

Table of Contents

1. Introduction	1
1.1. Background	1
1.2. Motivation	2
1.3. Definition of the studied scenario	3
1.4. Definition of the problem	4
1.5. Objectives and scope	4
1.5.1. General objective	4
1.5.2. Specific objectives	5
1.6. Methodology and tools	5
1.6.1. Bibliographic review	5
1.6.2. Estimation mechanism design and adaptation	5
1.6.3. Determination of the time required for the estimation	5
1.6.4. Scenario simulation	6
1.6.5. Performance evaluation metrics extraction	6
1.6.6. Comparative evaluation	7
1.6.7. Software tools	7
2. Theoretical framework and state of the art	8
2.1. Technical concepts	8
2.1.1. CubeSat standard	8
2.1.2. Media Access Control Protocols	9
2.1.3. Wireless sensor network	9
2.1.4. Performance metrics	10
2.2. Review and evaluation of the state of the art	11
3. WSN estimation mechanisms for DtS-IoT	17
3.1. Adaptation of Zanella's collision set size estimator	18
3.2. Design of a new estimator	19
4. Software simulations	23
4.1. Medium access control protocol for estimations	23
4.2. Static simulation	23
4.3. Dynamic simulation	24
4.4. Feedback simulation	26
5. First iteration of results and discussion	27
5.1. Initial version of the estimation mechanisms	27

5.2. Modifications required by the estimation mechanisms	28
6. Second iteration of results and analysis	31
6.1. Static simulations	31
6.2. Dynamic simulations	32
6.2.1. Randomly distributed nodes	32
6.2.2. Nodes distributed in clusters	35
6.3. Feedback to communication protocol	39
6.4. Analysis	41
7. Conclusions	47
BIBLIOGRAPHY	49