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A noble approach of Real time Intrusion detection system (NART-IDS)

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Abstract

Malicious users use different techniques such as cracking passwords, text traffic, sniffing unencrypted or light, etc. System overhead and compromise critical systems. Therefore, there must be some sort of security for the organization's private resources from the Internet and from the inside. Therefore, the intrusion detection system (IDS) could be the best solution. It complements the firewall to improve the security holes. An intrusion detection system includes a management console and sensors. The management console holds all the responsibility of functionality of IDS comprises with its initialization, packet capturing, and report generation, whereas the sensors used to monitor hosts or networks in real time.

There may be different categories of Intrusion Detection System. IDS can be designed in the concept of Signature analysis as well as anomaly behavior analysis. Therefore IDS used to capture the behavior of suspected packets. These functions are in host mode and called as Host Intrusion Detection System (HIDS) and in Network mode called as Network Intrusion Detection System (NIDS). The entitled dissertation work is carried out to obtain the best analysis performance through signature based detection system. It is efficient for host as well as network system .here basically Transmission Control Packets (TCP) and User Datagram Packets (UDP) considered to analysis for finding different attacks like Probe,DoS,R2l and U2R. This system is being found functionally efficient and also provide layer wise attacks details. Here different agent modules used to perform desired isolated responsibility like Mobile Agent (MA) to activate different IDS chest at different hosts, Tenet Agent (TA) for signature rule, Analysis Agent (AA) etc.

The proposed system can greatly improve efficiency from offline detection to real-time online detection. Since the proposed system derives features from packet headers. Many attacks were experimented in this system. Experiments were performed to demonstrate the excellent effectiveness and efficiency of the proposed system. The proposed system can greatly improve efficiency from offline detection to real-time online detection. Since the proposed system derives features from packet headers. The entitled system can be further enhanced to capture more type of attacks at the levels of multiple layers and also may stop attacks as well.

Keywords: Attack, DoS, Host Intrusion Detection System (HIDS), Intrusion Detection System (IDS), Mobile Agent (MA), Network Intrusion Detection System (NIDS), Transmission Control Packets (TCP), User Datagram Packets (UDP), Security, sniffing , Tenet Agent (TA), Transmission Control Packets (TCP), User Datagram Packets (UDP) etc.

INTRODUCTION

To prevent and detect the unauthorized access of any computer is a concern of Computer security. Hence computer security provides a measure of the level associated with Prevention and Detection which facilitate to avoid suspicious users. Such suspicious and unauthorized users generally named as "Intruders" [2]. Here they are stopped to access any part of computer system. Detection process is used to determine whether or not someone going to attempt to violet inside the target system, if it was occurring successfully, and also to find their activities logs may be done. Intruders with the help of some means of communication take over advantages of computers various things in the way of banking and investing to shopping [37]. Although It may not consider communications top secret, It probably do not want strangers reading email, using computer to attack or intrusion other systems, sending forged messages or email from a computer system, or checking personal information which stored on end computer that may contain information like financial statements, account details etc. Intruders also referred as attackers, crackers or hackers. They may not care about the identity of target system`s owner. They always used to take over the control of computer so that can use for launching the attacks on other desired computer systems. Usually attackers get control on target systems like government or financial firms systems, this will provide them an ability to make hidden them as well as their actual locations and hence intrusions/ attacks easily can be launched [28].

If a computer system connected with Internet, it doesn't matters whether specific secret tasks are being performed through or only used for playing games, chatting with friends, the system then also being targeted. Since, intruders are possibly capable of looking after all our activities on our system. They can violate the system information; reformat hard-drive, causing any type of damage, etc.

To protect the system it is very unfortunate that always intruders become successful to find newer vulnerabilities which are also termed as holes. These vulnerabilities are responsible to exploit in computer or system software. The difficulty in software makes it difficult high to thoroughly test the security of computer systems. Although, it`s up to the user, to obtain and install file patches, perform the configuration of the software for operating in more secure manner [29]. Also, there are such software applications which have predefined usual settings that allow accessing rights to other users for accessing computer unless it changes the settings to be more secure. For examples, including chat programs that let outsiders to execute commands on one's computer which provides facility to enable someone to introduce destructive programs that run when clicked by user. It probably wouldn't let a stranger to look through important documents [29]. In the same way, it may want to keep the tasks confidential to perform on computer, whether it is tracking our documents or performing other applications. Also users should have some assurance that the information entered into computer remains intact and is available when it is required. With the possibility of intentional misuse of our computer by intruders via the Internet there could be generated security policy violation. There are some more risks which could be faced even if users weren't connected to the Internet like hard disk failures, theft, power outages, etc. The bad news caused by this problem is that it possibly unable to plan for all possible risks. The good news is also exist here is that it can take some usual steps to reduce the chance to be affected by the most common threats. Some of those steps help to face with both the intentional and accidental risks. Before we get to know what we can do to protect our computer or home network, let us take a descriptive glance at some of these associated risks with security. Here some very common methods given which are used by intruders to gain control of computers also briefly described below [30].

Here some very common methods given which are used by intruders to gain control of computers also briefly described below [8].

- Being an intermediate for other attack
- Unprotected Windows sharing
- Roaming code (ActiveX and JavaScript)
- Spoofing
- Trojan horse
- Back door
- Denial of service
- Email-borne viruses
- Chat clients
- Packet sniffing

INTRUSION

Intrusions are actions that attempt to bypass security mechanisms of computer systems in non-obvious ways. They are any set of actions that threatens the integrity, availability, and/or confidentiality of the information. Confidentiality means that information should not be disclosed to any outsider who is not authorized to access. Integrity ensures the message has not been modified in transit. When a user send a message to any other user, but before it reach to intended recipient the content of the message are changed by unauthorized user. This is called as loss of integrity and it occurs due to modification. Availability feature determines that resources should be all the time for authorized users. Attack such as interruption causes loss of availability of resources. Table 2.1 depicts types of attacks that occur in network. Frequently, intrusions are caused by an outside attacker accessing the system from the Internet or local network or the operating system of the infected machine or uses the security flaw of a third-party application (middleware), or by inside attackers who may be authorized users in some respects attempting to gain and misuse non-authorized security and system privileges [2-5].

INTRUSION IDENTIFICATION

IDS detect malicious activity in computer systems and Conducts forensic analysis once attack is over. It monitors network resources to detect intrusions and attacks that were not stopped by preventative techniques (firewalls, packet-filtering routers, proxy servers) [31].An intrusion is an attempt to compromise the confidentiality, integrity or availability of a system. Intrusion detection systems can be considered to be a crude analogy to burglar alarms in real life. Misuse-based IDSs (as shown in Fig.1) are designed to detect violations to predefined security policies. But things immediately get complicated with the introduction of possible malicious behaviors which cannot be specified precisely ahead of time. An example would be developer in a firm doing large amount of file transfer in a short span of time. This could be a potential data infiltration problem but might not be caught by access policies because he is allowed to transfer files. Statistical anomaly detection was introduced for this particular reason where a profile of a user or a system is created and any deviations from the profile are reported. While both the type of systems is useful independently, a hybrid of both can reduce, but not eliminate, the individual disadvantages [31]. An important factor that defines the type of implementation IDS adopts is the source of audit data. The two main sources are host-based logs that host-based IDSs work with and data packets owing in a network that are tapped by network-based IDSs. The host logs can be kernel logs, application logs or device-related logs.

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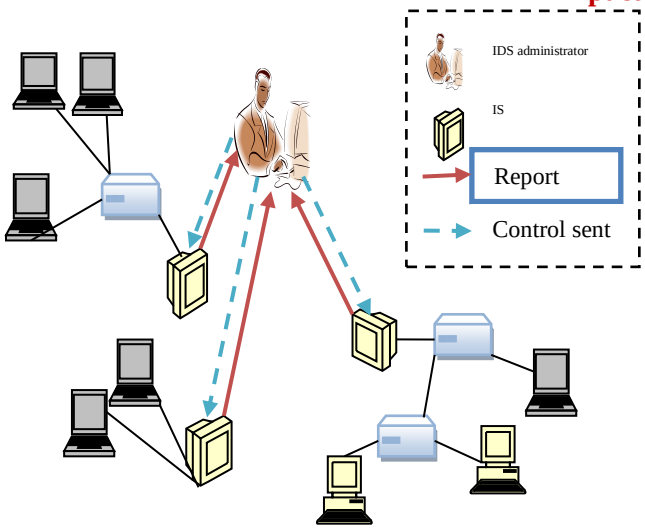

Fig. 1 Intrusion Detection System

There are several issues with both host-based IDSs and network-based IDSs [9]. They include:

- Heterogeneous operating systems making enumerating system-specific detection parameters for each system extremely time consuming.
- Increased number of critical nodes in the network increasing the performance overhead.
- Performance degradation in the host system due to additional activities for security such as logging.
- Difficulty in recognizing network-wide attacks.
- Hosts with insufficient computational capability to deploy complete host-based IDS.

In contrast, network-based intrusion detection systems can have a central system with a network tap to passively monitor traffic in the network. They do not affect the system performance and can detect network-wide attacks easily when installed at the network boundary. The implementation of network-based IDSs is very straightforward. Host-based IDSs in a network of mission-critical, performance oriented hosts have to be carefully chosen so they do not overly limit performance in each system [10].

IDS ISSUES

Until now IDS have poor perfection. There are so many shortcomings associated with IDSs. During development of these IDSs many shortcomings continuously addressing through the improvement and refinement of existing techniques, but some of them are inherent in the way IDSs are constructed. There are the most common shortcomings given below [16-19]:

- **Lack of Efficiency:** To evaluate the activities in real time IDSs are needed. It is very hard need to meet when faced with a very large number of events as is typical in today's networks. Hence, HIDSs usually slower down a system where as NIDSs drop network packets for those there is no sufficient time to process.
- **High Number of False Positives:** Most IDSs detect attacks throughout an enterprise by analyzing information from a single host, a single application, or a single network interface, at many locations throughout the network. False alarms are high and attack recognition is not perfect. Lowering thresholds to reduce false alarms raises the number of attacks that get through undetected as false negatives. Improving the ability of an ID to detect attacks accurately is the primary problem facing IDS manufactures today.
- detection may also face hardships to adapt to different patterns of usage. The tailoring detection method specifically to the system with some if and buts replacing those over time with improved detection techniques are also problematic with many IDS implementations. Often the IDS needs to be completely restarted in order to make changes and additions take effect.
- **End-to-end Encryption:** By improving security concerns in protocols used for communications in end to end mode encrypted traffic availability gets risen. Besides opposing a secret listening, encrypted content keeps network-based IDS from viewing into packets and analyzing their contents for intrusions.
- **High Speed Communications:** By increasing communication traffic rate the processing speed also changes because communication traffic rate is directly proportional to processing speed. So, it is needed to analyze the contents of communication packets. Here potentially packet loss occurs. In NIDS to observe various communication streams simultaneously increases the difficulty when switched communication i.e. a conventional communication is used in place of broadcast communication.

INTRUSION ISSUE RESOLUTION

Intrusion Prevention is the act of stopping detected bad data set in real-time by not allowing it to execute or continue to its destination. It is useful against denial of service floods, brute force attacks, vulnerability detection, protocols anomaly detection and prevention against unknown exploits within the kernel Operating System or middleware and networking applications [1].

LITERATURES

The task of developing Intrusion Detection System (IDS) crucially depends on the preprocessing along with selecting important data features of it. Another crucial factor is design of efficient learning algorithm that classifies normal and anomalous patterns. The objective of this research work is to propose a new and better version of the Naive Bayes classifiers that improves the accuracy of intrusion detection in IDS [1]. This paper describes the design and analysis of a network intrusion detection system (NIDS) and network intrusion prevention system (NIPS) using open source tools. The study also describes an open source Database to store the alerts and an open source front end management console application to view the alerts and logs from the proposed Database in any of the modern day web browser. In this particular research Snort was used as an NIDS to detect intrusions and attacks [2]. This paper reviews how data mining relates to IDS, feature selection and classification [3]. Use of internet is increasing to great extent and with it abnormal and malicious activities. Solving problem of these attacks is becoming a prime need of network services. Till date many techniques and algorithms are developed. All these can be summed to intrusion detection systems and firewall [4]. Many firms rely on security technologies such as intrusion detection systems (IDSs) to manage information technology security risks. IDSs are considered to be the last line of defense to secure a network and play a very important role in detecting large number of attacks [6]. In [2] it was being proposed a multi-agent based collaborative intrusion detection model. In this model, there are four agents with their separate functionalities are introduced. In [36] Information systems are more and more opened on Internet today. This opening, a prior beneficial, nevertheless raises a major problem: it ensues from it an increasing number of attacks. In [27] it is explained that, in most organization database systems are crucial assets associated with the information system infrastructure. The database possibly contains invaluable secret and sensitive information. In [31] Importance of IDS for network security management is widely accepted. Effectiveness and Efficiency of IDS is mainly affected by technique used for feature identification and classification.

PROPOSED WORK

The proposed model has designed for Agent based intrusion detection system and evaluates behavior of normal and abnormal data packets. In this research will provide a better Agent based intrusion detection model which will be work either on real time data packet or KDD'99 [31] data set to fulfill requirement of network security. Proposed model will use agent based concept with highly efficiency. The performance of the proposed model will evaluate by measuring the average normal and abnormal behavior of data packets, which also compared with the average execution time for a number of currently use network security techniques. Host cum Network Agent Based Intrusion Detection System monitors each system in the network. In this case, the agents of the IDS are located inside of the host to monitor system behavior [32]. This type of intrusion detection is especially useful for monitoring potentially dangerous user activity within the network. It's clear that there are two types of host-based intrusion detection software: host wrappers (or personal firewalls) and agent-based software. Here describes the host wrappers as tools that can be configured to look at all network packets, connection attempts, or login attempts to the monitored machine. The agent-based software has the same abilities as the host wrappers, but can also detect changes in system files and changes in user privileges.

A report by Network Associates makes a good argument for host-based intrusion detection, stating, and any masking techniques such as insertion, padding, fragmentation, or out-of-sequence delivery, which would evade a network-based IDS can be easily caught by a host-based IDS.

Proposed IDS is the agent based IDS with host and network based functionality. Fig.2 is shown the simple model of proposed agent based IDS. In public network packets are moving from one end to another end or network to network. During capturing these packets identify the pattern of the captured packet either its intrusion or not. So match the pattern which is already known if it is finding then drop the packets otherwise it will proceed to further action. Here I have presented simple model for an agent based intrusion detection system which will enhance efficiency as compare previously presented agent based intrusion detection system. An intrusion detection system is intended to detect suspicious behavior on the network, send alerts signal to the network admin and prevent intrusions and attacks. There are two types of intrusion detection systems: host-based and network-based. Building our own agent based intrusion detection system is not an easy task, in this there are so many thing involved like understanding of project scope, intrusion types and database design as well as implementation.

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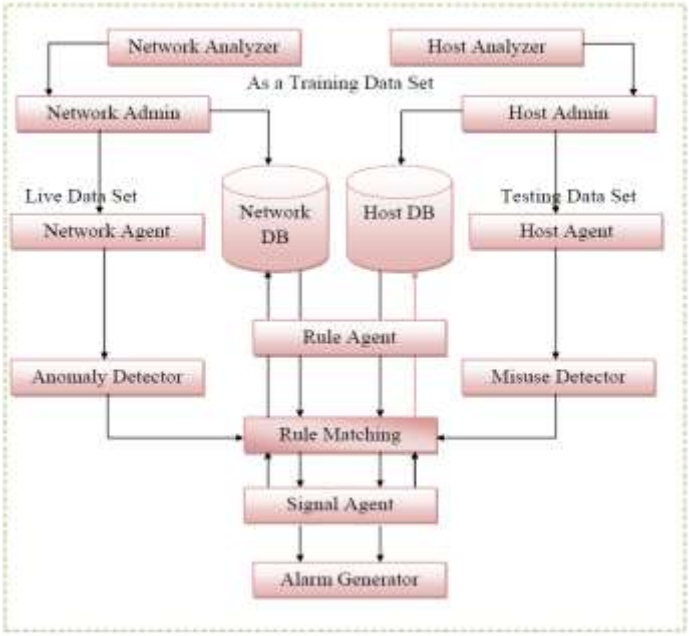


Fig. 2 Proposed Model of Agent Based IDS

Proposed model can be implemented on-line as well as off line IDS. If Proposed Agent Based IDS will capture real data or packet at run time then it will call on-line IDS and if Proposed Agent Based IDS are using pre define data set for performance evolution then it will called off-line IDS. In this model data packet will analyze through network admin for network data and host admin for local machine data. Initially it will prepare training data set then start capture data from network as well as local machine to find intrusion. In the Proposed Agent Based IDS total four type of agent will work which is following.

- Na: Network Agent/Host Agent
- Ra: Rule Agent
- Sa: Signal Agent
- Ida: Intrusion Detection Agent

PROPOSED IDS

Architecture of Proposed Intrusion Detection is shown in Fig. 2. In this five agents like network/host, rule, signal, intrusion detection and intrusion prevention agent works together but they do not acquire the data from the network/host directly, but receive/capture the preprocessed data in proper way, with the level of detail that is appropriate for host/network-based intrusion detection. Agent communications can be divided into two categories, communication among agents at same host in host mode and communication among agents on network systems in network mode. Communication methods for these situations have been studied in recent years. Communication among agents residing on the same computer need not be transmitted through the network layer [21]. They can communicate using other methods

Here First one is Network mode and second host mode. Detailed description of each component is as follow in Fig.3-

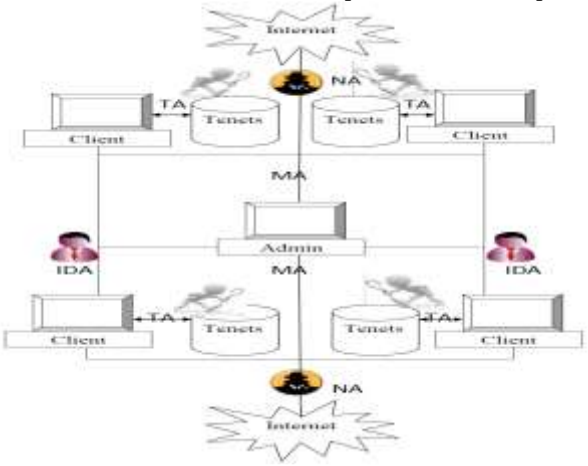


Fig. 3 Proposed Agent Intrusion Detection System Architecture

PROPOSED TECHNIQUE

Proposed IDS are working in two Modes. One is NIDS and second is HIDS.

NIDS

Rule Phase: In this phase proposed IDS have created the rules for normal behavior of packets as well as system and maintained in rule base data base. Here proposed IDS have maintained tents data base for different types of attacks like User to Root (U2R), Probe, Denial of Service (DOS), Remote to Local (R2L) and normal [23]. That's why Proposed AIDS have created and maintained different behavior to find out some well-known intrusions. Record attributes (see table 1) from capture packets and stored into tenets data-base. Table 1 shows the result of applying the Attribute Importance function to dataset of the captured packet. The tool ranks the attributes based on their significance, with the attribute of rank 1 being the most important attribute and all attributes having an importance less than or equal to zero have the same rank and considered as noise [23]. It is clear from this study of the network packet that 13 attributes out of the 41 attributes of the captured packet dataset have an importance value above zero, and the rest have an importance of zero. We will use these attributes in the agent based IDS process. We expect this to be more accurate having only 8 features while keeping the flag through the destination host difference server rate (dst_host_diff_srv_rate).

Table 1: Attributes

S. No.	Attributes
1	dst_host_srv_rerror_rate
2	dst_host_rerror_rate
3	dst_host_srv_serror_rate
4	dst_host_serror_rate
5	dst_host_srv_diff_host_rate
6	dst_host_same_src_port_rate
7	dst_host_diff_srv_rate

Identification Phase— In this Phase Tenets Agent and Intrusion Detection Agent will work in following way.

Attacks If

{ Probe Attacks:

IF (Cap_Pack.Flag-> "RSTO" || "REJ" || "SF")
IF (Dst_Host_Ser_error_Rate< 0 to 1 >)
IF (Dst_Host_Ser_Rerror_Rate< 0 to 1 >)
IF (Dst_Host_Ser_Serror_Rate< 0 >)
IF (Dst_Host_Server_Rate< 0 >)
IF (Dst_Host_Ser_Diff_Host_Rate< 0 to 1>)
IF (Dst_Host_Same_Src_Port_Rate< .01 to 1>)
IF (Dst_Host_Diff_Ser_Rate< 0 || 1 >)

Dos Attacks:

IF (Cap_Pack.Flag-> "SF"==0)
IF (Dst_Host_Ser_error_Rate<0 to 1>)
IF (Dst_Host_Ser_Rerror_Rate<0 to 1>)
IF (Dst_Host_Ser_Serror_Rate<0 to 1>)
IF (Dst_Host_Server_Rate<0 to 1>)
IF (Dst_Host_Ser_Diff_Host_Rate<0 to .44>)
IF (Dst_Host_Same_Src_Port_Rate<0 to 1>)
IF (Dst_Host_Diff_Ser_Rate<0 to 1>)

R2L Attacks:

IF (Cap_Pack.Flag-> "SF")
IF (Dst_Host_Ser_error_Rate< 0 >)
IF (Dst_Host_Ser_Rerror_Rate< 0 >)
IF (Dst_Host_Ser_Serror_Rate< 0 >)
IF (Dst_Host_Server_Rate< 0 >)
IF (Dst_Host_Ser_Diff_Host_Rate< 0 to 1>)
IF (Dst_Host_Same_Src_Port_Rate< .5 to 1>)
IF (Dst_Host_Diff_Ser_Rate< 0 >)

U2R Attacks:
IF (Cap_Pack.Flag-> "SF")
IF (Dst_Host_Ser_error_Rate< 0 >)
IF (Dst_Host_Ser_Rerror_Rate< 0 >)
IF (Dst_Host_Ser_Serror_Rate< 0 >)
IF (Dst_Host_Server_Rate< 0 >)
IF (Dst_Host_Ser_Diff_Host_Rate< 0 to .5>)
IF (Dst_Host_Same_Src_Port_Rate< .5 to 1>)
IF (Dst_Host_Diff_Ser_Rate< 0 >)
OR
IF (Cap_Pack.Flag-> "SO" || "S1" || "SF" || "SH")
IF (Dst_Host_Ser_error_Rate< 0 || .03 >)
IF (Dst_Host_Ser_Rerror_Rate< 0 >)
IF (Dst_Host_Ser_Serror_Rate< 0 to 1 >)
IF (Dst_Host_Server_Rate< 0 to 1 >)
IF (Dst_Host_Ser_Diff_Host_Rate< 0 >)
IF (Dst_Host_Same_Src_Port_Rate< 0 >)
IF (Dst_Host_Diff_Ser_Rate< 0 to 1 >)
}**else**
{
Normal Packets:
}
Host IDS
***Rules Phase*:** Here HIDS have created the tenets for abnormal behavior and maintained in tenets for data base. For this proposed AIDS have maintained two attribute (log- in & log-out time and authentication) in host mode [9, 13, 24, 25, 26]. It already known that most of the attacker used illegal accessing of the host within off working time. So that proposed AIDS have created and maintained these two attributes to find out some well-known intrusions. Record
***Detection Phase*:** This work focused on two attributes. In this Phase tenets Agent and intrusion detection Agents will work in following way.
If Cap_ Value > TH
Then
Intrusion Detection Agent Activate
Else
Intrusion Detection Agent Deactivate
Rule Agent Calculated Rules
Authentication_Recorded_Value→
User_Auth = Wrong(Password) > M
Where M is 3 time
Working_Time_Recorded_Value→
Time = Log_In→10 AM
& Log_Out→5 PM
Recorded Value for authentication and time can be read from log file of the network system. In tenets agent will sniff Log Record and identified Login filed details if it is more than three time that means any illegal user want access network system which is intrusion and intrusion detection Agent activate and its circulate that information to admin to take necessary action to prevent such type of attacks. Similarly at the time of working period of user tenets agents checked login and log out time of network system if system is on before 10 am and after 5 PM then that mean illegal activities are happing over system then intrusion detection agent activate and send signal to admin for take necessary action to prevent such type of attacks.

STEPS OF PROPOSED TECHNIQUE:
Steps of Proposed Concept are as follows and shown in Fig. 4:

1. Init_ IDS(server)
2. Init_ IDS(Client)
3. Acti → MA
4. Move→ MA→NS_i
5. (a) MA→ Acti→ NSIDS
   (b) Move →MA→NS_{i+1}
6. NSIDS→Acti→NA
7. (a)NA→CapPack

(b)CapPack→RA
8. Acti→RA
9. RA→Ana(CapPack, Rules).
10. (a) Agent(AA)
    (b) Acti→AA
11. AS→NS
12. Repeat Step 3 to 11 Every hour Duration.

RESULTS ANALYSIS

In this work we have find out various attacks like DOS, R2L, U2R Prob and normal packet during capturing packet in real time Network in NIDS mode [9]. Where HIDS focused on two attribute like log in log out time and login details [13, 24, 25]. The intended results are performed in the window-7 OS platform. For results, proposed RT-IDS used laptop system. Configuration of that laptop machine is Pentium Dual Core E2300 3.67 GHz, 1 GB RAM, in which routine data is accumulating and viewing. Proposed RT-IDS run number of times on different-different time and analyzed results are viewing in Table5.1 and Table 5.2 for NIDS.

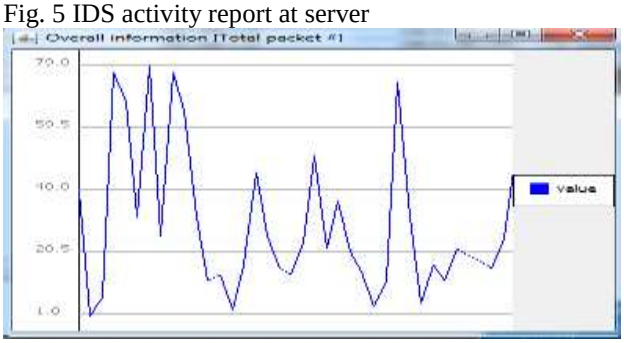
NOTE:

During real time network we have used two mode of real time network one is direct internet line where no firewall and other security concerned was installed in the machine as well as network and second is with security concerned (firewall). During installation of other security concerned like firewall, VPN and others then number of captured attacked will low.

SCREEN-SHOTS

Fig. 4 Server Initialization

Fig. 5 IDS activity report at server



EXPERIMENTAL RESULTS

Initially presented experiments are showing days wise without security concerned as in Table 5.1 and corresponding Graph 5.1. Total 6 day results are presented hear.

Day 1 (01/11/2016): start time of NIDS is 10:00 AM in and stop time is 12:00 Noon. During this time we have find DOS type Attacks packets are 1007. U2R type Attacks are 889. R2L type attacks are 335, probe type attacks are 669 and normal packet 1342.

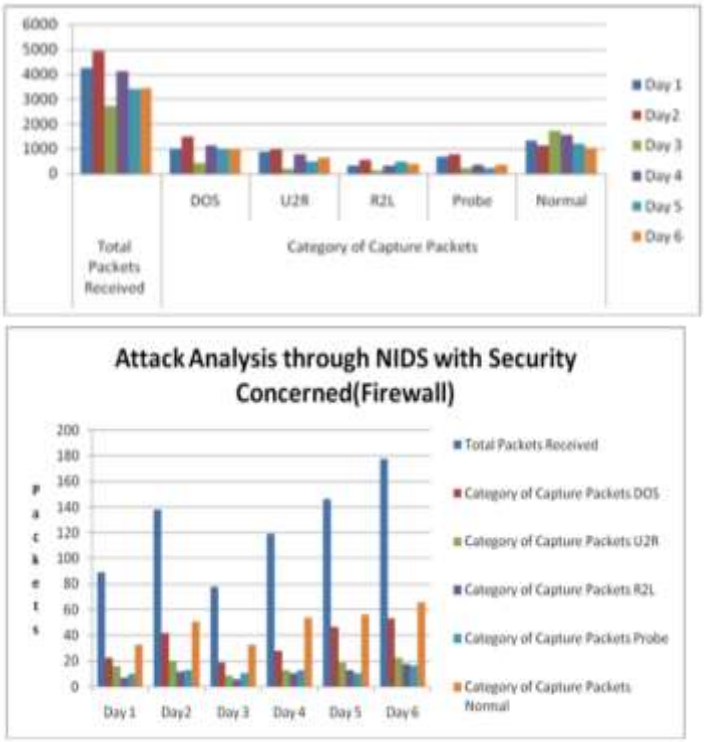
Day 2 (02/11/2016): Start time of NIDS is 1:00 PM in and stop time is 03:00 PM. During this time we have find DOS type Attacks packets are 1500. U2R type Attacks are 982. R2L type attacks are 543, probe type attacks are 769 and normal packet 1133.

Day 3 (03/11/2016): Start time of NIDS is 8:00 AM in and stop time is 10:00 AM. During this time we have find DOS type Attacks packets are 437. U2R type Attacks are 192. R2L type attacks are 132, probe type attacks are 231 and normal packet 1732.

Day 4 (04/11/2016): Start time of NIDS is 5:00 PM in and stop time is 07:00 PM. During this time we have find DOS type Attacks packets are 1132. U2R type Attacks are 763. R2L type attacks are 325, probe type attacks are 341 and normal packet 1567.
Day 5 (05/11/2016): Start time of NIDS is 8:00 PM in and stop time is 10:00 PM. During this time we have find DOS type Attacks packets are 1021. U2R type Attacks are 479. R2L type attacks are 485, probe type attacks are 231 and normal packet 1189.
Day 6 (06/11/2016): Start time of NIDS is 2:00 PM in and stop time is 04:00 PM. During this time we have find DOS type Attacks packets are 991. U2R type Attacks are 651. R2L type attacks are 382, probe type attacks are 361 and normal packet 1037.

RESULTS ANALYSIS

During results analysis proposed system has set two modes during real time NIDS one is without security concerned and second is with security concerned. One thing which is observed during these analysis that if security concerned is apply on network then total number of packet receiving is very low as compare without applied security concerned. From the results its observed that proposed RT-IDS are producing more accurate results as compare existing [2] in both mode for real time NIDS because existing IDS are using threshold values for detecting network intrusion and all these threshold value are assumption based. So there is a probability that produced result can differ from original results. But propose IDS using knowledge of KDD's 99 data set [20, 23] in which we have study of all type of normal and abnormal behaviors of packets along with 41 attribute defined in KDD'99 data set, after that we have select 8 attribute (see table 1) from 41 attribute which play important role during identification of intrusion in captured packets [23]. It is clear from produced results that 8 attributes out of the 41 attributes of the captured packets from network have a significance value higher than zero, and the rest have a significance of zero and hence not selected for the results. Another important thing of proposed RT-IDS is that it has the facility of Host IDS apart from network IDS in this if intrusion are coming from host system then it will also produce the report of such type of intrusions this type of facilities is not present in the existing IDS [2]. One more this in proposed RT-IDS is that it is finding more intrusion in capture packets as compare existing IDS [2] , presented results is six day analysis where proposed IDS has sniff the network at various time and time interval and then producing the intrusions report.



Graph 1: Attack analysis over captured packets in NIDS with security concerned (firewall)

At last proposed SNART-IDSis showing the results analysis of HIDS mode (as in Table 2). During HIDS analysis login and logout time is measured and noted down if any user login after valid time period then it will recorded and send an alert signal by agent to administrator for such type of intrusion.

Table 2: Attack analysis through HIDS

S.No.	U_Id	U_Pw	Date	Time	Status
1	XVY	XVY	16/03/17	7:15	Wrong Time

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2	ABC	ABC	11/04/17	8:35	Wrong Time
3	PQR	PQR	12/04/17	6:12	Wrong Time
4	LXY	LXY	13/04/17	6:49	Wrong Time

CONCLUSION

In this research Proposed NART-IDS that is more effective than current intrusion detection systems. The Proposed NART-IDS provide an intelligent fault tolerant self-managed intrusion detection system with continuous runtime and minimum human intervention due to the use of multi-agents supervised by autonomic manager, with minimum number of false-positive alarms due to the use of risk analysis and risk assessment. With the self-management properties the system can dynamically adapt to changing environments, monitor and tune resources automatically, discover, diagnose and react to disruptions automatically. Future plan is to extend this implementation with the use of mobile agents which have the capabilities to autonomously incarnate, migrate and consolidate inside the network from host to host to detect intrusions and execute prevention as a total solution against all known and some unknown generic threats.

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