.1	Introduction	1671
	20.2.2	TXVECTOR and RXVECTOR parameters	1671
	20.2.3	Effect of CH_BANDWIDTH, CH_OFFSET, and MCS parameters on PPDU format	1678
	20.2.4	Support for NON_HT formats	1679
	20.2.5	TXSTATUS parameters	1681
20.3	HT PLCP	sublayer	1681
	20.3.1	Introduction	1681
	20.3.2	PPDU format	1681
	20.3.3	Transmitter block diagram	1683
	20.3.4	Overview of the PPDU encoding process	1684
	20.3.5	Modulation and coding scheme (MCS)	1688
	20.3.6	Timing-related parameters	1689
	20.3.7	Mathematical description of signals	1691
	20.3.8	Transmission in the upper/lower 20 MHz of a 40 MHz channel	1693
	20.3.9	HT preamble	1694
	20.3.9.1	Introduction	1694
	20.3.9.2	HT-mixed format preamble	1694
	20.3.9.3	Non-HT portion of the HT-mixed format preamble	1694
	20.3.9.4	HT portion of HT-mixed format preamble	1698
	20.3.9.5	HT-greenfield format preamble	1707
	20.3.10	Transmission of NON_HT format PPDU with more than one antenna	1710
	20.3.11	Data field	1710
	20.3.11.1	General	1710
	20.3.11.2	SERVICE field	1710
	20.3.11.3	Scrambler	1710
	20.3.11.4	Coding	1711
	20.3.11.5	Encoder parsing operation for two BCC FEC encoders	1711
	20.3.11.6	Binary convolutional coding and puncturing	1711
	20.3.11.7	LDPC codes	1711
	20.3.11.8	Data interleaver	1716
	20.3.11.9	Constellation mapping	1718
	20.3.11.10	Pilot subcarriers	1720
	20.3.11.11	OFDM modulation	1722
	20.3.11.12	Non-HT duplicate transmission	1726
	20.3.12	Beamforming	1727
	20.3.12.1	General	1727
	20.3.12.2	Implicit feedback beamforming	1728
	20.3.12.3	Explicit feedback beamforming	1730
	20.3.13	HT Preamble format for sounding PPDU	1735
	20.3.13.1	General	1735
	20.3.13.2	Sounding with a NDP	1735
	20.3.13.3	Sounding PPDU for calibration	1736
	20.3.13.4	Sounding PPDU for channel quality assessment	1736
	20.3.14	Regulatory requirements	1737
	20.3.15	Channel numbering and channelization	1737
	20.3.15.1	General	1737
	20.3.15.2	Channel allocation in the 2.4 GHz Band	1737
	20.3.15.3	Channel allocation in the 5 GHz band	1738
	20.3.15.4	40 MHz channelization	1738
	20.3.16	Transmit and receive in-band and out-of-band spurious transmissions	1738

20.3.17	Transmitter RF delay	1738
20.3.18	Slot time	1738
20.3.19	Transmit and receive port impedance	1738
20.3.20	PMD transmit specification	1739
20.3.20.1	Transmit spectrum mask	1739
20.3.20.2	Spectral flatness	1741
20.3.20.3	Transmit power	1741
20.3.20.4	Transmit center frequency tolerance	1741
20.3.20.5	Packet alignment	1741
20.3.20.6	Symbol clock frequency tolerance	1742
20.3.20.7	Modulation accuracy	1742
20.3.20.8	Time of Departure accuracy	1744
20.3.21	HT PMD receiver specification	1744
20.3.21.1	Receiver minimum input sensitivity	1744
20.3.21.2	Adjacent channel rejection	1745
20.3.21.3	Nonadjacent channel rejection	1745
20.3.21.4	Receiver maximum input level	1746
20.3.21.5	CCA sensitivity	1746
20.3.21.6	Received channel power indicator (RCPI) measurement	1747
20.3.21.7	Reduced interframe space (RIFS)	1747
20.3.22	PLCP transmit procedure	1748
20.3.23	PLCP receive procedure	1750
20.4	HT PLME	1755
20.4.1	PLME_SAP sublayer management primitives	1755
20.4.2	PHY MIB	1756
20.4.3	TXTIME calculation	1760
20.4.4	PHY characteristics	1761
20.5	HT PMD sublayer	1762
20.5.1	Scope and field of application	1762
20.5.2	Overview of service	1762
20.5.3	Overview of interactions	1763
20.5.4	Basic service and options	1763
20.5.4.1	Status of service primitives	1763
20.5.4.2	PMD_SAP peer-to-peer service primitives	1763
20.5.4.3	PMD_SAP sublayer-to-sublayer service primitives	1763
20.5.4.4	PMD_SAP service primitive parameters	1764
20.5.5	PMD_SAP detailed service specification	1765
20.5.5.1	Introduction to PMD_SAP service specification	1765
20.5.5.2	PMD_DATA.request	1765
20.5.5.3	PMD_DATA.indication	1765
20.5.5.4	PMD_TXSTART.request	1766
20.5.5.5	PMD_TXEND.request	1766
20.5.5.6	PMD_TXEND.confirm	1767
20.5.5.7	PMD_TXPWRLVL.request	1767
20.5.5.8	PMD_RSSI.indication	1768
20.5.5.9	PMD_RCPI.indication	1768
20.5.5.10	PMD_TX_PARAMETERS.request	1769
20.5.5.11	PMD_CBW_OFFSET.indication	1769
20.5.5.12	PMD_CHAN_MAT.indication	1770
20.5.5.13	PMD_FORMAT.indication	1770
20.6	Parameters for HT MCSs	1771
Annex A (informative) Bibliography		1781

Annex B (normative) Protocol Implementation Conformance Statement (PICS) proforma.....	1785
B.1 Introduction.....	1785
B.2 Abbreviations and special symbols.....	1785
B.2.1 Symbols for Status column	1785
B.2.2 General abbreviations for Item and Support columns.....	1785
B.3 Instructions for completing the PICS proforma.....	1786
B.3.1 General structure of the PICS proforma.....	1786
B.3.2 Additional information	1787
B.3.3 Exception information.....	1787
B.3.4 Conditional status.....	1787
B.4 PICS proforma—IEEE Std 802.11-2012.....	1788
B.4.1 Implementation identification	1788
B.4.2 Protocol summary	1789
B.4.3 IUT configuration.....	1789
B.4.4 MAC protocol	1790
B.4.5 Frequency hopping (FH) PHY functions	1800
B.4.6 Direct sequence PHY functions	1803
B.4.7 IR baseband PHY functions	1806
B.4.8 OFDM PHY functions	1809
B.4.9 High Rate, direct sequence PHY functions.....	1819
B.4.10 Regulatory Domain Extensions.....	1823
B.4.11 ERP functions.....	1824
B.4.12 Spectrum management extensions	1828
B.4.13 Operating Classes extensions.....	1830
B.4.14 QoS base functionality	1830
B.4.15 QoS enhanced distributed channel access (EDCA)	1831
B.4.16 QoS hybrid coordination function (HCF) controlled channel access (HCCA).....	1832
B.4.17 Radio Management extensions.....	1832
B.4.18 DSE functions	1837
B.4.19 High-throughput (HT) features	1838
B.4.20 Tunneled direct-link setup extensions	1845
B.4.21 WNM extensions	1846
B.4.22 Interworking (IW) with external networks extensions.....	1849
B.4.23 Mesh protocol capabilities	1850
Annex C (normative) ASN.1 encoding of the MAC and PHY MIB.....	1855
C.1 General.....	1855
C.2 Guidelines for 802.11 MIB Authors/Editors	1855
C.3 MIB Detail	1855
Annex D (normative) Regulatory references.....	2287
D.1 External regulatory references	2287
D.2 Radio performance specifications.....	2289
D.2.1 Transmit and receive in-band and out-of-band spurious emissions.....	2289
D.2.2 Transmit power levels	2289
D.2.3 Transmit spectrum mask	2289
D.2.4 Transmit Mask M.....	2291
D.2.5 CCA-ED threshold	2292

Annex E (normative) Country elements and operating classes	2293
E.1 Country information and operating classes	2293
E.2 Band-specific operating requirements	2302
E.2.1 General	2302
E.2.2 3650–3700 MHz in the United States	2302
E.2.3 5.9 GHz band in the United States (5.850–5.925 GHz)	2303
E.2.4 5.9 GHz band in Europe (5.855–5.925 GHz)	2303
Annex F (normative) HT LDPC matrix definitions	2304
Annex G (normative) Frame exchange sequences	2307
G.1 General	2307
G.2 Basic sequences	2309
G.3 EDCA and HCCA sequences	2310
G.4 HT sequences	2312
Annex H (normative) Usage of Ethertype 89-0d	2320
Annex I (informative) Hopping sequences	2321
Annex J (informative) Formal description of a subset of MAC operation	2334
J.1 Status of this annex	2334
J.2 Overview	2334
J.3 Introduction to the MAC formal description	2337
J.3.1 Fundamental assumptions	2337
J.3.2 Notation conventions	2337
J.3.3 Modeling techniques	2338
J.4 Data type and operator definitions for the MAC state machines	2339
J.5 State machines for MAC STAs	2387
J.6 State machines for MAC AP	2464
Annex K (informative) High Rate PHY/FH interoperability	2535
K.1 Status of this Annex	2535
K.2 General	2535
Annex L (informative) Examples of encoding a frame for OFDM PHYs	2536
L.1 Example 1 - BCC encoding	2536
L.1.1 Introduction	2536
L.1.2 The message for the BCC example	2537
L.1.3 Generation of the preamble	2538
L.1.4 Generation of the SIGNAL field	2543
L.1.5 Generating the DATA bits for the BCC example	2547
L.1.6 Generating the first DATA symbol for the BCC example	2551
L.1.7 Generating the additional DATA symbols	2556
L.1.8 The entire packet for the BCC example	2556
L.2 Generating encoded DATA bits—LDPC example 1	2565
L.2.1 The message for LDPC example 1	2565
L.2.2 Prepending the SERVICE field for LDPC example 1	2566
L.2.3 Scrambling LDPC example 1	2568

L.2.4	Inserting shortening bits for LDPC example 1	2569
L.2.5	Encoding data for LDPC example 1	2571
L.2.6	Removing shortening bits and puncturing for LDPC example 1	2574
L.3	Generating encoded DATA bits—LDPC example 2	2576
L.3.1	The message for LDPC example 2	2576
L.3.2	Prepending the SERVICE field for LDPC example 2	2578
L.3.3	Scrambling LDPC example 2	2579
L.3.4	Inserting the shortening bits for LDPC example 2	2581
L.3.5	Encoding the data for LDPC example 2	2583
L.3.6	Removing shortening bits and repetition for LDPC example 2	2587
Annex M (informative) RSNA reference implementations and test vectors		2592
M.1	TKIP temporal key mixing function reference implementation and test vector	2592
M.1.1	TKIP temporal key mixing function reference implementation	2592
M.1.2	Test vectors	2602
M.2	Michael reference implementation and test vectors	2604
M.2.1	Michael test vectors	2604
M.2.2	Sample code for Michael	2605
M.3	PRF reference implementation and test vectors	2612
M.3.1	PRF reference code	2612
M.3.2	PRF test vectors	2613
M.4	Suggested pass-phrase-to-PSK mapping	2613
M.4.1	Introduction	2613
M.4.2	Reference implementation	2614
M.4.3	Test vectors	2616
M.5	Suggestions for random number generation	2616
M.5.1	General	2616
M.5.2	Software sampling	2616
M.5.3	Hardware-assisted solution	2617
M.6	Additional test vectors	2618
M.6.1	Notation	2618
M.6.2	WEP cryptographic encapsulation	2619
M.6.3	TKIP test vector	2620
M.6.4	CCMP test vector	2620
M.6.5	PRF test vectors	2621
M.7	Key hierarchy test vectors for pairwise keys	2623
M.7.1	General	2623
M.7.2	CCMP pairwise key derivation	2623
M.7.3	TKIP pairwise key derivation	2624
M.8	Test vectors for AES-128-CMAC	2624
M.9	Management frame protection test vectors	2624
M.9.1	BIP with broadcast Deauthentication frame	2624
M.9.2	CCMP with unicast Deauthentication frame	2625
M.10	SAE test vector	2626
Annex N (informative) Admission control		2628
N.1	Example use of TSPEC for admission control	2628
N.2	Recommended practices for contention-based admission control	2629
N.2.1	Use of ACM (admission control mandatory) subfield	2629
N.2.2	Deriving medium time	2629
N.3	Guidelines and reference design for sample scheduler and admission control unit	2630
N.3.1	Guidelines for deriving service schedule parameters	2630

N.3.2	TSPEC construction	2630
N.3.3	Reference design for sample scheduler and admission control unit	2632
Annex O (informative) An example of encoding a TIM virtual bit map.....		2636
O.1	Introduction	2636
O.2	Examples.....	2636
O.3	Sample C code	2639
Annex P (informative) Integration function		2646
P.1	Introduction	2646
P.2	Ethernet V2.0/IEEE 802.3 LAN integration function	2646
P.3	Example	2646
P.4	Integration service versus bridging.....	2648
Annex Q (informative) AP functional description		2649
Q.1	Introduction	2649
Q.2	Terminology.....	2649
Q.3	Primary ACM_STA functions	2653
Q.4	Primary AP functions.....	2653
Q.5	Primary DS functions.....	2655
Q.6	Primary portal function.....	2655
Q.7	AU example	2655
Annex R (informative) DS SAP specification		2656
R.1	Introduction	2656
R.2	SAP primitives	2657
R.2.1	General	2657
R.2.2	MSDU transfer	2657
R.2.3	Mapping updates	2658
Annex S (informative) Additional HT information		2660
S.1	Waveform generator tool	2660
S.2	A-MPDU deaggregation	2660
S.3	Example of an RD exchange sequence.....	2662
S.4	Illustration of determination of NDP addresses.....	2663
S.5	20/40 MHz BSS establishment and maintenance	2664
S.5.1	Signaling 20/40 MHz BSS capability and operation	2664
S.5.2	Establishing a 20/40 MHz BSS	2664
S.5.3	Monitoring channels for other BSS operation.....	2665
Annex T (informative) Location and Time Difference accuracy test.....		2667
T.1	Location via Time Difference of arrival	2667
T.2	Time Difference of departure accuracy test.....	2667
Annex U (informative) Example use of the Destination URI for Event and Diagnostic Reports		2670
U.1	Destination URI payload	2670
U.2	Use of HTTP (or HTTPS) for Destination URI of Event and Diagnostic Reports	2670

Annex V (informative) Interworking with external networks	2672
V.1 General	2672
V.2 Network discovery and selection	2672
V.2.1 General	2672
V.2.2 Airport	2672
V.2.3 Shopping	2673
V.2.4 Sales meeting	2674
V.2.5 Museum	2674
V.2.6 Emergency call	2675
V.2.7 Emergency alert	2676
V.3 QoS mapping guidelines for interworking with external networks	2676
V.3.1 General	2676
V.3.2 Determination of the mapping for a STA	2677
V.3.3 Example of QoS mapping from different networks	2677
V.4 Interworking and SSPN interface support	2679
V.4.1 General	2679
V.4.2 SSPN interface parameters	2680
V.5 Interworking with external networks and emergency call support	2683
V.5.1 General	2683
V.5.2 Background on emergency call support over IEEE 802.11 infrastructure	2684
V.5.3 System aspects for emergency call support	2684
V.5.4 Description of the Expedited Bandwidth Request element	2686
V.5.5 Access to emergency services in an RSN	2686
V.6 Peer information	2687
 Annex W (informative) Mesh BSS operation	 2688
W.1 Clarification of Mesh Data frame format	2688
W.2 Operational considerations for interworking	2688
W.2.1 Formation and maintenance of the IEEE 802.1D spanning tree	2688
W.3 Power save parameters selection	2688
W.3.1 General	2688
W.3.2 Selecting the mesh power mode based on traffic load	2689
W.3.3 Scanning of mesh BSSs	2689
W.3.4 Default parameters	2689
W.3.5 MSDU forwarding in an MBSS containing mesh STAs in light or deep sleep mode	 2690
W.3.6 Synchronization maintenance of mesh STAs in deep sleep mode	2690
W.4 SIV key wrapping test vector	2690
W.5 Airtime link metric usage example	2692
W.6 Generation of proactive PREPs in proactive PREQ mechanism of HWMP	2692
W.6.1 General	2692
W.6.2 Additions to forwarding information	2693
W.6.3 Actions when sending data frames as source mesh STA	2693
W.6.4 Actions on receipt of proactive PREQ	2693
W.6.5 Generation of proactive PREPs	2693
W.7 Generation of PREQs in proactive RANN mechanism of HWMP	2694
W.7.1 General	2694
W.7.2 Additions to forwarding information	2694
W.7.3 Actions when sending data frames as source mesh STA	2694
W.7.4 Actions on receipt of proactive RANN	2694
W.7.5 Actions on receipt of PREP	2695

Tables

Table 6-1—Supported TS management primitives	173
Table 6-2—Reason codes for network down	346
Table 6-3—Reason codes for ESS link down	347
Table 6-4—ESS description	349
Table 6-5—Trigger support values	349
Table 6-6—Event Capability Set	353
Table 6-7—ESS Link Parameter Set	354
Table 7-1—PHY-SAP peer-to-peer service primitives	369
Table 7-2—PHY-SAP sublayer-to-sublayer service primitives	369
Table 7-3—PHY-SAP service primitive parameters	369
Table 7-4—Vector descriptions	370
Table 8-1—Valid type and subtype combinations	382
Table 8-2—To/From DS combinations in data frames	384
Table 8-3—Duration/ID field encoding	387
Table 8-4—QoS Control field	389
Table 8-5—TID subfield	390
Table 8-6—Ack Policy subfield in QoS Control field of QoS data frames	391
Table 8-7—Subfields of Link Adaptation Control subfield	395
Table 8-8—Subfields of the MAI subfield	395
Table 8-9—ASEL Command and ASEL Data subfields	396
Table 8-10—Calibration control subfields	397
Table 8-11—CSI/Steering subfield values	397
Table 8-12—AC Constraint subfield values	397
Table 8-13—RDG/More PPDU subfield values	398
Table 8-14—Valid values for the Address Extension Mode	399
Table 8-16—BlockAckReq frame variant encoding	408
Table 8-15—BAR Ack Policy subfield	408
Table 8-17—BA Ack Policy subfield	410
Table 8-18—BlockAck frame variant encoding	411
Table 8-19—Address field contents	414
Table 8-20—Beacon frame body	419
Table 8-21—Disassociation frame body	423
Table 8-22—Association Request frame body	423
Table 8-23—Association Response frame body	425
Table 8-24—Reassociation Request frame body	426
Table 8-25—Reassociation Response frame body	428
Table 8-26—Probe Request frame body	429
Table 8-27—Probe Response frame body	430
Table 8-28—Authentication frame body	434
Table 8-29—Presence of fields and elements in Authentication frames	435
Table 8-30—Deauthentication frame body	436
Table 8-31—Action frame body	436
Table 8-32—Action No Ack frame body	436
Table 8-33—Timing Advertisement frame body	437
Table 8-34—Non-AP STA usage of QoS, CF-Pollable, and CF-Poll Request	439
Table 8-35—AP usage of QoS, CF-Pollable, and CF-Poll Request	439
Table 8-36—Reason codes	442
Table 8-37—Status codes	446
Table 8-38—Category values	450
Table 8-39—Settings of the Max SP Length subfield	453
Table 8-40—Settings of the Channel Width field	455
Table 8-41—Settings of the PCO Phase Control field	456

Table 8-42—Subfields of the MIMO Control field	458
Table 8-43—CSI Report field (20 MHz)	459
Table 8-44—CSI Report field (40 MHz)	460
Table 8-45—Number of matrices and carrier grouping	461
Table 8-47—Noncompressed Beamforming Report field (40 MHz)	462
Table 8-46—Noncompressed Beamforming Report field (20 MHz)	462
Table 8-48—Order of angles in the Compressed Beamforming Report field	463
Table 8-49—Quantization of angles	464
Table 8-50—Compressed Beamforming Report field (20 MHz)	464
Table 8-51—Compressed Beamforming Report field (40 MHz)	465
Table 8-52—Venue group codes and descriptions	469
Table 8-53—Venue type assignments	469
Table 8-54—Element IDs	474
Table 8-55—BSS membership selector value encoding	479
Table 8-56—Coverage Class field parameters	484
Table 8-57—Values of the Secondary Channel Offset field	492
Table 8-58—Summary of use of Enable, Request, and Report bits	493
Table 8-59—Measurement Type definitions for measurement requests	494
Table 8-60—Optional subelement IDs for Channel Load Request	496
Table 8-61—Reporting Condition for Channel Load Report	497
Table 8-62—Optional subelement IDs for Noise Histogram Request	498
Table 8-63—Reporting Condition for Noise Histogram Report	498
Table 8-64—Measurement Mode definitions for Beacon Request element	499
Table 8-65—Optional subelement IDs for Beacon Request	500
Table 8-66—Reporting Condition for Beacon Report	501
Table 8-67—Reporting Detail values	502
Table 8-68—Optional subelement IDs for frame request	503
Table 8-69—Group Identity for a STA Statistics Request	504
Table 8-70—Optional subelement IDs for STA Statistics Request	504
Table 8-71—Location subject definition	508
Table 8-72—Optional subelement IDs for LCI Request	509
Table 8-73—Optional subelement IDs for Transmit Stream/Category Measurement Request	511
Table 8-74—Delayed MSDU Range Definitions	513
Table 8-75—Optional subelement IDs for measurement pause request	514
Table 8-77—Civic Location Type	516
Table 8-76—Optional subelement IDs for STA Multicast Diagnostics Request	516
Table 8-79—Optional subelement IDs for Location Civic Request	517
Table 8-78—Location Service Interval Units	517
Table 8-80—Optional subelement IDs for Location Identifier Request	518
Table 8-81—Measurement Type definitions for measurement reports	520
Table 8-82—RPI definitions for an RPI histogram report	523
Table 8-83—Optional subelement IDs for Channel Load Report	524
Table 8-84—IPI Definitions for a Noise Histogram Report	525
Table 8-85—Optional subelement IDs for Noise Histogram Report	525
Table 8-86—Optional subelement IDs for Beacon Report	527
Table 8-87—Optional subelement IDs for Frame Report	528
Table 8-88—Group Identity for a STA Statistics Report	530
Table 8-89—Optional subelement IDs for STA Statistics Report	537
Table 8-90—Optional subelement IDs for Location Configuration Information Report	540
Table 8-91—Delay definitions for a Transmit Stream/Category Measurement Report for a Bin 0 Range field value of 10 TU	543
Table 8-92—Optional subelement IDs for Transmit Stream/Category Measurement Report	544
Table 8-94—Summary of fields used in the STA Multicast Diagnostics Report	546
Table 8-93—Optional subelement IDs for Multicast Diagnostics Report	546

Table 8-95—Optional subelement IDs for Location Civic Report.....	547
Table 8-96—Location Shape IDs	548
Table 8-97—Map Types	552
Table 8-98—Optional subelement IDs for Location Identifier Report	553
Table 8-99—Cipher suite selectors.....	557
Table 8-100—Cipher suite usage	558
Table 8-101—AKM suite selectors	558
Table 8-102—PTKSA/GTKSA/STKSA replay counters usage	560
Table 8-103—Capabilities field.....	562
Table 8-104—ACI-to-AC coding.....	568
Table 8-106—Default EDCA parameter set for STA operation if dot11OCBActivated is true	569
Table 8-105—Default EDCA Parameter Set element parameter values if dot11OCBActivated is false ...	569
Table 8-107—Direction subfield encoding	570
Table 8-108—Access Policy subfield.....	570
Table 8-109—TS Info Ack Policy subfield encoding	571
Table 8-110—Setting of Schedule subfield.....	571
Table 8-111—Frame classifier type	574
Table 8-112—Classifier Parameters for Classifier Type 4.....	576
Table 8-113—Encoding of Processing subfield	579
Table 8-114—Reachability field	581
Table 8-115—Optional subelement IDs for neighbor report.....	583
Table 8-116—Preference field values	584
Table 8-118—Available Admission Capacity Bitmask definition	589
Table 8-117—Optional subelement IDs for Measurement Pilot Transmission	589
Table 8-119—RM Enabled Capabilities definition	592
Table 8-120—Optional subelement IDs for Multiple BSSID	595
Table 8-121—Subelement IDs	597
Table 8-122—Timeout Interval Type field value.....	599
Table 8-123—Resource type code in RIC Descriptor element	600
Table 8-124—Subfields of the HT Capabilities Info field	605
Table 8-125—Subfields of the A-MPDU Parameters field.....	607
Table 8-126—Transmit MCS Set.....	608
Table 8-127—Subfields of the HT Extended Capabilities field.....	609
Table 8-128—Subfields of the Transmit Beamforming Capabilities field.....	610
Table 8-129—ASEL Capability field subfields.....	613
Table 8-130—HT Operation element fields and subfields	614
Table 8-131—Encoding of the Timing Capabilities field	620
Table 8-132—Time Value field format when Timing Capabilities is 2.....	621
Table 8-133—Event Type definitions for event requests and reports	624
Table 8-134—Transition Event Request subelement	625
Table 8-135—RSNA Event Request subelement.....	627
Table 8-136—Peer-to-Peer Link Event Request subelement	629
Table 8-137—Event Report Status	631
Table 8-138—Transition and Transition Query reasons	632
Table 8-139—Peer Status definitions	635
Table 8-140—Diagnostic Request/Report Type definitions	636
Table 8-141—Association Diagnostic request contents	637
Table 8-142—IEEE 802.1X Authentication Diagnostic request contents	637
Table 8-143—Diagnostic Information subelement ID values	638
Table 8-144—Credentials values.....	639
Table 8-146—Device Type definitions	641
Table 8-145—Collocated Radio Type.....	641
Table 8-147—Power Save Mode definition	644
Table 8-148—Tx Power Modes	646

Table 8-149—Manufacturer Information STA Report contents	647
Table 8-150—Configuration Profile report contents	648
Table 8-151—Association Diagnostic report contents	648
Table 8-152—IEEE 802.1X Authentication Diagnostic report contents	649
Table 8-153—Location subelements	649
Table 8-154—Report Interval Units field	651
Table 8-155—Motion Indicator field	654
Table 8-156—Speed Units	655
Table 8-157—Indication Parameter values	657
Table 8-158—Request subelements	660
Table 8-159—Status subelements	661
Table 8-160—FMS Element Status and TFS Response Status definition	662
Table 8-161—QoS Traffic Capability Bitmask/Flags definition	664
Table 8-162—TFS Action Code field values	666
Table 8-163—TFS Request subelements	666
Table 8-164—Status subelements	668
Table 8-165—Action Type definitions	669
Table 8-166—WNM-Sleep Mode Response Status definition	669
Table 8-167—Status field values	671
Table 8-168—Usage Mode definitions	673
Table 8-169—Request Type definitions	675
Table 8-170—Optional Subelement IDs for DMS Descriptor	676
Table 8-171—Response Type field values	677
Table 8-172—Optional Subelement IDs for DMS Status	678
Table 8-173—Optional Subelement IDs for U-APSD Coexistence	679
Table 8-174—Access network type	680
Table 8-175—Advertisement protocol ID definitions	683
Table 8-176—Precedence Level field description	684
Table 8-177—Active Path Selection Protocol Identifier field values	687
Table 8-178—Active Path Selection Metric Identifier field values	687
Table 8-179—Congestion Control Mode Identifier field values	688
Table 8-180—Synchronization Method Identifier field values	688
Table 8-181—Authentication Protocol Identifier field values	689
Table 8-182—Mesh Peering Protocol Identifier field values	692
Table 8-183—MCCA Reply Code field values	698
Table 8-184—ANQP-element definitions	712
Table 8-185—Network Authentication Type Indicator definitions	716
Table 8-186—IPv6 Address field values	718
Table 8-187—IPv4 Address field values	719
Table 8-188—Authentication Parameter types	721
Table 8-190—Vendor Specific Authentication Parameters	722
Table 8-189—Authentication Parameter format for the Expanded EAP method	722
Table 8-191—Spectrum Management Action field values	726
Table 8-192—QoS Action field values	729
Table 8-194—ADDTS Response frame Action field format	730
Table 8-193—ADDTS Request frame Action field format	730
Table 8-195—DELTS frame Action field format	731
Table 8-196—Schedule frame Action field format	732
Table 8-197—QoS Map configure frame body	732
Table 8-198—DLS Action field values	733
Table 8-199—DLS Request frame Action field format	733
Table 8-200—DLS Response frame Action field format	734
Table 8-201—DLS Teardown frame Action field format	735
Table 8-202—Block Ack Action field values	735

Table 8-203—ADDBA Request frame Action field format	736
Table 8-204—ADDBA Response frame Action field format	736
Table 8-205—DELBA frame Action field format	737
Table 8-206—Radio Measurement Action field values	738
Table 8-207—Optional subelement IDs for Link Measurement Request frame	740
Table 8-208—Optional subelement IDs for Link Measurement Report frame	741
Table 8-209—Optional subelement IDs for Neighbor Report Request frame	742
Table 8-210—Public Action field values	743
Table 8-211—20/40 BSS Coexistence Management frame Action field format	744
Table 8-213—Reason Result Code field values	746
Table 8-212—Optional subelement IDs for Measurement Pilot frame	746
Table 8-214—Reason Result Code field values	747
Table 8-215—Reason Result Code field values	751
Table 8-216—GAS Initial Request frame body format	752
Table 8-217—GAS Initial Response frame body format	753
Table 8-218—GAS Comeback Request frame body format	754
Table 8-219—GAS Comeback Response frame body format	755
Table 8-220—Information for TDLS Discovery Response frame	756
Table 8-221—Location Parameters Element field for Location Track Notification frame	757
Table 8-222—FT Action field values	758
Table 8-223—FT Request frame body	759
Table 8-224—FT Response frame body	760
Table 8-225—FT Confirm frame body	760
Table 8-226—FT Ack frame body	761
Table 8-227—SA Query Action field values	762
Table 8-228—Public Action field values defined for Protected Dual of Public Action frames	763
Table 8-229—HT Action field values	763
Table 8-230—Notify Channel Width frame Action field format	764
Table 8-232—PSMP frame Action field format	765
Table 8-231—SM Power Save frame Action field format	765
Table 8-234—CSI frame Action field format	766
Table 8-235—Noncompressed Beamforming frame Action field format	766
Table 8-233—Set PCO Phase frame Action field format	766
Table 8-236—Compressed Beamforming frame Action field format	767
Table 8-237—Antenna Selection Indices Feedback frame Action field format	767
Table 8-238—TDLS Action field values	768
Table 8-239—Information for TDLS Setup Request Action field	768
Table 8-240—Information for TDLS Setup Response Action field	770
Table 8-241—Information for TDLS Setup Confirm Action field	771
Table 8-242—Information for TDLS Teardown Action field	772
Table 8-243—Information for TDLS Peer Traffic Indication Action field	772
Table 8-244—Information for TDLS Channel Switch Request Action field	773
Table 8-245—Information for TDLS Channel Switch Response Action field	773
Table 8-246—Information for TDLS Peer PSM Request Action field	774
Table 8-247—Information for TDLS Peer PSM Response Action field	774
Table 8-248—Information for TDLS Peer Traffic Response Action field	775
Table 8-249—Information for TDLS Discovery Request Action field	775
Table 8-250—WNM Action field values	776
Table 8-251—Location Parameters Element field for Location Configuration Request frame	779
Table 8-252—Location Parameters Element field for Location Configuration Response frame	780
Table 8-253—Status code definitions	784
Table 8-254—WNM-Sleep Mode subelement IDs	789
Table 8-255—QoS Traffic Capability Flags definition	792
Table 8-256—WNM-Notification type	795

Table 8-257—Optional subelement IDs for WNM-Notification Request.....	795
Table 8-258—WNM-Notification Response Status	796
Table 8-260—Unprotected WNM Action field values.....	797
Table 8-259—Optional subelement IDs for WNM-Notification Response	797
Table 8-261—Self-protected Action field values	799
Table 8-262—Mesh Peering Open frame Action field format	800
Table 8-263—Mesh Peering Confirm frame Action field format	801
Table 8-265—Mesh Group Key Inform frame Action field format	803
Table 8-264—Mesh Peering Close frame Action field format.....	803
Table 8-266—Mesh Group Key Acknowledge frame Action field format.....	804
Table 8-268—Mesh Link Metric Report frame Action field format.....	805
Table 8-267—Mesh Action field values.....	805
Table 8-269—HWMP Mesh Path Selection frame Action field format	806
Table 8-270—Gate Announcement frame Action field format.....	806
Table 8-271—Congestion Control Notification frame Action field format	807
Table 8-272—MCCA Setup Request frame Action field format	807
Table 8-273—MCCA Setup Reply frame Action field format	808
Table 8-274—MCCA Advertisement Request frame Action field format.....	808
Table 8-276—MCCA Teardown frame Action field format.....	809
Table 8-275—MCCA Advertisement frame Action field format	809
Table 8-278—TBTT Adjustment Response frame Action field format.....	810
Table 8-277—TBTT Adjustment Request frame Action field format	810
Table 8-279—Multihop Action field values.....	811
Table 8-280—Proxy Update frame Action field format.....	811
Table 8-281—Proxy Update Confirmation frame Action field format	812
Table 8-282—MPDU delimiter fields	813
Table 8-283—A-MPDU Contexts	815
Table 8-284—A-MPDU contents in the data enabled immediate response context	815
Table 8-285—A-MPDU contents in the data enabled no immediate response context	816
Table 8-287—A-MPDU contents MPDUs in the control response context.....	817
Table 8-286—A-MPDU contents in the PSMP context.....	817
Table 9-1—UP-to-AC mappings	820
Table 9-2—Dual CTS rules	831
Table 9-3—CH_BANDWIDTH control frame response mapping	862
Table 9-4—Modulation classes	863
Table 9-5—Non-HT reference rate.....	864
Table 9-6—HCC family – N = 11; Family indices (SEQ) 1 to 10	870
Table 9-8—EHCC family – Code length = 8, N = 11; Family indices (SEQ) 1 to 8	871
Table 9-7—EHCC family – Code length = 9, N = 11; Family Indices (SEQ) 1 to 9.....	871
Table 9-9—Protection requirements for HT Protection field values nonmember protection mode and non-HT mixed mode	921
Table 9-10—Applicable HT protection mechanisms	922
Table 9-11—STA type requirements for transmit beamforming with implicit feedback	946
Table 9-12—Transmit beamforming support required with implicit feedback.....	947
Table 9-14—Rules for beamformee immediate feedback transmission responding to NDP sounding	956
Table 9-13—Rules for beamformee immediate feedback transmission responding to non-NDP sounding	956
Table 9-15—Valid address field usage for Mesh Data and Multihop Action frames	965
Table 10-1—Power Management modes	985
Table 10-2—Types of Block Ack agreement based on capabilities and ADDBA conditions	1035
Table 10-3—ReasonCode values for DLS teardown	1042
Table 10-4—Allowed measurement requests.....	1049
Table 10-5—Measurement Duration	1059
Table 10-6—Allowed measurement requests.....	1061

Table 10-7—Measurement Pilot Activated definition.....	1080
Table 10-8—DSE STA attributes	1085
Table 10-9—A-MSDU STA behavior for RSN associations	1108
Table 10-10—ANQP usage	1153
Table 10-11—ESR and UESA field settings	1159
Table 11-1—AAD length	1208
Table 11-2—Robust management frame selection in an ESS	1223
Table 11-3—Robust management frame selection in an IBSS	1225
Table 11-4—Cipher suite key lengths	1247
Table 11-5—Key RSC field	1248
Table 11-6—KDE.....	1249
Table 11-7—MUI values	1251
Table 11-8—SMK error types	1251
Table 11-9—Integrity and key-wrap algorithms	1253
Table 12-1—FT authentication elements	1328
Table 12-2—Remote Request/Response Payload format.....	1345
Table 12-3—Resource types and resource descriptor definitions	1346
Table 13-1—State variables for mesh STAs	1357
Table 13-2—MPM finite state machine	1364
Table 13-3—AMPE finite state machine.....	1375
Table 13-4—Airtime cost constants	1382
Table 13-5—Parameters of the airtime link metric for extensible path selection framework.....	1382
Table 13-6—Precursor and next hop examples (forward path).....	1385
Table 13-7—Precursor and next hop examples (reverse path).....	1385
Table 13-8—Parameters of HWMP for extensible path selection framework	1387
Table 13-9—Data for creation and update of forwarding information due to PREQ and PREP	1391
Table 13-10—Contents of a PREQ element in Case A	1393
Table 13-11—Contents of a PREQ element in Case B	1394
Table 13-12—Contents of a PREQ element in Case C	1395
Table 13-13—Contents of a PREQ element in Case D	1396
Table 13-14—Contents of a PREQ element in Case E1	1397
Table 13-15—Contents of a PREQ element in Case E2	1398
Table 13-16—Contents of a PREQ element in Case E3	1399
Table 13-17—Contents of a PREP element in Case A	1402
Table 13-18—Contents of a PREP element in Case B	1403
Table 13-19—Contents of a PREP element in Case C	1404
Table 13-20—Contents of a PREP element in Case D	1405
Table 13-21—Contents of a PERR element in Case A	1407
Table 13-23—Contents of a PERR element in Case C	1408
Table 13-22—Contents of a PERR element in Case B	1408
Table 13-24—Contents of a PERR element in Case D	1409
Table 13-25—Contents of a RANN element in Case A	1411
Table 13-26—Contents of a RANN element in Case B	1412
Table 13-27—Contents of a GANN element in Case A	1414
Table 13-28—Contents of a GANN element in Case B	1415
Table 13-29—Contents of a PXU element	1420
Table 13-30—Contents of a PXUC element	1421
Table 13-31—Peer-specific mesh power mode definition	1434
Table 13-32—Mesh peer service period triggering with RSPI and EOSP field combinations in peer trigger frame.....	1440
Table 14-1—TXVECTOR parameters	1443
Table 14-2—RXVECTOR parameters	1444
Table 14-3—PSF bit descriptions.....	1447
Table 14-4—PLCP field bit descriptions.....	1451

Table 14-5—PMD_SAP peer-to-peer service primitives	1461
Table 14-6—PMD_SAP sublayer-to-sublayer service primitives	1462
Table 14-7—List of parameters for PMD primitives	1462
Table 14-8—Transmit power levels	1465
Table 14-9—Operating frequency range	1468
Table 14-10—Number of operating channels	1468
Table 14-11—Requirements in China, North America and Europe (excluding Spain and France; values specified in GHz).....	1469
Table 14-12—Requirements in Japan (values specified in GHz).....	1470
Table 14-13—Requirements in Spain (values specified in GHz).....	1470
Table 14-14—Requirements in France (values specified in GHz).....	1470
Table 14-15—Base-Hopping sequence b(i) for China, North America and most of Europe.....	1472
Table 14-16—Base-Hopping sequence b(i) for Spain.....	1472
Table 14-17—Base-Hopping sequence b(i) for France.....	1472
Table 14-18—Symbol encoding into carrier deviation (1 Mb/s, 2GFSK)	1474
Table 14-19—1 Mb/s Dp.....	1477
Table 14-20—Symbol encoding into carrier deviation	1478
Table 14-21—2 Mb/s Dp.....	1480
Table 14-22—FHSS PHY attributes.....	1481
Table 14-23—Regulatory domain codes	1482
Table 14-24—Supported data rate codes (dot11SupportedDataRatesTX).....	1483
Table 14-25—Supported data rate codes (dot11SupportedDataRatesRX).....	1483
Table 14-26—Number of transmit antennas	1484
Table 14-27—Number of receive antennas	1484
Table 14-28—Diversity support codes	1485
Table 14-29—Diversity select antenna codes	1485
Table 14-30—Transmit power levels	1486
Table 14-31—FH PHY characteristics	1487
Table 15-2—Sixteen-PPM basic rate mapping	1495
Table 15-1—IR PMD_SAP peer-to-peer service primitives	1495
Table 15-3—Four-PPM enhanced rate mapping	1496
Table 15-4—Peak optical power as a function of emitter radiation pattern mask.....	1497
Table 15-5—Definition of the emitter radiation pattern Mask 1	1498
Table 15-6—Definition of emitter radiation pattern Mask 2.....	1498
Table 15-7—Definition of the receiver FOV	1501
Table 15-9—IR PHY characteristics	1503
Table 15-8—IR PHY MIB attributes.....	1503
Table 16-1—MIB attribute default values/ranges	1513
Table 16-2—DS PHY characteristics	1514
Table 16-3—PMD_SAP peer-to-peer service primitives	1516
Table 16-4—DSSS PMD_SAP peer-to-peer service primitives	1516
Table 16-5—PMD_SAP sublayer-to-sublayer service primitives.....	1518
Table 16-6—List of parameters for the PMD primitives	1518
Table 16-7—DSSS PHY frequency channel plan	1527
Table 16-8—1 Mb/s DBPSK encoding table	1528
Table 16-9—2 Mb/s DQPSK encoding table	1528
Table 17-1—SERVICE field definitions	1540
Table 17-2—Example of LENGTH calculations for CCK	1541
Table 17-3—Example of LENGTH calculations for PBCC	1542
Table 17-4—MIB attribute default values/ranges	1551
Table 17-5—High Rate PHY characteristics.....	1552
Table 17-6—Parameter vectors	1553
Table 17-7—PMD_SAP peer-to-peer service primitives	1555
Table 17-8—PMD_SAP sublayer-to-sublayer service primitives.....	1556

Table 17-9—High Rate PHY frequency channel plan	1566
Table 17-10—1 Mb/s DBPSK encoding table	1567
Table 17-11—2 Mb/s DQPSK encoding table	1567
Table 17-12—DQPSK encoding table	1568
Table 17-14—QPSK encoding table	1569
Table 17-13—5.5 Mb/s CCK encoding table	1569
Table 17-15—China and North American operating channels.....	1573
Table 17-16—European operating channels (except France and Spain).....	1573
Table 17-17—China and North American Set 1 hop patterns	1574
Table 17-18—European Set 1 hop patterns (except France and Spain)	1574
Table 18-1—TXVECTOR parameters	1585
Table 18-2—RXVECTOR parameters	1586
Table 18-3—TXSTATUS parameters	1587
Table 18-4—Modulation-dependent parameters	1590
Table 18-5—Timing-related parameters	1590
Table 18-6—Contents of the SIGNAL field.....	1595
Table 18-7—Modulation-dependent normalization factor K_{MOD}	1600
Table 18-8—BPSK encoding table.....	1602
Table 18-9—QPSK encoding table	1602
Table 18-10—16-QAM encoding table	1602
Table 18-11—64-QAM encoding table	1602
Table 18-12—Major parameters of the OFDM PHY	1605
Table 18-13—Allowed relative constellation error versus data rate	1610
Table 18-14—Receiver performance requirements.....	1612
Table 18-15—Optional enhanced receiver performance requirements	1613
Table 18-16—MIB attribute default values/ranges	1620
Table 18-17—OFDM PHY characteristics.....	1623
Table 18-19—PMD_SAP sublayer-to-sublayer service primitives.....	1625
Table 18-20—List of parameters for the PMD primitives	1625
Table 18-18—PMD_SAP peer-to-peer service primitives	1625
Table 19-1—TXVECTOR parameters	1633
Table 19-2—TXSTATUS parameters	1634
Table 19-3—RXVECTOR parameters	1634
Table 19-4—SERVICE field bit definitions.....	1636
Table 19-5—Example of LENGTH calculations for ERP-PBCC-22	1637
Table 19-6—CCA parameters	1646
Table 19-7—MIB attribute default values/ranges	1659
Table 19-8—ERP characteristics.....	1663
Table 19-10—PMD_SAP sublayer-to-sublayer services	1665
Table 19-11—List of parameters for the PMD primitives	1665
Table 19-9—PMD_SAP peer-to-peer services.....	1665
Table 20-1—TXVECTOR and RXVECTOR parameters.....	1671
Table 20-2—PPDU format as a function of CH_BANDWIDTH and CH_OFFSET parameters.....	1678
Table 20-3—Mapping of the HT PHY parameters for NON_HT operation.....	1679
Table 20-4—TXSTATUS parameter.....	1681
Table 20-5—Elements of the HT PLCP packet.....	1682
Table 20-6—Timing-related constants	1689
Table 20-7—Frequently used parameters.....	1690
Table 20-8—Value of tone scaling factor	1693
Table 20-9—Cyclic shift for non-HT portion of packet.....	1695
Table 20-10—Cyclic shift values of HT portion of packet	1698
Table 20-11—HT-SIG fields	1699
Table 20-12—Determining the number of space-time streams.....	1704
Table 20-13—Number of HT-DLTFs required for data space-time streams	1704

Table 20-14—Number of HT-ELTFs required for extension spatial streams	1704
Table 20-15—LDPC parameters	1712
Table 20-16—PPDU encoding parameters.....	1714
Table 20-17—Number of rows and columns in the interleaver	1717
Table 20-18—Constellation mapper output to spatial mapper input for STBC	1719
Table 20-19—Pilot values for 20 MHz transmission	1721
Table 20-20—Pilots values for 40 MHz transmission (excluding MCS 32).....	1721
Table 20-21—Maximum available space-time streams	1737
Table 20-22—Allowed relative constellation error versus constellation size and coding rate.....	1742
Table 20-23—Receiver minimum input level sensitivity.....	1745
Table 20-24—HT PHY MIB attributes	1756
Table 20-25—MIMO PHY characteristics	1761
Table 20-26—PMD_SAP peer-to-peer service primitives	1763
Table 20-27—PMD_SAP sublayer-to-sublayer service primitives.....	1763
Table 20-28—List of parameters for PMD primitives	1764
Table 20-29—Symbols used in MCS parameter tables.....	1771
Table 20-30—MCS parameters for mandatory 20 MHz, $N_{SS} = 1$, $N_{ES} = 1$	1771
Table 20-31—MCS parameters for optional 20 MHz, $N_{SS} = 2$, $N_{ES} = 1$, EQM.....	1772
Table 20-32—MCS parameters for optional 20 MHz, $N_{SS} = 3$, $N_{ES} = 1$, EQM.....	1772
Table 20-33—MCS parameters for optional 20 MHz, $N_{SS} = 4$, $N_{ES} = 1$, EQM.....	1773
Table 20-34—MCS parameters for optional 40 MHz, $N_{SS} = 1$, $N_{ES} = 1$	1773
Table 20-35—MCS parameters for optional 40 MHz, $N_{SS} = 2$, $N_{ES} = 1$, EQM.....	1774
Table 20-36—MCS parameters for optional 40 MHz, $N_{SS} = 3$, EQM	1774
Table 20-37—MCS parameters for optional 40 MHz, $N_{SS} = 4$, EQM	1775
Table 20-38—MCS parameters for optional 40 MHz MCS 32 format, $N_{SS} = 1$, $N_{ES} = 1$	1775
Table 20-39—MCS parameters for optional 20 MHz, $N_{SS} = 2$, $N_{ES} = 1$, UEQM.....	1775
Table 20-40—MCS parameters for optional 20 MHz, $N_{SS} = 3$, $N_{ES} = 1$, UEQM.....	1776
Table 20-41—MCS parameters for optional 20 MHz, $N_{SS} = 4$, $N_{ES} = 1$, UEQM.....	1776
Table 20-42—MCS parameters for optional 40 MHz, $N_{SS} = 2$, $N_{ES} = 1$, UEQM.....	1778
Table 20-43—MCS parameters for optional 40 MHz, $N_{SS} = 3$, UEQM.....	1778
Table 20-44—MCS parameters for optional 40 MHz, $N_{SS} = 4$, UEQM.....	1779
Table D-1—Regulatory requirement list	2287
Table D-2—Behavior limits sets	2288
Table D-3—Maximum STA transmit power classification for the 5.85–5.925 GHz band in the United States	2289
Table D-4—Spectrum mask data for 5 MHz channel spacing	2290
Table D-5—Spectrum mask data for 10 MHz channel spacing	2290
Table D-6—Spectrum mask data for 20 MHz channel spacing	2290
Table E-1—Operating classes in the United States	2294
Table E-2—Operating classes in Europe	2295
Table E-3—Operating classes in Japan	2297
Table E-4—Global operating classes	2299
Table E-5—DSE timer limits	2303
Table F-1—Matrix prototypes for codeword block length $n=648$ bits, subblock size is $Z = 27$ bits	2304
Table F-2—Matrix prototypes for codeword block length $n=1296$ bits, subblock size is $Z= 54$ bits	2305
Table F-3—Matrix prototypes for codeword block length $n=1944$ bits, subblock size is $Z = 81$ bits	2306
Table G-1—Attributes applicable to frame exchange sequence definition	2307
Table H-1—Payload Type field values	2320
Table I-1—Hopping sequence set 1	2322
Table I-2—Hopping sequence set 2	2326
Table I-3—Hopping sequence set 3	2330
Table L-1—The message for the BCC example	2537
Table L-2—Frequency domain representation of the short sequences.....	2538
Table L-3—One period of IFFT of the short sequences.....	2538

Table L-4—Time domain representation of the short sequence.....	2539
Table L-5—Frequency domain representation of the long sequences	2541
Table L-6—Time domain representation of the long sequence.....	2541
Table L-7—Bit assignment for SIGNAL field	2543
Table L-9—SIGNAL field bits after interleaving	2544
Table L-8—SIGNAL field bits after encoding	2544
Table L-11—Frequency domain representation of SIGNAL field with pilots inserted	2545
Table L-10—Frequency domain representation of SIGNAL field.....	2545
Table L-12—Time domain representation of SIGNAL field	2546
Table L-13—The DATA bits before scrambling	2547
Table L-15—The DATA bits after scrambling	2549
Table L-14—Scrambling sequence for seed 1011101	2549
Table L-16—The BCC encoded DATA bits	2551
Table L-17—First permutation	2552
Table L-18—Second permutation	2553
Table L-19—Interleaved bits of first DATA symbol	2554
Table L-20—Frequency domain of first DATA symbol	2555
Table L-21—Polarity of the pilot subcarriers	2556
Table L-22—Time domain representation of the short training sequence	2557
Table L-23—Time domain representation of the long training sequence	2558
Table L-24—Time domain representation of the SIGNAL field (1 symbol)	2559
Table L-25—Time domain representation of the DATA field: symbol 1 of 6	2560
Table L-26—Time domain representation of the DATA field: symbol 2 of 6	2561
Table L-27—Time domain representation of the DATA field: symbol 3 of 6	2562
Table L-28—Time domain representation of the DATA field: symbol 4 of 6	2562
Table L-29—Time domain representation of the DATA field: symbol 5 of 6	2563
Table L-30—Time domain representation of the DATA field: symbol 6 of 6	2564
Table L-31—Message for LDPC example 1	2565
Table L-32—DATA bits for LDPC example 1 before scrambling	2566
Table L-33—DATA bits for LDPC example 1 after scrambling	2568
Table L-34—DATA bits for LDPC example 1 after insertion of shortening bits	2569
Table L-35—DATA bits for LDPC example 1 after LDPC encoding	2571
Table L-36—DATA bits after puncturing and removal of shortening bits	2574
Table L-37—Message for LDPC example 2	2577
Table L-38—DATA bits for LDPC example 2 before scrambling	2578
Table L-39—DATA bits for LDPC example 2 after scrambling	2580
Table L-40—DATA bits for LDPC example 2 after insertion of shortening bits	2582
Table L-41—DATA bits for LDPC example 2 after LDPC encoding	2584
Table L-42—DATA bits after removal of shortening bits and copying of repetition bits	2587
Table M-1—Test vectors for block function	2604
Table M-2—Test vectors for Michael	2604
Table M-4—Sample plaintext MPDU	2619
Table M-5—ARC4 encryption	2619
Table M-3—Notation example	2619
Table M-7—Sample TKIP parameters	2620
Table M-6—Expanded MPDU after WEP encapsulation	2620
Table M-8—Sample plaintext and cipher text MPDUs, using parameter from Table M-7	2621
Table M-9—RSN PRF Test Vector 1	2622
Table M-10—RSN PRF Test Vector 2	2622
Table M-11—RSN PRF Test Vector 3	2622
Table M-13—Sample values for pairwise key derivations	2623
Table M-14—Sample derived CCMP temporal key (TK)	2623
Table M-12—RSN PRF Test Vector 4	2623
Table M-15—Sample derived PTK	2624

Table N-1—Admissible TSPECs	2628
Table P-1—IEEE 802.11 integration service STT	2646
Table P-2—Ethernet/IEEE 802.3 to IEEE 802.11 translation	2647
Table P-3—IEEE 802.11 to Ethernet/IEEE 802.3 translation	2647
Table U-1—Destination URI payload	2670
Table V-1—Mapping table of DSCP to 3GPP QoS information and EDCA ACs	2678
Table V-2—Example Enterprise DSCP to UP/AC mapping.....	2678
Table V-3—UP to DSCP range mapping example	2679
Table V-4—SSPN Interface information or permission parameters	2680
Table W-1—Default parameters for mesh STAs that intend to operate in light or deep sleep mode for mesh peerings.....	2690

Figures

Figure A—Changes in clause numbers and annex letters from 2007 revision to 2012 revision.....	x
Figure 4-1—BSSs	46
Figure 4-2—DSs and APs.....	47
Figure 4-3—ESS.....	48
Figure 4-4—A representative signal intensity map	50
Figure 4-5—Collocated coverage areas.....	50
Figure 4-6—Connecting to other IEEE 802 LANs	51
Figure 4-7—SSPN interface service architecture	61
Figure 4-8—Example MBSS containing mesh STAs, mesh gates, APs, and portals	63
Figure 4-9—Example device consisting of mesh STA and AP STA to connect an MBSS and an infrastructure BSS.....	64
Figure 4-10—MAC data transport over an MBSS	66
Figure 4-11—Complete IEEE 802.11 architecture.....	69
Figure 4-12—IEEE 802.11 architecture (again).....	80
Figure 4-13—Logical architecture of an IBSS	80
Figure 4-14—Portion of the ISO/IEC basic reference model covered in this standard.....	81
Figure 4-15—Interworking reference model.....	82
Figure 4-16—ESS link illustration	83
Figure 4-17—Establishing the IEEE 802.11 association.....	84
Figure 4-18—IEEE 802.1X EAP authentication.....	85
Figure 4-19—Establishing pairwise and group keys.....	86
Figure 4-20—Delivery of subsequent group keys.....	87
Figure 4-21—Example using SAE Authentication	87
Figure 4-22—Sample 4-Way Handshakes in an IBSS	89
Figure 4-23—Example using IEEE 802.1X authentication.....	90
Figure 5-1—MAC data plane architecture	96
Figure 6-1—GET and SET operations	104
Figure 6-2—Layer management model.....	153
Figure 6-3—Measurement request—accepted	154
Figure 6-4—Measurement request—rejected.....	154
Figure 6-5—TPC adaptation.....	155
Figure 6-6—Channel switch.....	155
Figure 6-7—TDLS direct-link establishment	229
Figure 6-8—TDLS direct-link teardown	235
Figure 6-9—TDLS Peer U-APSD	237
Figure 6-10—TDLS channel switching.....	240
Figure 6-11—TDLS Peer PSM.....	244
Figure 6-12—Event protocol exchange.....	247
Figure 6-13—Diagnostic protocol exchange.....	252
Figure 6-14—Location configuration request and response protocol exchange	255
Figure 6-15—Location track notification protocol exchange.....	259
Figure 6-16—Timing measurement primitives and timestamps capture.....	261
Figure 6-17—BSS Transition Management request—accepted.....	265
Figure 6-18—FMS setup protocol exchange.....	272
Figure 6-19—Collocated interference protocol exchange.....	275
Figure 6-20—TFS request and response exchange	279
Figure 6-21—Sleep mode request and response exchange.....	283
Figure 6-22—TIM broadcast setup protocol exchange	287
Figure 6-23—QoS traffic capability update protocol exchange.....	290
Figure 6-24—Channel usage request protocol exchange	292
Figure 6-25—DMS setup protocol exchange	296
Figure 6-26—MSGCF state machine	342

Figure 8-1—MAC frame format.....	381
Figure 8-2—Frame Control field.....	382
Figure 8-3—Sequence Control field.....	388
Figure 8-4—QoS AP PS Buffer State subfield.....	393
Figure 8-5—HT Control field.....	394
Figure 8-6—Link Adaptation Control subfield.....	395
Figure 8-7—MAI subfield.....	395
Figure 8-8—ASELC subfield.....	396
Figure 8-10—Mesh Flags subfield.....	399
Figure 8-9—Mesh Control field.....	399
Figure 8-11—Mesh Address Extension subfield.....	400
Figure 8-12—Frame Control field subfield values within control frames.....	404
Figure 8-13—RTS frame.....	404
Figure 8-14—CTS frame.....	405
Figure 8-15—ACK frame.....	405
Figure 8-16—PS-Poll frame.....	406
Figure 8-17—CF-End frame.....	406
Figure 8-18—CF-End+CF-Ack frame.....	407
Figure 8-19—BlockAckReq frame.....	407
Figure 8-20—BAR Control field.....	407
Figure 8-22—BAR Information field (Multi-TID BlockAckReq).....	409
Figure 8-23—Per TID Info subfield.....	409
Figure 8-21—Block Ack Starting Sequence Control field.....	409
Figure 8-24—BlockAck frame.....	410
Figure 8-25—BA Control field.....	410
Figure 8-26—BA Information field (BlockAck).....	411
Figure 8-27—BA Information field (Compressed BlockAck).....	412
Figure 8-28—BA Information field (Multi-TID BlockAck).....	412
Figure 8-29—Control Wrapper frame.....	413
Figure 8-30—Data frame.....	413
Figure 8-31—A-MSDU structure.....	416
Figure 8-32—A-MSDU subframe structure.....	416
Figure 8-33—A-MSDU Subframe structure for Mesh Data.....	417
Figure 8-34—Management frame format.....	418
Figure 8-35—Authentication Algorithm Number field.....	437
Figure 8-36—Authentication Transaction Sequence Number field.....	438
Figure 8-37—Beacon Interval field.....	438
Figure 8-38—Capability Information field.....	438
Figure 8-40—Listen Interval field.....	442
Figure 8-41—Reason Code field.....	442
Figure 8-39—Current AP Address field.....	442
Figure 8-42—AID field.....	445
Figure 8-43—Status Code field.....	445
Figure 8-44—Timestamp field.....	449
Figure 8-45—Action field.....	449
Figure 8-46—Dialog Token fixed field.....	451
Figure 8-47—DLS Timeout Value fixed field.....	451
Figure 8-48—Block Ack Parameter Set fixed field.....	451
Figure 8-49—Block Ack Timeout Value fixed field.....	452
Figure 8-50—DELBA Parameters fixed field.....	452
Figure 8-52—QoS Info field when set by a non-AP STA.....	453
Figure 8-51—QoS Info field when sent by an AP.....	453
Figure 8-53—Measurement Pilot Interval fixed field.....	454
Figure 8-54—Max Transmit Power field.....	454

Figure 8-55—Transmit Power Used field	454
Figure 8-56—Channel Width fixed field	455
Figure 8-57—SM Power Control fixed field	455
Figure 8-59—PSMP Parameter Set fixed field	456
Figure 8-58—PCO Phase Control fixed field	456
Figure 8-60—PSMP STA Info fixed field (group addressed)	457
Figure 8-61—PSMP STA Info fixed field (individually addressed)	457
Figure 8-62—MIMO Control field	458
Figure 8-63—CSI matrix coding	461
Figure 8-64—V matrix coding (noncompressed beamforming)	463
Figure 8-65—First example of Compressed Beamforming Report field encoding	466
Figure 8-66—Second example of Compressed Beamforming Report field encoding	466
Figure 8-67—Antenna Selection Indices fixed field	466
Figure 8-68—Organization Identifier field	467
Figure 8-69—Identification field format	467
Figure 8-70—Mask field format	467
Figure 8-71—GAS Query Response Fragment ID field	468
Figure 8-72—Venue Info field format	468
Figure 8-73—Target Channel field format	471
Figure 8-74—Operating Channel field format	472
Figure 8-75—Send-Confirm field	472
Figure 8-76—Anti-Clogging Token field	472
Figure 8-77—Scalar field	472
Figure 8-78—Element field	472
Figure 8-79—Confirm field	473
Figure 8-80—Finite Cyclic Group field	473
Figure 8-81—Element format	474
Figure 8-82—SSID element format	478
Figure 8-84—FH Parameter Set element format	479
Figure 8-83—Supported rates element format	479
Figure 8-85—DSSS Parameter Set element format	480
Figure 8-86—CF Parameter Set element format	480
Figure 8-87—TIM element format	481
Figure 8-88—IBSS Parameter Set element format	482
Figure 8-89—Challenge Text element format	483
Figure 8-90—Country element format	483
Figure 8-91—Hopping Pattern Parameters element	485
Figure 8-92—Hopping Pattern Table element	486
Figure 8-93—Request element	486
Figure 8-94—ERP element	487
Figure 8-95—ERP Parameters field	487
Figure 8-96—Extended Supported Rates element format	488
Figure 8-97—Power Constraint element format	488
Figure 8-98—Power Capability element format	488
Figure 8-99—TPC Request element format	489
Figure 8-100—TPC Report element format	489
Figure 8-101—Supported Channels element format	490
Figure 8-102—Channel Switch Announcement element format	490
Figure 8-103—Secondary Channel Offset element format	491
Figure 8-104—Measurement Request element format	492
Figure 8-105—Measurement Request Mode field	492
Figure 8-106—Measurement Request field format for a basic request	494
Figure 8-107—Measurement Request field format for a CCA request	495
Figure 8-108—Measurement Request field format for a RPI histogram request	495

Figure 8-109—Measurement Request field format for Channel Load Request	496
Figure 8-111—Measurement Request field format for Noise Histogram Request	497
Figure 8-110—Channel Load Reporting Information data field format	497
Figure 8-112—Noise Histogram Reporting Information data field format	498
Figure 8-113—Measurement Request field format for Beacon Request	499
Figure 8-114—Beacon Reporting Information data field format	501
Figure 8-115—Measurement Request field format for frame request	502
Figure 8-116—Measurement Request field format for STA Statistics Request	503
Figure 8-117—Triggered Reporting subelement for STA Counters	505
Figure 8-118—STA Counter Trigger Condition field	505
Figure 8-119—Triggered Reporting subelement for QoS STA Counters	506
Figure 8-120—QoS STA Counter Trigger Condition field	506
Figure 8-122—RSNA Trigger Condition field	507
Figure 8-121—Triggered Reporting subelement for RSNA Counters	507
Figure 8-123—Measurement Request field format for LCI Request	508
Figure 8-124—Azimuth Request subelement format	509
Figure 8-125—Azimuth Request field	509
Figure 8-126—Originator Requesting STA MAC Address subelement format	510
Figure 8-127—Target MAC Address subelement format	510
Figure 8-128—Measurement Request field format for Transmit Stream/Category Measurement Request	510
Figure 8-130—Triggered Reporting subelement format	511
Figure 8-129—Traffic Identifier field	511
Figure 8-131—Triggered Reporting field	512
Figure 8-132—Trigger Conditions bit-field	512
Figure 8-134—Measurement Request field format for measurement pause request	513
Figure 8-133—Delay Threshold subfield	513
Figure 8-135—Measurement Request field format for a Multicast Diagnostics Request	514
Figure 8-136—Multicast Triggered Reporting subelement format	515
Figure 8-137—Multicast Trigger Condition field	515
Figure 8-138—Location Civic Request field format	516
Figure 8-139—Location Identifier Request field format	518
Figure 8-140—Measurement Report element format	519
Figure 8-141—Measurement Report Mode field	519
Figure 8-142—Measurement Report field format for a basic report	521
Figure 8-143—Map field format	521
Figure 8-145—Measurement Report field format for an RPI histogram report	522
Figure 8-144—Measurement Report field format for a CCA report	522
Figure 8-146—Measurement Report field format for Channel Load Report	523
Figure 8-147—Measurement Report field format for Noise Histogram Report	524
Figure 8-148—Measurement Report field format for Beacon Report	526
Figure 8-149—Reported Frame Information field	526
Figure 8-150—Measurement Report field format for Frame Report	528
Figure 8-151—Frame Count Report subelement format	529
Figure 8-152—Frame Report Entry field format	529
Figure 8-153—Measurement Report field format for STA Statistics Report	530
Figure 8-154—Measurement Report field format for dot11Counters Group	535
Figure 8-155—Measurement Report field format for dot11MACStatistics Group	535
Figure 8-157—Measurement Report field format for dot11BSSAverageAccessDelay Group	536
Figure 8-156—Measurement Report field format for dot11QoSCounters Group for UPx	536
Figure 8-158—Measurement Report field format for RSNA Counters Group	537
Figure 8-159—Reporting Reason subelement for STA Counters	537
Figure 8-160—Reporting Reason subelement for QoS STA Counters	538
Figure 8-161—Reporting Reason subelement for RSNA Counters	538

Figure 8-162—Measurement Report field format for Location Configuration Information Report.....	539
Figure 8-163—Azimuth Report subelement format	540
Figure 8-164—Azimuth Report subfield	540
Figure 8-165—Measurement Report field format for Transmit Stream/Category Measurement Report ...	541
Figure 8-166—Reporting Reason field.....	542
Figure 8-167—Measurement Report field format for a Multicast Diagnostics Report.....	544
Figure 8-168—Multicast Reporting Reason field	544
Figure 8-169—Location Civic Report field format.....	546
Figure 8-170—Location Reference subelement format	547
Figure 8-171—Location Shape subelement format.....	548
Figure 8-172—2-Dimension Point Location Shape Value format	549
Figure 8-173—3-Dimension Point Location Shape Value format	549
Figure 8-174—Circle Location Shape Value format.....	549
Figure 8-175—Sphere Location Shape Value format	549
Figure 8-176—Polygon Location Shape Value format	550
Figure 8-177—Prism Location Shape Value format	550
Figure 8-178—Ellipse Location Shape Value format	550
Figure 8-179—Ellipsoid Location Shape Value format	551
Figure 8-180—Arcband Location Shape Value format.....	551
Figure 8-181—Map Image subelement format	551
Figure 8-182—Location Identifier Report field format.....	552
Figure 8-184—IBSS DFS element format.....	554
Figure 8-185—Channel Map field format	554
Figure 8-183—Quiet element format	554
Figure 8-186—RSNE format.....	555
Figure 8-187—Suite selector format	557
Figure 8-188—RSN Capabilities field format.....	560
Figure 8-188—RSN Capabilities field format.....	560
Figure 8-189—Vendor Specific element format	562
Figure 8-190—Extended Capabilities element format	562
Figure 8-191—BSS Load element format	566
Figure 8-192—EDCA Parameter Set element.....	567
Figure 8-193—AC_BE, AC_BK, AC_VI, and AC_VO Parameter Record field format	567
Figure 8-194—ACI/AIFSN field.....	568
Figure 8-195—ECWmin and ECWmax fields	568
Figure 8-196—TSPEC element format	569
Figure 8-197—TS Info field	570
Figure 8-198—Nominal MSDU Size field	572
Figure 8-200—Frame Classifier field	574
Figure 8-199—TCLAS element format.....	574
Figure 8-202—Frame Classifier field of Classifier Type 1 for traffic over IPv4.....	575
Figure 8-203—Frame Classifier field of Classifier Type 1 for traffic over IPv6.....	575
Figure 8-204—Frame Classifier field of Classifier Type 2.....	575
Figure 8-201—Frame Classifier field of Classifier Type 0.....	575
Figure 8-205—Frame Classifier field of Classifier Type 3.....	576
Figure 8-206—Frame Classifier subfield of Classifier Type 4 for traffic over IPv4	577
Figure 8-207—Frame Classifier subfield of Classifier Type 4 for traffic over IPv6	577
Figure 8-208—Frame Classifier field of Classifier Type 5.....	578
Figure 8-209—TS Delay element.....	578
Figure 8-210—TCLAS Processing element	578
Figure 8-211—Schedule element	579
Figure 8-212—Schedule Info field	579
Figure 8-213—QoS Capability element format.....	580
Figure 8-214—AP Channel Report element format	580

Figure 8-216—BSSID Information field	581
Figure 8-215—Neighbor Report element format	581
Figure 8-217—Capabilities subfield	582
Figure 8-218—TSF Information subelement format	583
Figure 8-219—BSS Transition Candidate Preference subelement field format	584
Figure 8-221—Bearing subelement field format	585
Figure 8-220—BSS Termination Duration subelement field format	585
Figure 8-223—BSS Average Access Delay element format	586
Figure 8-222—RCPI element format	586
Figure 8-224—Antenna element format	587
Figure 8-225—RSNI element format	588
Figure 8-226—Measurement Pilot Transmission element format	588
Figure 8-227—BSS Available Admission Capacity element format	589
Figure 8-228—BSS AC Access Delay element format	590
Figure 8-229—Access Category Access Delay subfields	591
Figure 8-230—RM Enabled Capabilities element format	592
Figure 8-231—Multiple BSSID element format	594
Figure 8-232—MDE format	596
Figure 8-233—FT Capability and Policy field	596
Figure 8-234—FTE format	596
Figure 8-235—MIC Control field	597
Figure 8-236—Optional Parameter(s) field	597
Figure 8-237—GTK subelement format	598
Figure 8-238—GTK subelement's Key Info subfield	598
Figure 8-239—IGTK subelement format	598
Figure 8-240—TIE format	599
Figure 8-241—RDE format	599
Figure 8-242—RIC Descriptor element format	600
Figure 8-243—DSE Registered Location element format	600
Figure 8-244—DSE registered location element body fields format	601
Figure 8-245—Extended Channel Switch Announcement element format	602
Figure 8-246—Supported Operating Classes element format	603
Figure 8-247—Management MIC element format	603
Figure 8-248—HT Capabilities element format	604
Figure 8-249—HT Capabilities Info field	604
Figure 8-250—A-MPDU Parameters field	606
Figure 8-251—Supported MCS Set field	607
Figure 8-252—HT Extended Capabilities field	608
Figure 8-253—Transmit Beamforming Capabilities field	610
Figure 8-254—ASEL Capability field	612
Figure 8-255—HT Operation element format	613
Figure 8-256—HT Operation Information field	614
Figure 8-257—20/40 BSS Intolerant Channel Report element format	617
Figure 8-258—Overlapping BSS Scan Parameters element format	618
Figure 8-260—20/40 BSS Coexistence Information field	619
Figure 8-259—20/40 BSS Coexistence element format	619
Figure 8-261—Time Advertisement element format	620
Figure 8-262—Link Identifier element format	621
Figure 8-263—Wakeup Schedule element format	621
Figure 8-264—Channel Switch Timing element format	622
Figure 8-266—TPU Buffer Status element format	623
Figure 8-265—PTI Control element format	623
Figure 8-267—Event Request element format	624
Figure 8-268—Transition Target BSSID subelement format	625

Figure 8-269—Transition Source BSSID subelement format	625
Figure 8-270—Transition Time Threshold subelement format	626
Figure 8-271—Transition Result subelement format	626
Figure 8-272—Match Value field definitions	626
Figure 8-273—Frequent Transition subelement format	627
Figure 8-275—Authentication Type subelement format	628
Figure 8-276—EAP Method subelement format	628
Figure 8-274—RSNA Target BSSID subelement format	628
Figure 8-277—RSNA Result subelement format	629
Figure 8-278—Match Value field definitions	629
Figure 8-280—Channel Number subelement format	630
Figure 8-279—Peer Address subelement format	630
Figure 8-281—Event Report element format	631
Figure 8-282—Event Report format for Transition event	632
Figure 8-283—Event Report format for RSNA event	634
Figure 8-284—Event Report format for Peer-to-Peer Link event	634
Figure 8-285—Event Report format for WNM Log event	635
Figure 8-286—Diagnostic Request element format	636
Figure 8-287—Diagnostic Information subelement format	638
Figure 8-288—Credential Type subelement format	639
Figure 8-289—AKM Suite subelement format	639
Figure 8-290—AP Descriptor subelement format	639
Figure 8-291—Antenna Type subelement format	640
Figure 8-292—Cipher Suite subelement format	640
Figure 8-293—Collocated Radio Type subelement format	640
Figure 8-294—Device Type subelement format	641
Figure 8-295—EAP Method subelement format	642
Figure 8-296—Firmware Version subelement format	643
Figure 8-297—MAC Address subelement format	643
Figure 8-298—Manufacturer ID String subelement format	643
Figure 8-299—Manufacturer Model String subelement format	643
Figure 8-300—Manufacturer OI subelement format	644
Figure 8-301—Manufacturer Serial Number String subelement format	644
Figure 8-302—Power Save Mode subelement format	644
Figure 8-303—Profile ID subelement format	645
Figure 8-304—Supported Operating Classes subelement format	645
Figure 8-305—Status Code subelement format	645
Figure 8-306—SSID subelement format	646
Figure 8-307—Tx Power Capability subelement format	646
Figure 8-308—Certificate ID subelement format	646
Figure 8-309—Diagnostic Report element format	647
Figure 8-310—Location Parameters element format	649
Figure 8-311—Location Indication Parameters subelement	650
Figure 8-312—Location Indication Channels subelement	652
Figure 8-313—Channel Entry field format	652
Figure 8-315—Radio Information subelement	653
Figure 8-314—Location Status subelement	653
Figure 8-316—Motion subelement	654
Figure 8-317—Location Indication Broadcast Data Rate subelement	655
Figure 8-319—Location Indication Options subelement	656
Figure 8-320—Options Used field format	656
Figure 8-318—Time of Departure subelement	656
Figure 8-321—Nontransmitted BSSID Capability element format	657
Figure 8-322—SSID List element format	657

Figure 8-323—Multiple BSSID-Index element format	658
Figure 8-324—FMS Descriptor element format	658
Figure 8-325—FMS Counter format	659
Figure 8-326—FMS Request element format	659
Figure 8-327—FMS Subelement format	660
Figure 8-328—FMS Response element format	661
Figure 8-329—FMS Status Subelement format	662
Figure 8-330—TCLAS Status Subelement format	663
Figure 8-331—QoS Traffic Capability Element format	663
Figure 8-332—BSS Max Idle Period element format	665
Figure 8-333—Idle Options field	665
Figure 8-334—TFS Request element format	666
Figure 8-335—TFS Subelement format	667
Figure 8-336—TFS Response element format	667
Figure 8-337—TFS Status Subelement format	668
Figure 8-338—WNM-Sleep Mode element format	668
Figure 8-339—TIM Broadcast Request element format	670
Figure 8-340—TIM Broadcast Response element format	670
Figure 8-341—Collocated Interference Report element format	671
Figure 8-342—Interference Level Accuracy/Interference Index field format	672
Figure 8-343—Channel Usage element format	673
Figure 8-344—Time Zone element format	674
Figure 8-345—DMS Request element format	674
Figure 8-346—DMS Descriptor	675
Figure 8-347—DMS Response element format	676
Figure 8-348—DMS Status field format	676
Figure 8-349—Destination URI element format	678
Figure 8-350—U-APSD Coexistence element format	679
Figure 8-351—Interworking element format	680
Figure 8-352—Access Network Options field format	680
Figure 8-354—Advertisement Protocol Tuple field format	682
Figure 8-355—Query Response Info field format	682
Figure 8-353—Advertisement Protocol element format	682
Figure 8-356—Expedited Bandwidth Request element format	683
Figure 8-357—QoS Map Set element description	684
Figure 8-358—DSCP Exception format	684
Figure 8-359—DSCP Range description	685
Figure 8-360—Roaming Consortium element format	685
Figure 8-362—Emergency Alert Identifier element format	686
Figure 8-363—Mesh Configuration element format	686
Figure 8-361—OI #1 and #2 Lengths field format	686
Figure 8-364—Mesh Formation Info field	689
Figure 8-365—Mesh Capability field	690
Figure 8-366—Mesh ID element format	690
Figure 8-367—Mesh Link Metric Report element format	691
Figure 8-368—Flags field	691
Figure 8-370—Mesh Peering Management element format	692
Figure 8-369—Congestion Notification element format	692
Figure 8-371—Mesh Channel Switch Parameters element format	693
Figure 8-372—Flags field	694
Figure 8-373—Mesh Awake Window element format	694
Figure 8-374—Beacon Timing element format	695
Figure 8-375—Report Control field	695
Figure 8-376—Beacon Timing Information field	695

Figure 8-377—MCCAOP Setup Request element format	696
Figure 8-378—MCCAOP Reservation field	697
Figure 8-379—MCCAOP Setup Reply element format.....	697
Figure 8-380—MCCAOP Advertisement Overview element format	698
Figure 8-381—Flags field format	699
Figure 8-382—MCCAOP Advertisement element format	699
Figure 8-383—MCCAOP Advertisement Element Information field	700
Figure 8-385—MCCAOP Teardown element format	701
Figure 8-386—GANN element format	701
Figure 8-384—MCCAOP Reservation Report field	701
Figure 8-387—RANN element format	702
Figure 8-388—Flags field format	702
Figure 8-389—PREQ element format	703
Figure 8-390—Flags field format	704
Figure 8-391—Per Target Flags field format	705
Figure 8-393—Flags field format	706
Figure 8-392—PREP element format	706
Figure 8-394—PERR element format	707
Figure 8-395—Flags field format	707
Figure 8-396—PXU element format	708
Figure 8-398—Flags subfield	709
Figure 8-397—Proxy Information field.....	709
Figure 8-400—Authenticated Mesh Peering Exchange element format	710
Figure 8-399—PXUC element format.....	710
Figure 8-401—MIC element format.....	711
Figure 8-402—Subelement format	711
Figure 8-403—ANQP-element format	712
Figure 8-404—Query List ANQP-element format	713
Figure 8-405—Capability List ANQP-element format	713
Figure 8-406—Venue Name ANQP-element format	714
Figure 8-407—Venue Name Duple field.....	714
Figure 8-408—Emergency Call Number ANQP-element format	715
Figure 8-409—Emergency Call Number Unit field format.....	715
Figure 8-410—Network Authentication Type ANQP-element format	715
Figure 8-411—Network Authentication Type Unit field format.....	716
Figure 8-412—Roaming Consortium ANQP-element format.....	717
Figure 8-413—OI Duple field format.....	717
Figure 8-414—Vendor Specific ANQP-element format	717
Figure 8-415—IP Address Type Availability ANQP-element	718
Figure 8-416—IP Address field format	718
Figure 8-417—NAI Realm ANQP-element format.....	719
Figure 8-418—NAI Realm Data field format.....	719
Figure 8-419—NAI Realm Encoding subfield format	720
Figure 8-420—EAP Method subfield format	720
Figure 8-421—Authentication Parameter subfield format	721
Figure 8-422—3GPP Cellular Network ANQP-element format	722
Figure 8-423—AP Geospatial Location ANQP-element format.....	723
Figure 8-424—AP Civic Location ANQP-element format	723
Figure 8-425—AP Location Public Identifier URI ANQP-element format.....	724
Figure 8-426—Domain Name ANQP-element format.....	724
Figure 8-427—Domain Name subfield format.....	724
Figure 8-428—Emergency Alert URI ANQP-element format.....	725
Figure 8-429—Emergency NAI ANQP-element format.....	725
Figure 8-430—TDLS Capability ANQP-element format	725

Figure 8-431—Neighbor Report ANQP-element format	726
Figure 8-432—Measurement Request frame Action field format	727
Figure 8-433—Measurement Report frame Action field format	727
Figure 8-434—TPC Request frame Action field format	728
Figure 8-435—TPC Report frame Action field format	728
Figure 8-436—Channel Switch Announcement frame Action field format	729
Figure 8-437—Vendor Specific Action frame Action field format	737
Figure 8-438—Radio Measurement Request frame Action field format	738
Figure 8-439—Radio Measurement Report frame Action field format	739
Figure 8-440—Link Measurement Request frame Action field format	739
Figure 8-441—Link Measurement Report frame Action field format	741
Figure 8-442—Neighbor Report Request frame Action field format	742
Figure 8-443—Neighbor Report Response frame Action field format	743
Figure 8-445—Condensed Capability Information field	745
Figure 8-444—Measurement Pilot frame Action field format	745
Figure 8-446—DSE Enablement frame Action field format	746
Figure 8-447—DSE Deenablement frame Action field format	747
Figure 8-448—DSE Registered Location Announcement frame Action field format	748
Figure 8-449—Extended Channel Switch Announcement frame Action field format	748
Figure 8-451—DSE Measurement Report frame Action field format	749
Figure 8-450—DSE Measurement Request frame Action field format	749
Figure 8-452—DSE LCI field format	750
Figure 8-453—DSE Power Constraint frame Action field format	751
Figure 8-454—Vendor Specific Public Action frame Action field format	752
Figure 8-455—Query Request length field	753
Figure 8-456—Query Request field	753
Figure 8-457—GAS Comeback Delay field	754
Figure 8-458—Query Response length field	754
Figure 8-459—Query Response field	754
Figure 8-460—Location Track Notification frame format	757
Figure 8-461—FT Request frame Action field format	759
Figure 8-462—FT Response frame Action field format	759
Figure 8-463—FT Confirm frame Action field format	760
Figure 8-464—FT Ack frame Action field format	761
Figure 8-465—SA Query Request frame Action field format	762
Figure 8-466—SA Query Response frame Action field format	762
Figure 8-467—Event Request frame body format	777
Figure 8-468—Event Report frame body format	777
Figure 8-469—Diagnostic Request frame body format	778
Figure 8-470—Diagnostic Report frame body format	778
Figure 8-472—Location Configuration Response frame body format	779
Figure 8-471—Location Configuration Request frame body format	779
Figure 8-473—BSS Transition Management Query frame body format	780
Figure 8-474—BSS Transition Management Request frame body format	781
Figure 8-475—Request Mode field	782
Figure 8-476—Disassociation Timer field format	782
Figure 8-477—Session Information URL field format	783
Figure 8-478—BSS Transition Management Response frame body format	783
Figure 8-479—FMS Request frame format	784
Figure 8-480—FMS Response frame format	785
Figure 8-481—Collocated Interference Request frame format	785
Figure 8-482—Request Info field format	786
Figure 8-483—Collocated Interference Report frame format	786
Figure 8-484—TFS Request frame format	787

Figure 8-485—TFS Response frame format	787
Figure 8-486—TFS Notify frame format	788
Figure 8-487—WNM-Sleep Mode Request frame format	788
Figure 8-488—WNM-Sleep Mode Response frame format	789
Figure 8-489—WNM-Sleep Mode GTK subelement format	790
Figure 8-490—WNM-Sleep Mode IGTK subelement format	790
Figure 8-491—TIM Broadcast Request frame format	791
Figure 8-492—TIM Broadcast Response frame format	791
Figure 8-494—Channel Usage Request frame format	792
Figure 8-493—QoS Traffic Capability Update frame format	792
Figure 8-495—Channel Usage Response frame format	793
Figure 8-496—DMS Request frame format	793
Figure 8-497—DMS Response frame format	794
Figure 8-498—Timing Measurement Request frame format	794
Figure 8-499—WNM-Notification Request frame format	795
Figure 8-500—WNM-Notification Response frame format	796
Figure 8-501—TIM frame format	797
Figure 8-502—Timing Measurement frame format	798
Figure 8-503—A-MPDU format	812
Figure 8-504—A-MPDU subframe format	812
Figure 8-505—MPDU delimiter	813
Figure 8-506—MPDU delimiter CRC calculation	814
Figure 9-1—MAC architecture	818
Figure 9-2—Fragmentation	823
Figure 9-3—Some IFS relationships	826
Figure 9-4—RTS/CTS/data/ACK and NAV setting	829
Figure 9-5—RTS/CTS with fragmented MSDU	830
Figure 9-6—RTS/CTS with transmitter priority and missed acknowledgment	830
Figure 9-7—Example of dual CTS mechanism (STBC initiator)	833
Figure 9-8—Example of the dual CTS mechanism (non-STBC initiator)	833
Figure 9-9—Individually addressed data/ACK MPDU	834
Figure 9-10—Example of exponential increase of CW	837
Figure 9-11—Basic access method	838
Figure 9-12—Backoff procedure	839
Figure 9-13—Transmission of a multiple-fragment MSDU using SIFS	841
Figure 9-14—DCF timing relationships	843
Figure 9-15—CFP/CP alternation	846
Figure 9-16—Beacon frames and CFPs	846
Figure 9-17—Example of delayed beacon and shortened CFP	847
Figure 9-18—Example of PCF frame transfer	848
Figure 9-19—Reference implementation model	874
Figure 9-20—EDCA mechanism timing relationships	877
Figure 9-21—Example of TXOP truncation	881
Figure 9-22—CAP/CFP/CP periods	882
Figure 9-23—Polled TXOP	885
Figure 9-24—Example MCCAOP reservation with MCCAOP Periodicity equal to 2	894
Figure 9-25—Message sequence chart for Block Ack mechanism: (a) setup, (b) data and acknowledgment transfer and (c) tear down	904
Figure 9-26—A typical Block Ack sequence when immediate policy is used	907
Figure 9-27—A typical BlockAck sequence when delayed policy is used	907
Figure 9-28—HT-immediate Block Ack architecture	910
Figure 9-29—Basic concept of L-SIG TXOP protection	926
Figure 9-30—Example of L-SIG duration setting	927
Figure 9-31—Illustration of PSMP sequence with and without PSMP recovery	936

Figure 9-32—PSMP burst	937
Figure 9-33—PSMP burst showing resource allocation.....	938
Figure 9-34—PSMP burst showing retransmission and resource allocation	939
Figure 9-35—Example PPDU exchange for unidirectional implicit transmit beamforming	948
Figure 9-36—Example PPDU exchange for bidirectional implicit transmit beamforming	949
Figure 9-37—Calibration procedure with sounding PPDU containing an MPDU	951
Figure 9-38—Calibration procedure with NDP.....	952
Figure 9-39—Calibration procedure with NDP when STA B supports transmitting sounding PPDUs for which only one channel dimension can be estimated (i.e., a single column of the MIMO channel matrix).....	953
Figure 9-40—Transmit ASEL	959
Figure 9-41—Receive ASEL.....	961
Figure 9-42—Example addressing for a Mesh Data frame	966
Figure 10-1—Beacon transmission on a busy network	974
Figure 10-2—Beacon transmission in an IBSS	975
Figure 10-3—Probe response	980
Figure 10-4—Infrastructure power management operation (no PCF operating).....	986
Figure 10-5—Power management in an IBSS—basic operation	1007
Figure 10-6—Relationship between state and services	1012
Figure 10-7—TS life cycle	1025
Figure 10-8—TS setup.....	1026
Figure 10-9—Failed TS setup detected within non-AP STA's MLME	1030
Figure 10-10—TS deletion	1031
Figure 10-11—TS timeout.....	1033
Figure 10-12—Block Ack setup	1034
Figure 10-13—Block Ack deletion.....	1035
Figure 10-14—Error recovery by the receiver upon a peer failure	1037
Figure 10-15—The four steps involved in direct-link handshake	1039
Figure 10-16—DLS message flow	1040
Figure 10-17—STA-initiated DLS teardown message flow	1042
Figure 10-18—Example of Measurement Pilot Scheduling.....	1081
Figure 10-19—Dependent STA state machine.....	1088
Figure 10-20—Phased coexistence operation (PCO)	1104
Figure 10-21—Events occurring for a TDLS direct-link channel switch.....	1115
Figure 10-22—STA transmission on three channels, three frames per channel with Normal Report Interval	1128
Figure 10-23—Timing measurement procedure.....	1131
Figure 10-24—GAS message sequence with dot11GASPauseForServerResponse equal to true.....	1146
Figure 10-25—GAS message sequence with GAS fragmentation and dot11GASPauseForServerResponse equal to true.....	1147
Figure 10-26—GAS message sequence with GAS fragmentation and dot11GASPauseForServerResponse equal to false	1148
Figure 10-27—Example TDLS Capability discovery using ANQP.....	1156
Figure 11-1—Construction of expanded WEP MPDU	1167
Figure 11-2—WEP encapsulation block diagram	1169
Figure 11-3—WEP decapsulation block diagram	1170
Figure 11-4—SAE finite state machine.....	1185
Figure 11-5—TKIP encapsulation block diagram.....	1192
Figure 11-6—TKIP decapsulation block diagram.....	1193
Figure 11-7—Construction of expanded TKIP MPDU.....	1194
Figure 11-8—TKIP MIC relation to IEEE 802.11 processing (informative).....	1195
Figure 11-9—TKIP MIC processing format	1196
Figure 11-10—Michael message processing.....	1197
Figure 11-11—Michael block function	1197

Figure 11-12—Authenticator MIC countermeasures	1199
Figure 11-13—Supplicant MIC countermeasures	1200
Figure 11-14—Phase 1 key mixing	1203
Figure 11-15—Phase 2 key mixing	1204
Figure 11-16—Expanded CCMP MPDU	1206
Figure 11-17—CCMP encapsulation block diagram.....	1207
Figure 11-18—AAD construction	1208
Figure 11-19—Nonce construction	1209
Figure 11-20—Nonce Flags subfield.....	1209
Figure 11-21—CCMP decapsulation block diagram.....	1210
Figure 11-22—BIP Encapsulation.....	1212
Figure 11-23—BIP AAD Construction	1213
Figure 11-24—Pairwise key hierarchy	1236
Figure 11-25—Group key hierarchy (informative)	1238
Figure 11-26—PeerKey hierarchy	1239
Figure 11-27—FT key hierarchy at an Authenticator	1241
Figure 11-28—EAPOL-Key frame	1245
Figure 11-29—Key Information bit layout.....	1245
Figure 11-30—KDE format.....	1249
Figure 11-31—GTK KDE format.....	1250
Figure 11-32—MAC address KDE format.....	1250
Figure 11-33—PMKID KDE format.....	1250
Figure 11-34—SMK KDE format	1250
Figure 11-35—Nonce KDE format	1250
Figure 11-36—Lifetime KDE format	1250
Figure 11-37—Error KDE format	1251
Figure 11-38—IGTK KDE format	1251
Figure 11-39—Key ID KDE.....	1252
Figure 11-40—Sample 4-Way Handshake	1262
Figure 11-41—Sample Group Key Handshake	1267
Figure 11-42—PeerKey Handshake Supplicant key management state machine	1285
Figure 11-43—RSNA Supplicant key management state machine.....	1287
Figure 11-44—Authenticator state machines, part 1	1290
Figure 11-45—Authenticator state machines, part 2	1291
Figure 11-46—Authenticator state machines, part 3	1291
Figure 11-47—Authenticator state machines, part 4	1292
Figure 12-1—FT key holder architecture	1309
Figure 12-2—FT initial mobility domain association in an RSN.....	1312
Figure 12-3—FT initial mobility domain association in a non-RSN	1314
Figure 12-4—Over-the-air FT Protocol in an RSN	1315
Figure 12-5—Over-the-DS FT Protocol in an RSN	1317
Figure 12-6—MLME interfaces for over-the-DS FT Protocol messages	1318
Figure 12-7—Over-the-air FT Protocol in a non-RSN.....	1319
Figure 12-8—Over-the-DS FT Protocol in a non-RSN.....	1320
Figure 12-9—Over-the-air FT Resource Request Protocol in an RSN	1321
Figure 12-10—Over-the-air FT Resource Request Protocol in a non-RSN	1322
Figure 12-11—Over-the-DS FT Resource Request Protocol in an RSN	1324
Figure 12-12—Over-the-DS FT Resource Request Protocol in a non-RSN	1324
Figure 12-13—R0KH state machine	1333
Figure 12-14—R1KH state machine, including portions of the SME (part 1).....	1335
Figure 12-15—R1KH state machine, including portions of the SME (part 2).....	1336
Figure 12-16—S0KH state machine.....	1338
Figure 12-17—S1KH state machine, including portions of the SME (part 1)	1340
Figure 12-18—S1KH state machine, including portions of the SME (part 2)	1341

Figure 12-19—Sample message flow for over-the-DS resource request	1345
Figure 12-20—RIC-Request format	1346
Figure 12-21—Resource Request format	1346
Figure 12-22—Resource Request example #1	1347
Figure 12-23—Resource Request example #2	1347
Figure 12-24—RIC-Request example #1	1347
Figure 12-25—RIC-Request example #2	1347
Figure 12-26—RIC-Request example #3	1348
Figure 12-27—RIC-Response format	1348
Figure 12-28—Example QoS RIC-Response	1348
Figure 12-29—Overview of RIC processing at an AP	1350
Figure 13-1—Logical flowchart of protocol interaction in the mesh peering management framework ...	1356
Figure 13-2—Finite state machine of the MPM protocol.....	1365
Figure 13-3—Finite state machine of the AMPE protocol.....	1376
Figure 13-4—Illustration of definitions.....	1383
Figure 13-5—An example of mesh power mode usage	1433
Figure 13-6—Mesh power management operation	1437
Figure 13-7—Mesh peer service period	1439
Figure 14-1—State diagram notation example	1445
Figure 14-2—PLCP frame format	1446
Figure 14-3—Frame synchronous scrambler/descrambler.....	1448
Figure 14-4—PLCP data whitener format.....	1448
Figure 14-5—PLCP top-level state diagram	1449
Figure 14-6—Transmit state machine	1450
Figure 14-7—Data whitener encoding procedure.....	1451
Figure 14-8—Transmit state timing	1453
Figure 14-9—CS/CCA state machine.....	1454
Figure 14-10—CS/CCA state timing.....	1456
Figure 14-11—Receive state machine	1457
Figure 14-12—Data whitener decoding procedure.....	1457
Figure 14-13—Receive timing	1459
Figure 14-14—PLME state machine	1460
Figure 14-15—PMD layer reference model	1461
Figure 14-16—Transmit modulation mask.....	1474
Figure 14-17—4GFSK transmit modulation	1479
Figure 15-1—PPDU frame format	1491
Figure 15-2—Basic pulse shape	1497
Figure 15-3—Emitter radiation pattern Mask 1	1498
Figure 15-4—Emitter radiation pattern Mask 2	1499
Figure 15-5—Mask 2 device orientation drawing.....	1499
Figure 15-6—Transmit spectrum mask	1500
Figure 16-1—PLCP frame format	1505
Figure 16-2—CRC-16 implementation	1507
Figure 16-3—Example CRC calculation.....	1507
Figure 16-4—Data scrambler	1508
Figure 16-5—Data descrambler.....	1508
Figure 16-6—Transmit PLCP.....	1509
Figure 16-7—PLCP transmit state machine	1510
Figure 16-8—Receive PLCP	1510
Figure 16-9—PLCP receive state machine.....	1512
Figure 16-10—PMD layer reference model	1515
Figure 16-11—Transmit spectrum mask	1530
Figure 16-12—Transmit power-on ramp.....	1530
Figure 16-13—Transmit power-down ramp.....	1531

Figure 16-14—Modulation accuracy measurement example	1531
Figure 16-15—Chip clock alignment with baseband eye pattern.....	1532
Figure 17-1—Long PPDU format	1538
Figure 17-2—Short PPDU format	1539
Figure 17-3—CRC-16 implementation	1543
Figure 17-4—Example of CRC calculation.....	1544
Figure 17-5—Data scrambler	1545
Figure 17-6—Data descrambler.....	1546
Figure 17-7—Transmit PLCP	1547
Figure 17-8—Receive PLCP	1549
Figure 17-9—PLCP receive state machine.....	1550
Figure 17-10—Layer reference model.....	1555
Figure 17-11—PBCC modulator scheme	1570
Figure 17-12—PBCC convolutional encoder	1570
Figure 17-13—Cover code mapping	1571
Figure 17-14—China and North American channel selection—nonoverlapping.....	1572
Figure 17-15—China and North American channel selection—overlapping.....	1573
Figure 17-16—European channel selection—nonoverlapping.....	1573
Figure 17-17—European channel selection—overlapping.....	1573
Figure 17-18—Transmit spectrum mask	1576
Figure 17-19—Transmit power-on ramp.....	1577
Figure 17-20—Transmit power-down ramp.....	1577
Figure 17-21—Modulation accuracy measurement example	1578
Figure 17-22—Chip clock alignment with baseband eye pattern.....	1579
Figure 18-1—PPDU frame format	1588
Figure 18-2—Illustration of OFDM frame with cyclic extension and windowing for (a) single reception or (b) two receptions of the FFT period.....	1592
Figure 18-3—Inputs and outputs of inverse Fourier transform	1593
Figure 18-4—OFDM training structure.....	1593
Figure 18-5—SIGNAL field bit assignment	1595
Figure 18-6—SERVICE field bit assignment	1596
Figure 18-7—Data scrambler	1597
Figure 18-8—Convolutional encoder ($k = 7$)	1598
Figure 18-9—Example of the bit-stealing and bit-insertion procedure ($r = 3/4, 2/3$)	1599
Figure 18-10—BPSK, QPSK, 16-QAM, and 64-QAM constellation bit encoding	1601
Figure 18-11—Subcarrier frequency allocation	1604
Figure 18-12—Transmitter and receiver block diagram for the OFDM PHY	1605
Figure 18-13—Transmit spectrum mask for 20 MHz transmission	1608
Figure 18-14—Transmit spectrum mask for 10 MHz transmission	1608
Figure 18-15—Transmit spectrum mask for 5 MHz transmission	1609
Figure 18-16—Constellation error.....	1611
Figure 18-17—Transmit PLCP	1615
Figure 18-18—PLCP transmit state machine	1617
Figure 18-19—Receive PLCP	1618
Figure 18-20—PLCP receive state machine.....	1620
Figure 18-21—PMD layer reference model	1624
Figure 19-1—Long preamble PPDU format for DSSS-OFDM	1639
Figure 19-2—Short preamble PPDU format for DSSS-OFDM	1640
Figure 19-3—22/33 Mb/s ERP-PBCC convolutional encoder.....	1641
Figure 19-4—ERP-PBCC-22 and ERP-PBCC-33 cover code mapping.....	1642
Figure 19-5—33 Mb/s clock switching	1642
Figure 19-6—DSSS-OFDM PSDU	1643
Figure 19-7—Single carrier to multicarrier transition definition	1649
Figure 19-8—Linear distortions common to the single carrier and multicarrier signal segments	1650

Figure 19-9—Spectral shaping achieved by OFDM symbol onset and termination shaping	1651
Figure 19-10—Subcarrier spectrums for rectangular windowing and Clause 18 suggested windowing	1652
Figure 19-11—Foundational brickwall filter.....	1653
Figure 19-12—Continuous time Hanning window	1654
Figure 19-13—Specified pulse	1654
Figure 19-14—Single carrier frequency response	1655
Figure 19-15—Comparing signal power	1655
Figure 19-16—Aligning the 11 MHz and 20 MHz clocks	1656
Figure 19-17—Single carrier to OFDM time alignment	1656
Figure 19-18—Single carrier termination requirement	1657
Figure 19-19—Carrier frequency coherency shall be maintained	1657
Figure 19-20—The phase of the first OFDM segment symbol is established by the last Barker symbol.....	1658
Figure 19-21—BPSK and QPSK signaling with the I/Q channels maximally energized	1658
Figure 20-1—PPDU format.....	1682
Figure 20-2—Transmitter block diagram 1	1685
Figure 20-3—Transmitter block diagram 2	1685
Figure 20-4—Timing boundaries for PPDU fields.....	1691
Figure 20-5—L-SIG structure	1697
Figure 20-6—Format of HT-SIG1 and HT-SIG2.....	1700
Figure 20-7—Data tone constellations in an HT-mixed format PPDU	1701
Figure 20-8—HT-SIG CRC calculation	1702
Figure 20-9—Generation of HT-DLTFs	1705
Figure 20-10—Generation of HT-ELTFs.....	1706
Figure 20-11—Puncturing at rate 5/6	1712
Figure 20-12—Examples of cyclic-permutation matrices with $Z=8$	1713
Figure 20-13—LDPC PPDU encoding padding and puncturing of a single codeword	1716
Figure 20-14—Beamforming MIMO channel model (3x2 example)	1728
Figure 20-15—Baseband-to-baseband channel	1729
Figure 20-16—Example of an NDP used for sounding.....	1735
Figure 20-17—Transmit spectral mask for 20 MHz transmission in the 2.4 GHz band	1739
Figure 20-18—Transmit spectral mask for a 40 MHz channel in the 2.4 GHz band	1740
Figure 20-19—Transmit spectral mask for 20 MHz transmission in the 5 GHz band	1740
Figure 20-20—Transmit spectral mask for a 40 MHz channel in the 5 GHz band	1740
Figure 20-21—Packet alignment example (HT-greenfield format packet with short GI).....	1742
Figure 20-22—PLCP transmit procedure (HT-mixed format PPDU).....	1748
Figure 20-23—PLCP transmit procedure (HT-greenfield format PPDU).....	1749
Figure 20-24—PLCP transmit state machine	1751
Figure 20-25—PLCP receive procedure for HT-mixed format PLCP format	1752
Figure 20-26—PLCP receive procedure for HT-greenfield format PLCP	1753
Figure 20-27—PLCP receive state machine.....	1754
Figure 20-28—PMD layer reference model	1762
Figure D-1—Transmit spectrum mask and application.....	2291
Figure H-1—Ethertype 89-0d frame body.....	2320
Figure M-1—Randomness generating circuit.....	2618
Figure N-1—Schedule for stream from STA i	2633
Figure N-2—Schedule for streams from STAs i to k	2634
Figure N-3—Reallocation of TXOPs when a stream is dropped	2634
Figure O-1—Virtual bitmap example #1	2636
Figure O-2—Virtual bitmap example #2.....	2637
Figure O-3—Virtual bitmap example #3.....	2637
Figure O-4—Virtual Bitmap Example #4, Method A and Method B	2637
Figure O-5—Virtual Bitmap Example #5, Method A or Method B.....	2638

Figure O-6—Virtual Bitmap Example #5, Method A	2638
Figure O-7—Virtual Example #5, Method B	2639
Figure Q-1—Very high level UML use case diagram for the AP	2650
Figure Q-2—Very high level UML use case diagram for the WLAN system	2650
Figure Q-3—High-level UML use case diagram for the WLAN system	2651
Figure Q-4—High-level UML entity diagram for the WLAN system	2652
Figure Q-5—AP UML composition diagram (alternate syntax)	2653
Figure Q-6—High-level UML use case diagram for the AP	2654
Figure R-1—Location of the DS SAP	2656
Figure S-1—A-MPDU parsing	2661
Figure S-2—Example of RD exchange sequence showing response burst	2662
Figure S-3—Determination of NDP source and destination for unidirectional NDP sequences	2663
Figure S-4—Determination of NDP source and destination for bidirectional NDP sequence	2664
Figure V-1—Interworking IEEE 802.11 infrastructure supporting multiple SSPNs	2677
Figure V-2—Basic architecture of the interworking service	2680
Figure W-1—Format of a CCMP-encrypted Mesh Data frame containing a single MSDU	2688

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**IEEE Standard for Information technology—
 Telecommunications and information exchange between systems
 Local and metropolitan area networks—
 Specific requirements**

Part 11: Wireless LAN Medium Access Control (MAC) and Physical Layer (PHY) Specifications

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1. Overview

1.1 Scope

The scope of this standard is to define one medium access control (MAC) and several physical layer (PHY) specifications for wireless connectivity for fixed, portable, and moving stations (STAs) within a local area.

1.2 Purpose

The purpose of this standard is to provide wireless connectivity for fixed, portable, and moving stations within a local area. This standard also offers regulatory bodies a means of standardizing access to one or more frequency bands for the purpose of local area communication.

1.3 Supplementary information on purpose

Specifically, this standard

- Describes the functions and services required by an IEEE 802.11™-compliant device to operate within independent and infrastructure networks as well as the aspects of STA mobility (transition) within those networks.
- Describes the functions and services that allow an IEEE 802.11-compliant device to communicate directly with another such device outside of an independent or infrastructure network.

- Defines the MAC procedures to support the MAC service data unit (MSDU) delivery services.
- Defines several PHY signaling techniques and interface functions that are controlled by the IEEE 802.11 MAC.
- Permits the operation of an IEEE 802.11-conformant device within a wireless local area network (WLAN) that may coexist with multiple overlapping IEEE 802.11 WLANs.
- Describes the requirements and procedures to provide data confidentiality of user information and MAC management information being transferred over the wireless medium (WM) and authentication of IEEE 802.11-conformant devices.
- Defines mechanisms for dynamic frequency selection (DFS) and transmit power control (TPC) that may be used to satisfy regulatory requirements for operation in any band.
- Defines the MAC procedures to support local area network (LAN) applications with quality-of-service (QoS) requirements, including the transport of voice, audio, and video.
- Defines mechanisms and services for wireless network management of STAs that include BSS transition management, channel usage and coexistence, collocated interference reporting, diagnostic, multicast diagnostic and event reporting, flexible multicast, efficient beacon mechanisms, proxy ARP advertisement, location, timing measurement, directed multicast, extended sleep modes, traffic filtering, and management notification.
- Defines functions and procedures aiding network discovery and selection by STAs, information transfer from external networks using QoS mapping, and a general mechanism for the provision of emergency services.
- Defines the MAC procedures that are necessary for wireless multi-hop communication to support wireless LAN mesh topologies.

1.4 Word Usage

In this document, the word *shall* is used to indicate a mandatory requirement. The word *should* is used to indicate a recommendation. The word *may* is used to indicate a permissible action. The word *can* is used for statements of possibility and capability.

2. Normative references

The following referenced documents are indispensable for the application of this standard (i.e., they must be understood and used; therefore, each referenced document is cited in the text and its relationship to this document is explained). For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments or corrigenda) applies.

3GPP TS 24.234, 3GPP System to Wireless Local Area Network (WLAN) interworking; WLAN User Equipment (WLAN UE) to network protocols; Stage 3.¹

ETSI EN 301 893, Broadband Radio Access Networks (BRAN); 5 GHz high performance RLAN; Part 2: Harmonized EN covering essential requirements of article 3.2 of the R&TTE Directive.²

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