

Contents

	Page no.
1. INTRODUCTION	1
1.1 Intrusion	1
1.2 Intrusion Detection	2
1.3 Intrusion Detection System	3
1.4 Types of Intrusion Detection Systems	4
1.5 Intrusion Detection Approaches	5
1.6 Elements of a generic Anomaly Network Intrusion Detection System	6
1.7 Issues in existing Intrusion Detection Systems	7
1.8 What is DDoS attack?	8
1.8.1 Causes of DDoS attacks	8
1.8.2 Symptoms and Manifestations	8
1.8.3 Working of DDoS attacks	9
1.9 Existing methods for DDoS attack detection	9
1.10 Motivation	10
1.11 Contribution	10
1.12 Organization of Report	11
2. FUNDAMENTALS OF DDOS ATTACKS	12
2.1 DDoS attack overview	12
2.2 DDoS attack strategy	13
2.3 DDoS goals	13
2.4 DDoS attack architecture	13
2.4.1 The Agent Handler Model	13
2.4.2 Internet Relay Chat (IRC) based model	14
2.5 DDoS attack parameters	14
2.6 Taxonomy of DDoS attacks	16

2.7	Discussions	22
3.	RELATED WORK	23
3.1	Statistical Methods	23
3.2	Soft - Computing Methods	24
3.3	Knowledge – based Methods	25
3.4	Data Mining – based Methods	25
3.5	Ensemble - based Methods	26
3.6	Discussions	26
4.	DATASET DESCRIPTION	28
4.1	Dataset used	28
4.2	Characteristics of Dataset	29
4.3	DDoS attack Categorization in CAIDA Dataset	30
4.3.1	Low – Rate attack	30
4.3.2	Constant – Rate attack	30
4.3.3	Increasing - Rate attack	31
4.3.4	Intermittent - Rate attack	31
4.4	Description of Tools Used	32
4.5	Discussions	35
5.	PROPOSED MODELS	36
5.1	Detection of Predictable and Non Predictable Rates of DDoS attacks	36
5.1.1	Description of Work	40
5.2	Source IP segregation method for DDoS attack detection	42
5.2.1	Description of Work	42
5.3	Detection of Protocol Flooding attack	45
5.3.1	Description of Work	46
6.	EXPERIMENTATION & RESULT	47
6.1	Environment worked on	47

6.2	Detection of Predictable and Non Predictable Rates of DDoS attacks	47
6.2.1	Data Analysis	54
6.2.2	Results & Discussions	57
6.3	Source IP based segregation method for DDoS attack detection	58
6.3.1	Data Analysis	58
6.3.2	Discussion	62
6.4	Detection of DDoS Protocol Flooding	63
6.4.1	Data Analysis	63
6.4.2	Results	67
6.4.3	Discussions	68
7.	Conclusion	69
7.1	Future Work	70
8.	References	71

List of figures:

	Page no.
Figure 1: Intrusion Detection System	03
Figure 2: Taxonomy of IDS	04
Figure 3: A generic architecture of ANIDS	07
Figure 4: DDoS attack	12
Figure 5: Agent Handler attack model	14
Figure 6: IRC-based attack model	15
Figure 7: A comparison between normal traffic and CAIDA DDoS traffic	16
Figure 8: CAIDA traffic profile	29
Figure 9: Increasing rate DDoS attack	31
Figure 10: Pulsing rate DDoS attack	31
Figure 11: Constant rate DDoS attack	32
Figure 12: Subgroup rate DDoS attac	32
Figure 13: Rawcap interface	32
Figure 14: Traffic client and server	33
Figure 15: Wireshark interface	34
Figure 16: Splitcap	34
Figure 17: Proposed test bed for the future	70

List of Tables:

	Page no.
Table 1: Correlation of 5 minute interval (25 th – 30 th min)	48 - 49
Table 2: Correlation of 5 minute interval (30 th – 35 th min)	50 - 51
Table 3: Correlation of 5 minute interval (45 th – 50 th min)	52 - 53
Table 4: Packet rates of the samples of a 5 sec window	58
Table 5: Sorted packet rates and IP address of the sample of the 5 sec window	58
Table 6: Packet rates from 1 second window from (45 th – 50 th min) time interval	60
Table 7: Packet rates from 1 second window from (45 th – 50 th min) time interval	61
Table 8: Protocol Flooding 1 for 5 minute window	63 – 65
Table 9: Protocol Flooding 2 for 5 minute window	65 – 66

List of Graphs:

	Page no.
Graph 1: Correlation vs Time graph (25th to 30th min)	54
Graph 2: Correlation vs Time graph (30th – 35th min)	55
Graph 3: Correlation vs Time graph (45th – 50th min)	56
Graph 4: Increasing rate DDoS attack graph	59
Graph 5: Constant rate DDoS attack graph	60
Graph 6: Pulsing rate DDoS attack graph	61
Graph 7: ICMP Flooding graph	67
Graph 8: TCP/ICMP Flooding graph	67