

<b>List of Figures</b>	<b>xv</b>
<b>List of Tables</b>	<b>xxi</b>
<b>Chapter 1. Introduction and Objectives</b>	<b>1</b>
1.1 Introduction.....	1
1.2 Objectives.....	2
1.3 Methodology.....	5
1.3.1 Gather Information.....	5
1.3.2 Architecture design.....	8
1.3.3 Communication Protocol Development.....	10
1.4 Dissertation Structure.....	11
<b>Chapter 2. Foundations and State of the Art</b>	<b>13</b>
2.1 Introduction.....	13
2.2 Foundations.....	13
2.2.1 Wireless ad hoc network.....	13
2.2.2 Quality of Service (QoS).....	17
2.2.3 Quality of Experience (QoE).....	21
2.2.4 Multimedia Traffic.....	23
2.3 State of the Art.....	27
2.3.1 Multimedia delivery in hererogeneous networks.....	28

2.3.2	QoS in wireless ad hoc networks.....	28
2.3.3	Multimedia and video delivery in ad hoc networks .....	30
2.3.4	Fault tolerant mechanisms for wireless ad hoc networks.....	33
2.3.5	Clustering algorithms for Wireless Ad Hoc and Sensor Networks .	35
2.4	Conclusion .....	38

**Chapter 3. Design of Network Architectures and algorithms for multimedia delivery 39**

3.1	Introduction.....	39
3.2	An Architecture to Connect Disjoint Multimedia Networks Based on node's Capacity .....	40
3.2.1	Mathematical description .....	41
3.2.2	Onodes organization .....	42
3.2.3	Dnodes organization.....	44
3.2.4	Protocol description and recovery algorithms .....	45
3.2.5	Messages Bandwidth.....	48
3.2.6	Experimental Measurements .....	49
3.3	A Group-based Content Delivery Network Architecture and Protocol.....	54
3.3.1	Architecture description.....	57
3.3.2	Protocol and architecture operation.....	60
3.3.3	Experimental Measurements .....	63
3.4	A Cluster-Based Architecture to Structure the Topology of Parallel Wireless Sensor Networks .....	74
3.4.1	Problem Formulation and Application Environments.....	76
3.4.2	Architecture Proposal Description .....	78
3.4.3	Scalability.....	83

3.4.4	Architecture Proposal Operation and Fault Tolerance.....	86
3.4.5	Protocol Messages.....	91
3.4.6	Architecture measurements.....	91
3.4.7	Protocols Comparison .....	105
3.5	Conclusion .....	114
 <b>Chapter 4. Architecture and Protocol for Multimedia Wireless Ad Hoc Networks</b>		<b>117</b>
4.1	Introduction.....	117
4.2	Multimedia-Oriented Architecture and Protocol for Wireless Ad Hoc Networks .....	117
4.2.1	Multimedia-oriented architecture description .....	119
4.2.2	Analytical model. ....	121
4.2.3	Protocol and algorithm operation.....	122
4.3	MWAHCA: A Multimedia Wireless Ad Hoc Cluster Architecture .....	124
4.3.1	Multimedia Init Profile (MIP).....	126
4.3.2	System Process .....	133
4.3.3	Routing Algorithm .....	137
4.3.4	Finite-State Machine .....	138
4.4	. Conclusion .....	144
 <b>Chapter 5. Fault Tolerance in MWAHCA</b>		<b>145</b>
5.1	Introduction.....	145
5.2	Adding fault tolerance to the MWAHCA architecture.....	146
5.3	Fault tolerant mechanism based on a fast switching path.....	149
5.4	Protocol Extensions .....	153
5.5	Analytical Model of Convergence Time and QoS Parameters.....	158

5.6 Conclusion .....	161
<b>Chapter 6. Architecture Optimization for Wireless Sensor Networks</b>	<b>163</b>
6.1 Introduction .....	163
6.2 System Architecture .....	165
6.3 Protocol Fields .....	169
6.4 Data Structure .....	171
6.5 Message Table .....	176
6.6 System Operation .....	179
6.6.1 Discovery Process .....	179
6.6.2 Adjacency Process .....	180
6.6.3 Forwarding Process .....	182
6.6.4 Disconnect Process .....	185
6.7 Conclusion .....	187
<b>Chapter 7. Performance Tests and System Validation</b>	<b>189</b>
7.1 Introduction .....	189
7.2 Performance test of the multimedia wireless ad hoc network.....	189
7.2.1 Test Bench and measurement system .....	189
7.2.2 VoIP test.....	191
7.2.3 IPTV & VoD .....	196
7.3 Performance Study of MWAHCA.....	204
7.3.1 Codecs - Comparison .....	205
7.3.2 Hops Comparison .....	208
7.4 Performance Study of the Fault Tolerance.....	211

7.5 Performance Study of the QoS-Based Wireless Multimedia Sensor Cluster Protocol.....	217
7.5.1 MIP Comparison .....	218
7.5.2 Cluster Comparison .....	222
7.5.3 Packet Loss study.....	226
7.6 Conclusion .....	227
<b>Chapter 8. Conclusion and Future Research</b>	<b>229</b>
8.1 Introduction.....	229
8.2 Conclusion .....	229
8.3 Future Research.....	235
8.4 Publications derived from the PhD.....	236
<b>References</b>	<b>241</b>