

Signals and Systems

Market Intelligence and Consultancy Solutions



The Public Safety LTE & Mobile Broadband Market: 2012 - 2017

Revision Date: 14 November 2012

Table of Contents

List of Figures	9
1 Chapter 1: Introduction	11
1.1 Executive Summary	11
1.2 Topics Covered	14
1.3 Key Questions Answered.....	15
1.4 Methodology.....	16
1.5 Target Audience.....	16
1.6 Companies Mentioned	17
2 Chapter 2: An Overview of the Public Safety Mobile Broadband Market 23	
2.1 Narrowband Land Mobile Radio (LMR) Systems in Public Safety.....	23
2.1.1 LMR Market Size.....	24
2.1.2 The Perceived Role of Mobile Broadband in Public Safety Scenarios	25
2.1.3 The Limitations of LMR Data Capabilities	25
2.2 Mobile Broadband for Public Safety.....	26
2.2.1 Partnerships with Commercial Carriers	26
2.2.2 Private LTE and WiMAX Deployments	26
2.3 How Big is the Mobile Broadband Market?.....	26
2.3.1 Will the Public Safety Segment Witness the Same Level of Growth as the Consumer Segment?	27
2.3.2 What are the Growth Drivers?.....	27
2.3.3 LMR Systems will Continue to Support Mission-Critical Voice	29
2.4 Why use Commercial Mobile Broadband Technology for Public Safety	30
2.5 Why LTE?.....	30
2.5.1 Performance Metrics	30
2.5.2 Coexistence, Interoperability and Spectrum Flexibility	30
2.5.3 A Thriving Ecosystem	31
2.5.4 OPEX Reduction	31
2.6 Public Safety LTE Technology & Architecture	33
2.6.1 LTE Radio Access Network (E-UTRAN).....	34
2.6.2 TDD vs. FDD	35
2.6.3 User Equipment (UE) Categories.....	36
2.6.3.1 USB Data Cards.....	36
2.6.3.2 Vehicular Modems.....	36
2.6.3.3 Smartphones	37
2.6.3.4 Tablets.....	37
2.6.4 Public Safety LTE EPC	38
2.6.4.1 Serving Gateway (SGW)	38
2.6.4.2 Packet Data Network Gateway (PGW).....	38
2.6.4.3 Mobility Management Entity (MME).....	38

The Public Safety LTE & Mobile Broadband Market: 2012 - 2016

© 2012 Signals and Systems Telecom

2.6.4.4	Home Subscriber Server (HSS).....	39
2.6.4.5	Policy Charging and Rules Function (PCRF).....	39
2.6.5	LMR Network Integration and Inter-Working.....	40
2.6.6	The Evolution to LTE-Advanced and its Implications for Public Safety	41
2.6.7	Support for Roaming in Public Safety LTE	42
2.6.8	Inter-System Roaming	42
2.6.9	Intra-System Roaming to Commercial Carriers	42
2.7	Public Safety LTE Deployment Models.....	43
2.7.1	Private Public Safety LTE Network Deployments	43
2.7.2	Shared Commercial Public Safety LTE.....	43
2.7.3	Hosted Core Public Safety LTE Networks	43
2.8	Funding Models for Private Public Safety LTE Network Deployment.....	44
2.8.1	Built, Owned and Operated by Integrator/Vendor	44
2.8.2	Owned and Operated by the State Government.....	44
2.8.3	Local Agency Hosted Core	44
2.8.4	Multiple Networks	45
2.9	The Public Safety LTE Business Case	46
2.9.1	Higher throughput and Low Latency	46
2.9.2	Economic Feasibility	46
2.9.3	Bandwidth Flexibility.....	46
2.9.4	Spectral Efficiency.....	46
2.9.5	Regional Interoperability	47
2.9.6	Lack of Competition from Other Standards.....	47
2.9.7	Endorsement from the Public Safety Community	48
2.9.8	Commitments by Infrastructure and Device vendors	48
2.9.9	Quality of Service (QoS) & Priority Provisioning	49
2.10	Challenges to the Public Safety LTE Ecosystem.....	50
2.10.1	Spectrum Allocation	50
2.10.2	Interworking with LMR Networks.....	51
2.10.3	Budgetary Issues.....	51
2.10.4	Security Issues	52
2.10.5	Support for Mission-Critical Voice and Direct Mode-Operation	52
2.10.6	Smaller Coverage Footprint to Comparison to LMR Systems	53
2.10.7	Support for Group Communication (Multi-Casting) in Release 8.....	54
2.10.8	Lack of Specifications for Battery Life in Public Safety Scenarios.....	54
2.10.9	User Profiles to fit Public Safety Requirements	55

The Public Safety LTE & Mobile Broadband Market: 2012 - 2016

© 2012 Signals and Systems Telecom

3 Chapter 3: Public Safety LTE and Mobile Broadband Industry Roadmap 56

3.1	Industry Roadmap.....	56
3.2	2012 – 2014: The Disparate Networks Era.....	57
3.3	2014 – 2015: The Hybrid Networks Era.....	57
3.4	2015 – 2017: The Converged Networks Era.....	57
3.5	Public Safety LTE Deployment & Trial Case Studies	58
3.5.1	Harris County	58
3.5.2	Qatar MOI.....	59
3.5.3	Oman Royal Office	59
3.5.4	Turkish National Police Force	59
3.5.5	Hong Kong Police Force Trial	59
3.5.6	China TD-LTE Public Safety Trial	60

4 Chapter 4: Public Safety LTE and Mobile Broadband Applications Ecosystem 61

4.1	Mobile Video.....	61
4.2	Mobile Broadband and Seamless Mobile VPN Access	62
4.3	GIS (Geographical Information Systems) and Mapping	63
4.4	Automatic Vehicle Location Solutions (AVLS)	63
4.5	Computer Aided Dispatching (CAD)	64
4.6	Remote Data Access	64
4.7	Telemetry and Remote Diagnostics.....	64
4.8	Bulk Multimedia/Data Transfers.....	64
4.9	Situational Awareness Applications	65
4.10	PTT over LTE	65
4.11	The Present State of the Market: What's on offer.....	66
4.12	The Numbers: How Big is the Public Safety LTE Applications Ecosystem?	67

5 Chapter 5: Public Safety LTE & Mobile Broadband Vendor Assessment 68

5.1	Alcatel-Lucent.....	68
5.1.1	Products and Solutions	68
5.1.2	Strategy	69
5.1.3	Strengths	69
5.1.4	Challenges	69
5.2	Amdocs (Bridgewater).....	70

The Public Safety LTE & Mobile Broadband Market: 2012 - 2016

© 2012 Signals and Systems Telecom

5.2.1	Products and Solutions	70
5.2.2	Strategy	70
5.2.3	Strengths	70
5.2.4	Challenges	70
5.3	Cassidian.....	71
5.3.1	Products and Solutions	71
5.3.2	Strategy	71
5.3.3	Strengths	71
5.3.4	Challenges	71
5.4	Cisco	72
5.4.1	Products and Solutions	72
5.4.2	Strategy	72
5.4.3	Strengths	72
5.4.4	Challenges	73
5.5	Ericsson.....	74
5.5.1	Products and Solutions	74
5.5.2	Strategy	74
5.5.3	Strengths	74
5.5.4	Challenges	75
5.6	Etherstack	76
5.6.1	Products and Solutions	76
5.6.2	Strategy	76
5.6.3	Strengths	76
5.6.4	Challenges	76
5.7	Motorola Solutions	77
5.7.1	Products and Solutions	77
5.7.2	Strategy	77
5.7.3	Strengths	77
5.7.4	Challenges	78
5.8	Raytheon.....	79
5.8.1	Products and Solutions	79
5.8.2	Strategy	79
5.8.3	Strengths	79
5.8.4	Challenges	80
5.9	IP Wireless (General Dynamics).....	81
5.9.1	Products and Solutions	81
5.9.2	Strategy	81

The Public Safety LTE & Mobile Broadband Market:

2012 - 2016

© 2012 Signals and Systems Telecom

5.9.3	Strengths	81
5.9.4	Challenges	81
5.10	Harris	82
5.10.1	Products and Solutions	82
5.10.2	Strategy	82
5.10.3	Strengths	82
5.10.4	Challenges	83
5.11	Huawei	84
5.11.1	Products and Solutions	84
5.11.2	Strategy	84
5.11.3	Strengths	84
5.11.4	Challenges	84
5.12	Hytera	85
5.12.1	Products and Solutions	85
5.12.2	Strategy	85
5.12.3	Strengths	85
5.12.4	Challenges	85
5.13	Tait	86
5.13.1	Products and Solutions	86
5.13.2	Strategy	86
5.13.3	Strengths	86
5.13.4	Challenges	86
5.14	Nokia Siemens Networks	87
5.14.1	Products and Solutions	87
5.14.2	Strategy	87
5.14.3	Strengths	87
5.14.4	Challenges	87
5.15	Reality Mobile	88
5.15.1	Products and Solutions	88
5.15.2	Strategy	88
5.15.3	Strengths	88
5.15.4	Challenges	88
5.16	Thales	89
5.16.1	Products and Solutions	89
5.16.2	Strategy	89
5.16.3	Strengths	89
5.16.4	Challenges	89

The Public Safety LTE & Mobile Broadband Market: 2012 - 2016

© 2012 Signals and Systems Telecom

5.17	Twisted Pair Solutions.....	90
5.17.1	Products and Solutions	90
5.17.2	Strategy	90
5.17.3	Strengths	90
5.17.4	Challenges	90
6	Chapter 6: Public Safety LTE Spectrum Allocation Strategies Worldwide	91
6.1	North America	91
6.2	Latin & Central America	92
6.3	Europe.....	92
6.4	Middle East & Africa.....	93
6.5	Asia Pacific.....	94
6.6	The Prospects of Spectrum Harmonisation	95
7	Chapter 7: Market Analysis and Forecasts	96
7.1	The Global Public Safety Mobile Broadband Market	96
7.1.1	First Responder Data Subscriptions over Public (Commercial) Cellular Networks	96
7.1.2	First Responder Data Subscriptions Over LMR Networks.....	97
7.1.3	First Responder Data Subscriptions over Private Mobile Broadband.....	98
7.1.3.1	The Unreliability of Commercial Cellular Mobile Broadband Networks.....	98
7.1.3.2	Private Public Safety LTE and WiMAX Subscriptions Compared.....	98
7.1.4	Private Public Safety LTE Networks	100
7.1.4.1	Subscriptions over Private Public Safety LTE Networks.....	100
7.1.4.2	Device Shipments over Private Public Safety LTE Networks	102
7.1.4.3	Private Public Safety LTE Network Service Revenue.....	104
7.1.5	Public Safety LTE over Public (Commercial) LTE Networks	105
7.1.5.1	Public Safety Subscriptions over Commercial LTE Networks.....	105
7.1.5.2	Public Safety Device Shipments over Commercial LTE Networks	107
7.1.5.3	Public Safety Service Revenue over Commercial LTE Networks	109
7.1.6	Private vs. Commercial Public Safety LTE Compared.....	110
7.1.6.1	Private and Commercial Public Safety LTE Subscriptions Compared.....	110
7.1.6.2	Private and Commercial Public Safety LTE Device Shipments Compared	111
7.1.6.3	Private and Commercial Public Safety LTE Service Revenues Compared	112
7.1.7	Public Safety LTE Device Shipments by Form Factor	113
7.1.8	Private Public Safety LTE eNodeB Shipments	114
7.1.8.1	Commercial and Private Public Safety LTE eNodeB Shipments Compared	114
7.1.8.2	Regional Assessment of Private Public Safety LTE eNodeB Shipments.....	116
7.1.9	Private Public Safety LTE eNodeB Installed Base.....	118

The Public Safety LTE & Mobile Broadband Market: 2012 - 2016

© 2012 Signals and Systems Telecom

7.2	Regional Market Assessment	119
7.2.1	Asia Pacific.....	119
7.2.1.1	Private Public Safety LTE Subscriptions, Device Shipments & Service Revenues	119
7.2.1.2	Commercial Public Safety LTE Subscriptions, Device Shipments & Service Revenues	121
7.2.1.3	Private Public Safety LTE eNodeB Shipments, Revenue & Installed Base	123
7.2.2	North America	124
7.2.2.1	Private Public Safety LTE Subscriptions, Device Shipments & Service Revenues	124
7.2.2.2	Commercial Public Safety LTE Subscriptions, Device Shipments & Service Revenues	126
7.2.2.3	Private Public Safety LTE eNodeB Shipments, Revenue & Installed Base	128
7.2.3	Latin & Central America	129
7.2.3.1	Private Public Safety LTE Subscriptions, Device Shipments & Service Revenues	129
7.2.3.2	Commercial Public Safety LTE Subscriptions, Device Shipments & Service Revenues	131
7.2.3.3	Private Public Safety LTE eNodeB Shipments, Revenue & Installed Base	133
7.2.4	Middle East & Africa	134
7.2.4.1	Private Public Safety LTE Subscriptions, Device Shipments & Service Revenues	134
7.2.4.2	Commercial Public Safety LTE Subscriptions, Device Shipments & Service Revenues	136
7.2.4.3	Private Public Safety LTE eNodeB Shipments, Revenue & Installed Base	138
7.2.5	Eastern Europe	139
7.2.5.1	Private Public Safety LTE Subscriptions, Device Shipments & Service Revenues	139
7.2.5.2	Commercial Public Safety LTE Subscriptions, Device Shipments & Service Revenues	141
7.2.5.3	Private Public Safety LTE eNodeB Shipments, Revenue & Installed Base	143
7.2.6	Western Europe	144
7.2.6.1	Private Public Safety LTE Subscriptions, Device Shipments & Service Revenues	144
7.2.6.2	Commercial Public Safety LTE Subscriptions, Device Shipments & Service Revenues	146
7.2.6.3	Private Public Safety LTE eNodeB Shipments, Revenue & Installed Base	148

The Public Safety LTE & Mobile Broadband Market:

2012 - 2016

© 2012 Signals and Systems Telecom

List of Figures

Figure 1: Global Land Mobile Radio (LMR) Subscriptions by Technology: 2011 – 2017 (Millions)	24
Figure 2: Global Mobile Broadband Subscriptions by Technology: 2011 – 2017 (Millions)	27
Figure 3: Purpose of Using Mobile Broadband for Public Safety Applications (Survey Results - 2011 & 2012)	28
Figure 4: Global LTE Subscriptions: 2011 – 2017 (Millions)	32
Figure 5: Public Safety LTE Network Architecture	33
Figure 6: Global Voice over LTE (VoLTE) Subscriptions: 2011 – 2017 (Millions)	40
Figure 7: Public Safety LTE Industry Roadmap	56
Figure 8: Global Mobile Video Surveillance Market: 2011 – 2017 (\$ Millions)	61
Figure 9: PTT over LTE Application	66
Figure 10: The Public Safety LTE/Broadband Applications Market: 2011 – 2017 (\$ Millions)	67
Figure 11: LTE and LMR PTT Voice Interoperability	90
Figure 12: Global First Responder Data Subscriptions over Public Cellular Networks by Technology (Millions) 2011 - 2017	97
Figure 13: Global First Responder Data Subscriptions over LMR Networks by Technology (Thousands) 2011 - 2017	97
Figure 14: Global First Responder Data Subscriptions over Private Mobile Broadband Networks by Technology (Thousands): 2011 - 2017	98
Figure 15: Global First Responder Subscriptions over Private Public Safety LTE Networks (Thousands): 2011 - 2017	100
Figure 16: First Responder Subscriptions over Private Public Safety LTE Networks by Region (Thousands): 2011 - 2017	101
Figure 17: Global First Responder Data Device Shipments over Private Public Safety LTE Networks (Thousands): 2011 - 2017	102
Figure 18: Global First Responder Data Device Shipment Revenue over Private Public Safety LTE Networks (\$ Million): 2011 - 2017	102
Figure 19: First Responder Data Device Shipments over Private Public Safety LTE Networks by Region (Thousands): 2011 - 2017	103
Figure 20: First Responder Data Device Shipment Revenue over Private Public Safety LTE Networks by Region (\$ Million): 2011 - 2017	103
Figure 21: Global Service Revenue over Private Public Safety LTE Networks (\$ Million): 2011 - 2017	104
Figure 22: Service Revenue over Private Public Safety LTE Networks by Region (\$ Million): 2011 - 2017	104
Figure 23: Global First Responder Subscriptions over Commercial LTE Networks (Thousands): 2011 - 2017	105
Figure 24: Global First Responder Subscriptions over Commercial LTE Networks by Region (Thousands): 2011 - 2017	106
Figure 25: Global First Responder Data Device Shipments over Commercial LTE Networks (Thousands): 2011 - 2017	107
Figure 26: Global First Responder Data Device Shipment Revenue over Commercial LTE Networks (\$ Million): 2011 - 2017	107
Figure 27: First Responder Data Device Shipments over Commercial LTE Networks by Region (Thousands): 2011 - 2017	108
Figure 28: First Responder Data Device Shipment Revenue over Commercial LTE Networks by Region (\$ Million): 2011 - 2017	108
Figure 29: Global Public Safety Service Revenue over Commercial LTE Networks (\$ Million): 2011 - 2017	109
Figure 30: Public Safety Service Revenue over Commercial LTE Networks by Region (\$ Million): 2011 - 2017	109
Figure 31: Private vs. Commercial Public Safety LTE Subscriptions Compared (Thousands): 2011 - 2017	110
Figure 32: Private vs. Commercial Public Safety LTE Device Shipments Compared (Thousands): 2011 - 2017	111
Figure 33: Private vs. Commercial Public Safety LTE Device Shipments Revenues Compared (\$ Million): 2011 - 2017	111
Figure 34: Private vs. Commercial Public Safety LTE Service Revenues Compared (\$ Million): 2011 - 2017	112
Figure 35: Public Safety LTE Device Shipments by Category (Thousands): 2011 - 2017	113
Figure 36: Global Private (Public Safety) and Commercial LTE eNodeB Shipments Compared: 2011 - 2017	114
Figure 37: Global Private (Public Safety) and Commercial LTE eNodeB Shipment Revenues Compared (\$ Million): 2011 - 2017	115
Figure 38: Private (Public Safety) LTE eNodeB Shipments by Region: 2011 - 2017	116
Figure 39: Private (Public Safety) LTE eNodeB Shipment Revenue by Region (\$ Million): 2011 - 2017	117
Figure 40: Private (Public Safety) LTE eNodeB Installed Base by Region: 2011 - 2017	118
Figure 41: First Responder Subscriptions over Private Public Safety LTE Networks in Asia Pacific (Thousands): 2011 – 2017	119
Figure 42: First Responder Data Device Shipments over Private Public Safety LTE Networks in Asia Pacific (Thousands): 2011 - 2017	119
Figure 43: First Responder Data Device Shipment Revenue over Private LTE Public Safety LTE Networks in Asia Pacific (\$ Million): 2011 - 2017 ...	120
Figure 44: Service Revenue over Private Public Safety LTE Networks in Asia Pacific (\$ Million): 2011 – 2017	120
Figure 45: First Responder Subscriptions over Commercial LTE Networks in Asia Pacific (Thousands): 2011 - 2017	121
Figure 46: First Responder Data Device Shipments over Commercial LTE Networks in Asia Pacific (Thousands): 2011 – 2017	121
Figure 47: First Responder Data Device Shipment Revenue over Commercial LTE Networks in Asia Pacific (\$ Million): 2011 - 2017	122
Figure 48: Public Safety Service Revenue over Commercial LTE Networks in Asia Pacific (\$ Million): 2011 - 2017	122
Figure 49: Private (Public Safety) LTE eNodeB Shipments in Asia Pacific: 2011 - 2017	123
Figure 50: Private (Public Safety) LTE eNodeB Shipment Revenue in Asia Pacific (\$ Million): 2011 - 2017	123
Figure 51: Private (Public Safety) LTE eNodeB Installed Base in Asia Pacific: 2011 - 2017	123
Figure 52: First Responder Subscriptions over Private Public Safety LTE Networks in North America (Thousands): 2011 - 2017	124
Figure 53: First Responder Data Device Shipments over Private Public Safety LTE Networks in North America (Thousands): 2011 – 2017	124
Figure 54: First Responder Data Device Shipment Revenue over Private LTE Public Safety LTE Networks in North America (\$ Million): 2011 – 2017	125

The Public Safety LTE & Mobile Broadband Market:

2012 - 2016

© 2012 Signals and Systems Telecom

Figure 55: Service Revenue over Private Public Safety LTE Networks in North America (\$ Million): 2011 – 2017	125
Figure 56: First Responder Subscriptions over Commercial LTE Networks in North America (Thousands): 2011 - 2017	126
Figure 57: First Responder Data Device Shipments over Commercial LTE Networks in North America (Thousands): 2011 – 2017	126
Figure 58: First Responder Data Device Shipment Revenue over Commercial LTE Networks in North America (\$ Million): 2011 - 2017	127
Figure 59: Public Safety Service Revenue over Commercial LTE Networks in North America (\$ Million): 2011 – 2017	127
Figure 60: Private (Public Safety) LTE eNodeB Shipments in North America: 2011 – 2017	128
Figure 61: Private (Public Safety) LTE eNodeB Shipment Revenue in North America (\$ Million): 2011 - 2017	128
Figure 62: Private (Public Safety) LTE eNodeB Installed Base in North America: 2011 – 2017	128
Figure 63: First Responder Subscriptions over Private Public Safety LTE Networks in Latin & Central America (Thousands): 2011 - 2017	129
Figure 64: First Responder Data Device Shipments over Private Public Safety LTE Networks in Latin & Central America (Thousands): 2011 – 2017	129
Figure 65: First Responder Data Device Shipment Revenue over Private LTE Public Safety LTE Networks in Latin & Central America (\$ Million): 2011 – 2017	130
Figure 66: Service Revenue over Private Public Safety LTE Networks in Latin & Central America (\$ Million): 2011 – 2017	130
Figure 67: First Responder Subscriptions over Commercial LTE Networks in Latin & Central America (Thousands): 2011 - 2017	131
Figure 68: First Responder Data Device Shipments over Commercial LTE Networks in Latin & Central America (Thousands): 2011 – 2017	131
Figure 69: First Responder Data Device Shipment Revenue over Commercial LTE Networks in Latin & Central America (\$ Million): 2011 - 2017	132
Figure 70: Public Safety Service Revenue over Commercial LTE Networks in Latin & Central America (\$ Million): 2011 – 2017	132
Figure 71: Private (Public Safety) LTE eNodeB Shipments in Latin & Central America: 2011 – 2017	133
Figure 72: Private (Public Safety) LTE eNodeB Shipment Revenue in Latin & Central America (\$ Million): 2011 - 2017	133
Figure 73: Private (Public Safety) LTE eNodeB Installed Base in Latin & Central America: 2011 - 2017	133
Figure 74: First Responder Subscriptions over Private Public Safety LTE Networks in Middle East & Africa (Thousands): 2011 - 2017	134
Figure 75: First Responder Data Device Shipments over Private Public Safety LTE Networks in Middle East & Africa (Thousands): 2011 – 2017	134
Figure 76: First Responder Data Device Shipment Revenue over Private LTE Public Safety LTE Networks in Middle East & Africa (\$ Million): 2011 – 2017	135
Figure 77: Service Revenue over Private Public Safety LTE Networks in Middle East & Africa (\$ Million): 2011 – 2017	135
Figure 78: First Responder Subscriptions over Commercial LTE Networks in Middle East & Africa (Thousands): 2011 - 2017	136
Figure 79: First Responder Data Device Shipments over Commercial LTE Networks in Middle East & Africa (Thousands): 2011 – 2017	136
Figure 80: First Responder Data Device Shipment Revenue over Commercial LTE Networks in Middle East & Africa (\$ Million): 2011 - 2017	137
Figure 81: Public Safety Service Revenue over Commercial LTE Networks in Middle East & Africa (\$ Million): 2011 – 2017	137
Figure 82: Private (Public Safety) LTE eNodeB Shipments in Middle East & Africa: 2011 – 2017	138
Figure 83: Private (Public Safety) LTE eNodeB Shipment Revenue in Middle East & Africa (\$ Million): 2011 - 2017	138
Figure 84: Private (Public Safety) LTE eNodeB Installed Base in Middle East & Africa: 2011 - 2017	138
Figure 85: First Responder Subscriptions over Private Public Safety LTE Networks in Eastern Europe (Thousands): 2011 - 2017	139
Figure 86: First Responder Data Device Shipments over Private Public Safety LTE Networks in Eastern Europe (Thousands): 2011 – 2017	139
Figure 87: First Responder Data Device Shipment Revenue over Private LTE Public Safety LTE Networks in Eastern Europe (\$ Million): 2011 – 2017	140
Figure 88: Service Revenue over Private Public Safety LTE Networks in Eastern Europe (\$ Million): 2011 – 2017	140
Figure 89: First Responder Subscriptions over Commercial LTE Networks in Eastern Europe (Thousands): 2011 - 2017	141
Figure 90: First Responder Data Device Shipments over Commercial LTE Networks in Eastern Europe (Thousands): 2011 – 2017	141
Figure 91: First Responder Data Device Shipment Revenue over Commercial LTE Networks in Eastern Europe (\$ Million): 2011 - 2017	142
Figure 92: Public Safety Service Revenue over Commercial LTE Networks in Eastern Europe (\$ Million): 2011 – 2017	142
Figure 93: Private (Public Safety) LTE eNodeB Shipments in Eastern Europe: 2011 – 2017	143
Figure 94: Private (Public Safety) LTE eNodeB Shipment Revenue in Eastern Europe (\$ Million): 2011 - 2017	143
Figure 95: Private (Public Safety) LTE eNodeB Installed Base in Eastern Europe: 2011 - 2017	143
Figure 96: First Responder Subscriptions over Private Public Safety LTE Networks in Western Europe (Thousands): 2011 - 2017	144
Figure 97: First Responder Data Device Shipments over Private Public Safety LTE Networks in Western Europe (Thousands): 2011 – 2017	144
Figure 98: First Responder Data Device Shipment Revenue over Private LTE Public Safety LTE Networks in Western Europe (\$ Million): 2011 – 2017	145
Figure 99: Service Revenue over Private Public Safety LTE Networks in Western Europe (\$ Million): 2011 – 2017	145
Figure 100: First Responder Subscriptions over Commercial LTE Networks in Western Europe (Thousands): 2011 - 2017	146
Figure 101: First Responder Data Device Shipments over Commercial LTE Networks in Western Europe (Thousands): 2011 – 2017	146
Figure 102: First Responder Data Device Shipment Revenue over Commercial LTE Networks in Western Europe (\$ Million): 2011 - 2017	147
Figure 103: Public Safety Service Revenue over Commercial LTE Networks in Western Europe (\$ Million): 2011 – 2017	147
Figure 104: Private (Public Safety) LTE eNodeB Shipments in Western Europe: 2011 – 2017	148
Figure 105: Private (Public Safety) LTE eNodeB Shipment Revenue in Western Europe (\$ Million): 2011 - 2017	148
Figure 106: Private (Public Safety) LTE eNodeB Installed Base in Western Europe: 2011 - 2017	148

The Public Safety LTE & Mobile Broadband Market: 2012 - 2016

© 2012 Signals and Systems Telecom

1 Chapter 1: Introduction

1.1 Executive Summary

For more than 60 years first responders have relied on narrowband Land Mobile Radio (LMR) systems for mission critical voice communications. While many of these dedicated LMR systems generally support basic data applications such as short data messaging, first responders are often compelled to rely on commercial (cellular) mobile broadband networks to support data intensive applications such as bulk multimedia transfers in emergency situations.

However, commercial networks do not meet the availability and resilience requirements for public safety operations, where a single glitch in communications can result in a loss of human lives. Thus public safety agencies worldwide are echoing demands for the deployment of cost effective mobile broadband networks dedicated for public safety usage.

While a number of public safety agencies deployed a combination of private WiMAX and proprietary technology based mobile broadband networks between 2009 and 2011 to support data intensive applications such as video surveillance, it soon became apparent that a solution that is interoperable nationwide and across borders will be necessary enable cooperation among different public safety entities, and to achieve economies of scale.

Considering its thriving ecosystem, spectrum flexibility and performance metrics, public safety organizations worldwide recognize LTE as the de-facto standard for mobile broadband.

The Public Safety LTE & Mobile Broadband Market: 2012 - 2016

© 2012 Signals and Systems Telecom

With spectrum already allocated, public safety agencies in the Middle East and the U.S have already begun to operate private LTE networks.

Signals and Systems Telecom estimates that the installed base of private public safety LTE base stations (eNode Bs) will reach nearly 80,000 globally by the end of 2017, following a CAGR of nearly 80% between 2012 and 2017, and serve more than 1 Million private public safety LTE subscribers.

However, it is important to note that, LTE will be one of the most complex technical changes the public safety communications industry will ever witness which will bring a new set of challenges in its own right. Furthermore, spectrum, regulatory and budgetary issues in certain regions such as Europe will delay large scale deployments until the end of 2014.

Nonetheless, service prioritization partnerships with commercial LTE network carriers will create an ecosystem for operating public safety devices over commercial LTE networks during this transition period. We estimate that public safety LTE device shipments over both private and commercial networks will account for nearly \$1 Billion in annual revenue by the end of 2017.

This report presents an in-depth assessment of the global public safety LTE market, besides considering the wider LMR and mobile broadband industries. In addition to covering the business case, the challenges, spectrum allocation strategies, the industry's roadmap, deployment case studies, vendor strategies, and the application ecosystem for public safety LTE, the report also presents comprehensive forecasts for mobile broadband, LMR and public safety LTE subscriptions from 2011 till 2017.

The Public Safety LTE & Mobile Broadband Market: 2012 - 2016

© 2012 Signals and Systems Telecom

Also covered are public safety LTE service revenues as well as device and infrastructure (eNodeB base stations) shipments and associated revenues.

The report comes with an associated XLS datasheet covering quantitative data from all figures presented within the report, as well as a list and associated details of 26 global private public safety LTE network deployments (as of November 2012).

The Public Safety LTE & Mobile Broadband Market: 2012 - 2016

© 2012 Signals and Systems Telecom

1.2 Topics Covered

The report covers the following topics

- Business case for public safety LTE and mobile broadband services
- Key benefits of public safety LTE and mobile broadband
- Challenges to public safety LTE adoption
- Agency, carrier and vendor commitments to public safety LTE
- List of public safety LTE commitments worldwide
- Public safety LTE deployment case studies
- The industry roadmap for the public safety mobile broadband in general and the LTE market in particular
- Public safety LTE deployment and funding models
- Spectrum allocation for public safety LTE
- Public safety LTE applications ecosystem
- Public safety LTE vendor assessment and strategies
- Subscriptions, operating service revenue, unit shipment and revenue forecasts for (private and commercial) public safety LTE, mobile broadband (WiMAX, WCDMA, HSPA, EV-DO) and LMR (TETRA, TEDs, P25, Tetrapol, dPMR, PDT, Analogue Radio) user devices and infrastructure, globally and by region

The Public Safety LTE & Mobile Broadband Market: 2012 - 2016

© 2012 Signals and Systems Telecom

1.3 Key Questions Answered

The report answers to the following key questions.

- Which countries will be the first to deploy and adopt LTE for public safety applications?
- How many private public safety LTE base stations (eNodeBs) and user devices will ship in 2017, and how will these compare to the wider commercial LTE market?
- How will the VoLTE ecosystem evolve and how will this impact PTT and voice services for public safety LTE?
- How much revenue will the public safety LTE application ecosystem generate in 2017?
- How will public safety LTE device shipments vary by form factor (Handportable LMR Terminals, Mobile In-Vehicle LMR Modems, Notebook PCs, USB Dongles, Smartphones, PDAs) overtime?
- Is a 10 MHz bandwidth for LTE realistically feasible to support public safety applications?
- Does Huawei stand a chance in the public safety LTE market following its ban in the U.S?
- How many first responders rely on private and commercial mobile broadband networks for their daily tasks?
- How will private and commercial public safety LTE subscriptions compare in 2017?
- How will public safety LTE subscriptions compare to other mobile broadband technologies such as WiMAX and HSPA in 2017?

The Public Safety LTE & Mobile Broadband Market: 2012 - 2016

© 2012 Signals and Systems Telecom

1.4 Methodology

The contents of this report have been accumulated by combining information attained from a range of primary and secondary research sources. In addition to analyzing official corporate announcements, policy documents, media reports, and industry statements, Signals and Systems Telecom sought opinions from leading industry players within the public safety LTE and mobile broadband market to derive an unbiased, accurate and objective mix of market trends, forecasts and the future prospects of the public safety LTE and mobile broadband industry between 2011 and 2017.

1.5 Target Audience

The report targets the following audience.

- Government/military/public safety agencies
- Public safety communications integrators
- Mobile network carriers
- Mobile network Infrastructure, handset and sub-component vendors
- Application developers
- Investment firms

The Public Safety LTE & Mobile Broadband Market: 2012 - 2016

© 2012 Signals and Systems Telecom

1.6 Companies Mentioned

The following companies have been reviewed, discussed or mentioned in the report:

- 3GPP
- Abu Dhabi Police
- Airspan Networks
- Airwave Solutions
- Alcatel-Lucent
- Amdocs
- Apple
- ARASKOM
- ASTRID
- AT&T Mobility
- Atlas Telecom
- ACMA (Australian Communications and Media Authority)
- Aviat Networks
- BAE Systems
- BayWEB (Bay Area Wireless Enhanced Broadband system)
- Brazilian Army
- Bridgewater (Now part of Bridgewater)
- Bridgewater Systems Corporation
- Cassidian
- Catalyst Communications
- China Mobile
- Cisco
- Covia Labs
- Dubai Police

The Public Safety LTE & Mobile Broadband Market: 2012 - 2016

© 2012 Signals and Systems Telecom

- Dutch Police
- EADS
- Eircom
- Ericsson
- Etherstack
- ETSI (European Telecommunications Standards Institute)
- EENA (European Emergency Number Association)
- FCC (Federal Communications Commission)
- First Responder Network Authority ('FirstNet')
- General Dynamics
- Harris
- Henggeler Computer Consultants
- Hong Kong Police Force
- HTC
- Huawei
- Hytera
- Hytera Mobilfunk GmbH (Formely Rohde & Schwarz PMR Division)
- InterAct
- ITU (International Telecommunications Union)
- UIC (International Union of Railways)
- Intrado
- IP Wireless (Part of General Dynamics)
- jNetX (Part of Amdocs)
- Kenwood
- KPN
- Ktech Corporation
- LA-RICS (Los Angeles Regional Interoperable Communications System)

The Public Safety LTE & Mobile Broadband Market: 2012 - 2016

© 2012 Signals and Systems Telecom

- LG Electronics
- LG Uplus
- Lockheed Martin
- Longshine Information Technology Company
- MetroPCS
- Mission Critical Partners
- Motorola Mobility
- Motorola Solutions
- MX Telecom
- NTIA (National Telecommunications and Information Administration)
- NDS Group
- Net4Mobility
- NetMotion
- New York Police Department
- Nokia
- Nokia Siemens Networks
- NPSTC (National Public Safety Telecommunications Council)
- Oman Royal Office
- Panasonic
- Pikerwerks Corporation (Part of Raytheon)
- Police Federation of Australia
- PSCR (Public Safety Communications Research)
- Putian
- Qatar Armed Forces
- Qatar MOI
- Qualcomm
- Raytheon

The Public Safety LTE & Mobile Broadband Market: 2012 - 2016

© 2012 Signals and Systems Telecom

- Reality Mobile
- RIM (Research in Motion)
- Royal Canadian Mounted Police
- Rohde & Schwarz
- Samsung
- Sao Paulo Military Police
- Sapura Technologies
- SANG (Saudi Arabian National Guard)
- Saudi MOI
- Seattle Fire Department
- SELEX Elsag
- Sepura
- Shanghai Police
- Sierra Wireless
- SK Telecom
- Sony
- St. Petersburg Police Department
- Tait Communications
- TCS (TeleCommunication Systems)
- Televate, LLC
- TCCA (TETRA and Critical Communications Association)
- TETRA Ireland Communications
- TetraNed
- Thales
- T-Mobile
- Turkish National Police Force
- Twisted Pair Solutions

The Public Safety LTE & Mobile Broadband Market: 2012 - 2016

© 2012 Signals and Systems Telecom

- U.S Army
- U.S Marine Corps
- U.S. Department of Defense
- U.S. Department of Homeland Security
- Verizon Wireless
- Vodafone
- West Australian Police
- ZTE

The Public Safety LTE & Mobile Broadband Market: 2012 - 2016

© 2012 Signals and Systems Telecom

Copyright Signals and Systems Telecom Ltd, 2012. All rights reserved.

This material is subject to the laws of copyright and is restricted to registered license-holders who have entered into a Corporate, a Multi-User or a Single-User license agreement with Signals and Systems Telecom Ltd. It is an offence for the license-holder to make the material available to any unauthorized person, either via e-mail messaging or by placing it on a network.

All Signals and Systems Telecom research reports & databases are intended to provide general information and strategic insights only, and they do not constitute, nor are they intended to constitute, investment advice. Signals and Systems Telecom and its employees disclaim all and any guarantees, undertakings and warranties, whether express or implied, and shall not be liable for any loss or damage whatsoever, and whether foreseeable or not, arising out of, or in connection with, any use of or reliance on any information, statements, opinions, estimates or forecasts contained in the reports.

The Public Safety LTE & Mobile Broadband Market: 2012 - 2016

© 2012 Signals and Systems Telecom

In all the mentioned scenarios, the public always expects government authorities to respond with an immediate and effective action to safeguard the human lives and restoring the services (e.g., roads, electricity, communication, etc.) at the emergency site.

2.1.1 LMR Market Size

The primary means of instant communications with field personnel has been narrowband Land Mobile Radio or simply LMR for the last 60 years with a subscriptions base of more than 40 Million users, which is expected to grow to over 45 Million subscriptions by the end of 2017.

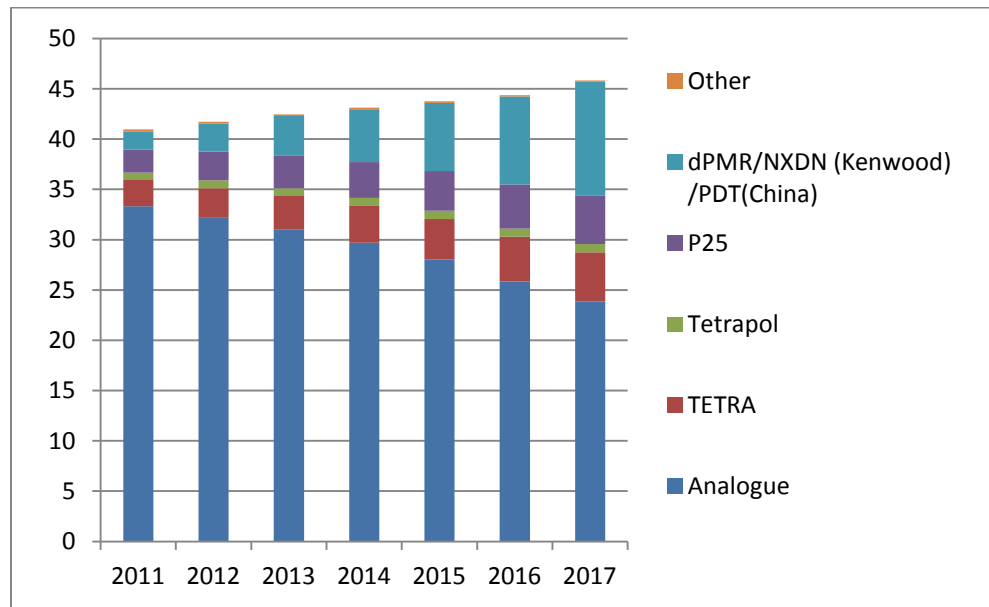


Figure 1: Global Land Mobile Radio (LMR) Subscriptions by Technology: 2011 – 2017 (Millions)

Source: Signals and Systems Telecom

The Public Safety LTE & Mobile Broadband Market: 2012 - 2016

© 2012 Signals and Systems Telecom

2.6 Public Safety LTE Technology & Architecture

In the context of a public safety network deployment, LTE can follow a number of deployment models, however, the inherit architecture would remain the same.

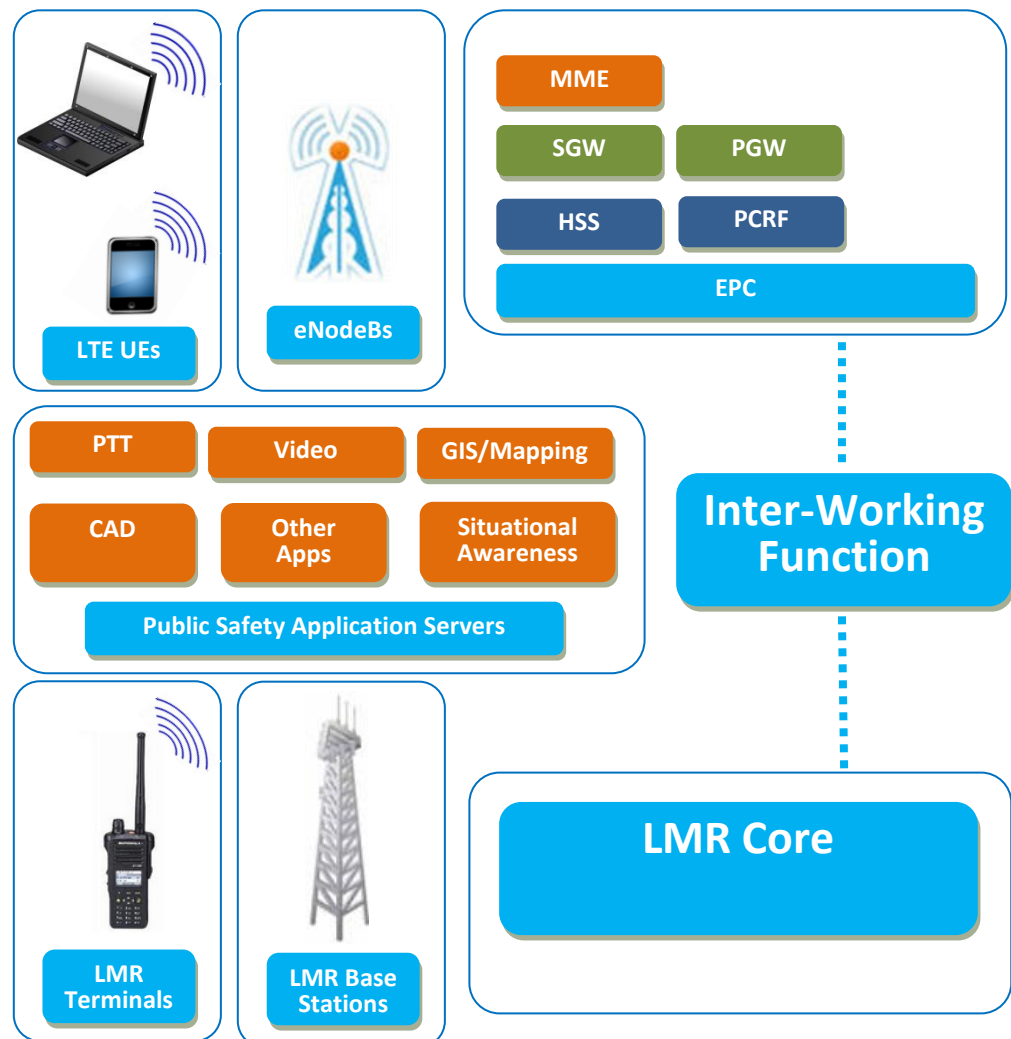


Figure 5: Public Safety LTE Network Architecture

Source: Signals and Systems Telecom

The Public Safety LTE & Mobile Broadband Market: 2012 - 2016

© 2012 Signals and Systems Telecom

4 Chapter 4: Public Safety LTE and Mobile Broadband Applications Ecosystem

In this Chapter we review the public safety LTE applications ecosystem, firstly by discussing the applications of public safety LTE and then by reviewing the future prospects of the market.

4.1 Mobile Video

LTE makes it possible for first responders to practically use mobile video surveillance applications.

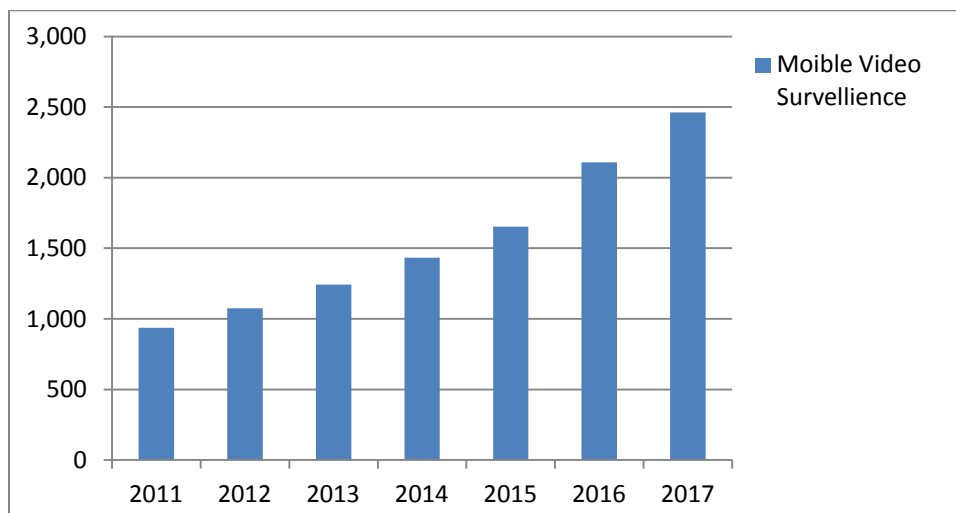


Figure 8: Global Mobile Video Surveillance Market: 2011 – 2017 (\$ Millions)

Source: Signals and Systems Telecom

The market for mobile video surveillance is already expected to account for \$1 Billion in global revenues and further expected to grow at a CAGR of

The Public Safety LTE & Mobile Broadband Market: 2012 - 2016

© 2012 Signals and Systems Telecom

7 Chapter 7: Market Analysis and Forecasts

This chapter presents quantitative market analysis and forecasts for the public safety LTE, mobile broadband and LMR market, at both a global and regional level

7.1 The Global Public Safety Mobile Broadband Market

Driven by the growing demand for bandwidth intensive applications such as large file/multimedia transfers, AVLS and mobile video, public safety agencies are taking an ever increasing interest in mobile broadband technologies.

7.1.1 First Responder Data Subscriptions over Public (Commercial) Cellular Networks

At present, we estimate at more than 13 Million public safety personnel utilize mobile broadband over public carrier networks to assist in their day to day activities.

The number is expected to increase drastically at a CAGR of nearly X% between 2012 and 2017, eventually accounting for nearly X Million subscriptions worldwide in 2017, which represents as many as X% of all public safety LMR subscriptions worldwide.

However, due to their relatively slow evolution cycle, and the planned deployment of private LTE networks for public safety applications, data subscriptions on LMR networks will only account for X Million by the end of 2017.