

# Contents

<b>1. Introduction</b>	<b>1</b>
1.1. Motivation . . . . .	2
1.2. Contributions . . . . .	5
1.3. List of Publications . . . . .	12
1.4. Outline . . . . .	15
<b>I. Managing Self-Published Online Data</b>	<b>17</b>
<b>2. The State of Data Revocation Research</b>	<b>19</b>
2.1. Introduction . . . . .	20
2.2. Systematization Methodology . . . . .	23
2.3. Categorizing User Interaction . . . . .	26
2.4. Categorizing Technical Proposals . . . . .	31
2.5. Technical Key Challenges . . . . .	36
2.6. Further Issues . . . . .	50
2.7. Conclusion . . . . .	54
<b>3. User Perception of Message Deletion</b>	<b>55</b>
3.1. Introduction . . . . .	56
3.2. Deleting Messages . . . . .	58
3.3. Method . . . . .	65
3.4. Results . . . . .	71
3.5. Discussion . . . . .	84
3.6. Conclusion . . . . .	86
<b>4. Contractual Agreements for Data Revocation</b>	<b>87</b>
4.1. Introduction . . . . .	88
4.2. Solution Overview . . . . .	90
4.3. Revocation Contract Scheme . . . . .	92
4.4. Protocol Design Space . . . . .	95
4.5. Prototype Implementation . . . . .	99
4.6. Discussion . . . . .	102
4.7. Conclusion . . . . .	104

<b>II. Usage-Driven Information Revelation</b>	<b>107</b>
<b>5. Preliminaries on Traffic Analysis</b>	<b>109</b>
5.1. Motivation . . . . .	110
5.2. Traffic Analysis Attacks . . . . .	111
5.3. Related Work . . . . .	113
<b>6. Operational Requirements for Tor Traffic Analysis</b>	<b>121</b>
6.1. Introduction . . . . .	122
6.2. Tor Background . . . . .	125
6.3. Threat Vectors . . . . .	130
6.4. Attack Concepts . . . . .	136
6.5. Case Studies . . . . .	144
6.6. Discussion . . . . .	158
6.7. Conclusion . . . . .	162
<b>7. Location Revelation in Instant Messengers</b>	<b>163</b>
7.1. Introduction . . . . .	164
7.2. Messenger Infrastructure Analysis . . . . .	168
7.3. Message Status Timing Side Channel . . . . .	172
7.4. Descriptive Dataset Analysis . . . . .	178
7.5. Delivery Notification Timing Classification . . . . .	185
7.6. Countermeasures . . . . .	201
7.7. Conclusion . . . . .	204
<b>8. Conclusion</b>	<b>205</b>
8.1. Summary and Key Results . . . . .	206
8.2. Directions for Future Research . . . . .	208
8.3. Closing Remarks . . . . .	212
<b>List of Figures</b>	<b>214</b>
<b>List of Tables</b>	<b>216</b>
<b>A. User Perception of Message Deletion</b>	<b>217</b>
<b>B. Operational Requirements for Tor Traffic Analysis</b>	<b>225</b>
<b>C. Location Revelation in Instant Messengers</b>	<b>231</b>
<b>Bibliography</b>	<b>255</b>