

Table of Content

1. Introduction.....	10
1.1. Problem Statement	12
1.2. Goals	13
1.3. Summary.....	15
1.4. Chapter Organization.....	16
2. Background	17
2.1. Design Alternatives.....	17
2.2. DynaMO: An Example for In-layer Adaptations.....	18
2.3. Cross-layer Design.....	25
2.4. Summary.....	27
3. Related Work	28
3.1. Cross-layer Adaptations and Optimizations	28
3.2. Cross-layer Architectures for Ad Hoc Networks.....	30
3.2.1. Cross-layer Approach To Self-healing (CATS).....	31
3.2.2. ECLAIR	32
3.2.3. Global Resource Adaptation through CoopEration (GRACE).....	32
3.2.4. The MobileMAN (Mobile Metropolitan Ad hoc Network) architecture	35
3.2.5. WIDENS (WIreless DEployable Network System).....	37
3.2.6. TinyCubus	38
3.3. Potential Weaknesses of Cross-layer Design	40
3.4. Assessment of the Presented Architectures.....	41
3.5. Summary.....	42
4. The CrossTalk Architecture	44
4.1. Motivation & Architectural Overview.....	44
4.2. Local View	47
4.2.1. Data Management	47
4.2.2. Metric Generation.....	52
4.3. Global View	53
4.3.1. The Data Dissemination Process	53
4.3.2. The Global View Calculation.....	57
4.4. Node Bootstrap and Protocol Signaling.....	63
4.5. Summary.....	64
5. Applications, Results and Analysis	65
5.1. Load Balancing – Solving Conventional Networking Issues Using CrossTalk.....	65
5.1.1. Related Work.....	65
5.1.2. Metric Generation and the Load Balancing Extension to AODV	71
5.1.3. Experimental Setup	75

5.1.4.	Experimental Results	77
5.1.5.	Conclusion	87
5.2.	Mobility Adaptations – Solving Ad Hoc Networking Issues Using CrossTalk.....	87
5.2.1.	Related Work.....	87
5.2.2.	Metric Generation and the Mobility Adaptation Extension to AODV	92
5.2.3.	Experimental Setup	97
5.2.4.	Experimental Results	99
5.2.5.	Conclusion	107
5.3.	Partition Detection – A Novel Application Using CrossTalk	108
5.3.1.	Related Work.....	108
5.3.2.	The Partition Detection System.....	110
5.3.3.	Experimental Setup	115
5.3.4.	Experimental Results	116
5.3.5.	Conclusion	124
5.4.	Global View Scalability Enhancements	124
5.4.1.	Experimental Setup	125
5.4.2.	Experimental Results	126
5.4.3.	Conclusion	134
5.5.	Summary.....	134
6.	Conclusions.....	135
7.	Outlook and Future Work	138
	References.....	139
	Appendix A – List of Abbreviations.....	148
	Appendix B – DynaMO Results	150
	Appendix C – Selected Local View Interaction Flows.....	153