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Data Transmission & Its Encryption Techniques in Military Networks

[1]Dr. K. V. Naganjaneyulu, [2]N. Veneela, [3]R.Tejaswi. [4]S.Prathiksha Pai, [5]N. Karthik

[1]Assistant Professor (M.Tech, Ph.D)

[1, 2, 3, 4] Department of Computer Science & Engineering, Bharat Institute of Engineering & Technology,
Ibrahimpatnam, Ranga Reddy District, Telangana, India

[5] Master of Business Administration, Bhavan's Vivekananda College, Sainikpuri, Secunderabad, Telangana, India

***Abstract:** In military environments such as battlefield are likely to suffer from intermittent network. Disruption Tolerant Network (DTN) technologies are becoming successful solutions. In the transformation of data sources in military systems, the security constraints have serious issues. In order to retrieve the data secured and efficiently we use the CP-ABE. Cipher text-policy attribute-based encryption (CP-ABE) is a promising cryptographic solution to the access control issues. In this paper, we propose a secure data transmission using CP-ABE for decentralized DTNs where multiple key authorities manage their attributes independently. The problems of key Escrow, Revocation and co-ordination are discussed and we demonstrate how to apply the proposed mechanism to securely and efficiently manage the confidential data distributed in the disruption-tolerant military network. The overall monitoring of the system is and uses of analysis are discussed.*

***Key Words:** Attribute Based Encryption (ABE), Cipher Text Policy-Attribute Based Encryption(CP-ABE), Key Policy-Attribute Based Encryption(KP-ABE), Disruption Tolerant Network (DTN) And two-party computation (2PC)protocol*

I. INTRODUCTION

Military networks normally have several wireless interconnected communication devices to carry forward secure information. The major scenario is the effective and secured communication on both the ends. The connection problem caused by Jammers, Towers, and many other natural calamities are met by recently developed Disruption Tolerant Network (DTN) technologies, When one message is sent to another node, due to disruption, it stores the in intermediate storage nodes. Hence, information can be assessed quickly through these nodes when connection is found out.

The secured data retrieval among the sources is met by Attribute Based Encryption (ABE) [2] [4].It is encryption algorithm to encrypt the confidential data's. Since the attributes are encrypted, if one user suddenly changes the location (or) position, it results in key revocation problem [8], where immediate update of the attribute becomes difficult and there is a possibility of secret key leakage.

Key escrow is also an major issue, where un-authorized non-trusted user accesses the network on the login when the key is leaked. As all the members of the crew are having a public secret key, the whole military's confidential data's get exploited [7]. In order to resolve these issues, The cipher text policy-Attribute based encryption(CP-ABE), provides a multiple authority schemes, where each user is given a own private key generated by the Master's secret key based on their Attributes[5][6]. This gives the advantage of maximum confidentiality in hostile environments. ex: If a non-trusted user tends to leak his secret key, Then the data's of only his functionality get exposed there by keeping others information secured. Since it has multi authority to single-user, it updates the attributes individually and immediately, solving the revocation and co-ordination problem.

II. RELATED WORKS

Military Networks with many wireless communicating devices suffers an end to end node communication problem in DTN, which came out with the proposal gave on Message Ferry Route Design for Sparse Ad hoc Networks with Mobile Node that generates a ferry route which assures good performance without any online link between the nodes and the ferry[3]. This Design has an intermediate node communication. In these DTNs The Attribute based Encryption (ABE) is the suggested algorithm for Secure Attribute Based System presenting cryptographic optimizations that vastly improve enforcement efficiency of complex policies, proposed by Matthew Pirretti and Patrick Traynor [4].This Method led to Key Revocation Problem, when handled in the Disruption tolerant Networks (DTN).Then with the Fuzzy Identity Based Encryption (F-IBE) from Lattices proposed on Learning With Errors (LWE) [2]. This was possible by observing properties that secret sharing schemes need to satisfy, becomes complicated. Resolving this, The Identity-based Encryption (IBE) with Efficient Revocation proposed a scheme that improves key-update efficiency of the trusted party, based on the ideas of the Fuzzy IBE primitive and binary tree data structure[2][9]. This module has a constraint in data sharing, since it has the user's identity encrypted. So, by using the method of proxy re-encryption with CP-ABE, the Attribute Based Data Sharing with Attribute Revocation is achieved, which enables the authority to revoke user attributes efficiently, but the Authorization Problem With the single public key is a major challenge in confidentiality [8].

In hostile environments on military sources, if a soldier tends to leak the public key, the whole system gets distorted and results in the Key Escrow problem. It is the scenario that a un authorized person gets in to the networks. Therefore, Sherman S.M. Chow proposed on Removing Escrow, which is new system architecture with a private key generation protocol issuing a private key to an authenticated user not considering their identities [7].This individual multiple keys to individual users improves the networks security. The management of this key remains complicated process [1] and has a separate group key management.

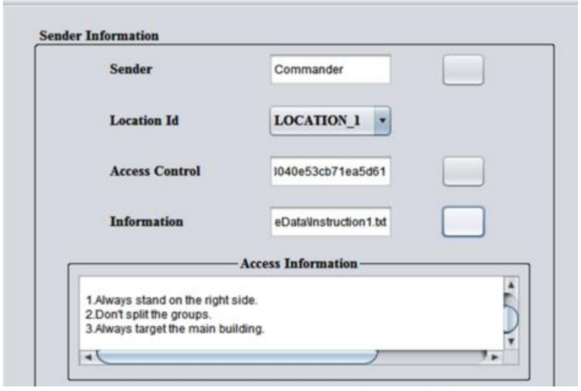
III. CONS OF EXISTING SYSTEM

The problem of applying the ABE to DTNs introduces several security and privacy provocations. Since some users may change their associated attributes at some point (for example, moving from one region to another region), or some private keys might be compromised, key revocation (or update) for each attribute is necessary in order to make systems secure.

IV. PROPOSED SYSTEM

We propose a decentralized CP-ABE scheme in multi authority network environment to secure the encrypt and decrypt data using key authority generating the key.Thus, the scalability and security can be enhanced in the proposed scheme. Thus, the access structure will contain the authorized sets of attributes.

The number of times the user logged in, the time, date and various factors are monitored using the (CS-UDD).Therefore the most trusted user ,ex:-(battalion, soldier) can be selected based on these Analysis.



Sender Information

Sender: Commander

Location Id: LOCATION_1

Access Control: 040e53cb71ea5d61

Information: eData\Instruction1.txt

Access Information

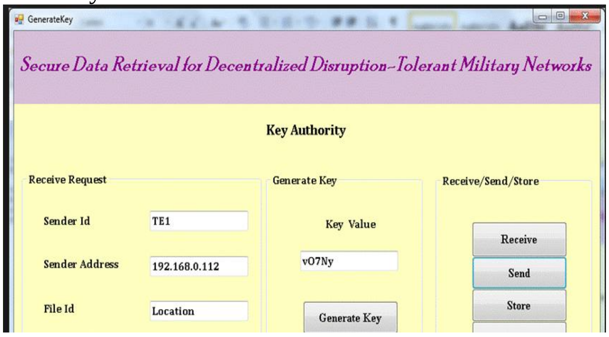
1.Always stand on the right side.
2.Don't split the groups.
3.Always target the main building.

Fig4. (CS-UDD)Monitoring Access Log

V. PROS OF PROPOSED SYSTEM

The benefits of proposed system are, it provides following features:

i. Data Confidentiality.
ii. Collusion Resistance.
iii. Backward and forward Secrecy.



GenerateKey

Secure Data Retrieval for Decentralized Disruption-Tolerant Military Networks

Key Authority

Receive Request

Sender Id: TE1

Sender Address: 192.168.0.112

File Id: Location

Generate Key

Key Value: vO7Ny

Fig 5. Secure Data Retrieval (DTN)

VI. ARCHITECTURE

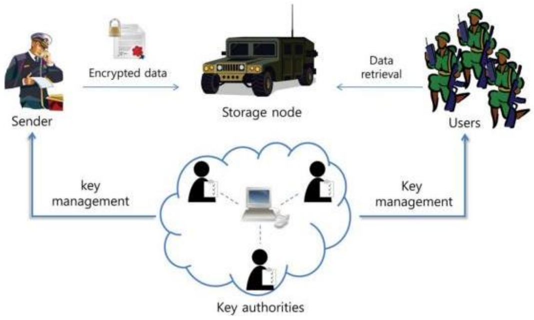


Fig6. Architecture for Secured Data Retrieval Decentralised DTN

6.1 Software and Hardware Requirements:

6.1.1 Hardware Requirements:

Processor Type	: Pentium IV
RAM	: 256 MB
Hard disk	: 20 GB
Keyboard	: 101/102 Standard Keys
Mouse	: Scroll Mouse

6.2.2 Software Requirements:

Operating System	: Windows 8
Programming Package	: Eclipse Luna
Coding Language	: Java

VII. SYSTEM COMPONENTS

The data transmission in these networks is carried out between the admin and the end users. In the midst of this functioning, database holds the user's login details and the storage node has control of encrypted keys.

There are 4 major modules in Decentralised military system they are:

1. KeyAuthority
2. Storage Node
3. Storage Carry & Forward
4. Decentralised User

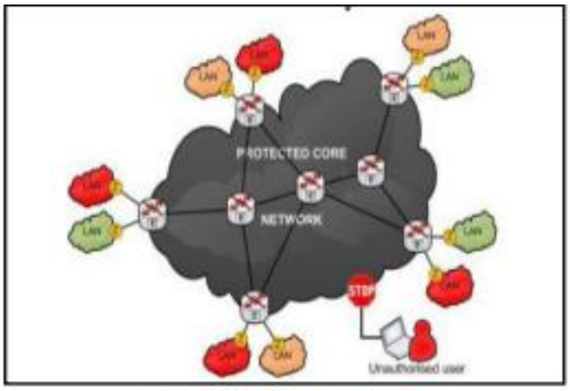


Fig: 1 Military Network

The requests on both the ends is managed by the storage node.

7.1 Key Generation

This is the first phase, where the user gets checked in to the network. This component is created for the security purpose with the user interface design. In this we have a login page to enter user name and password. It validates the given data by referring the database. If found matched, then enters the user page, else re-transmits to the initial page. So we are preventing unauthorized user entering the network. It will provide a good Initial security for highly confidential data.

7.2 Storage Node

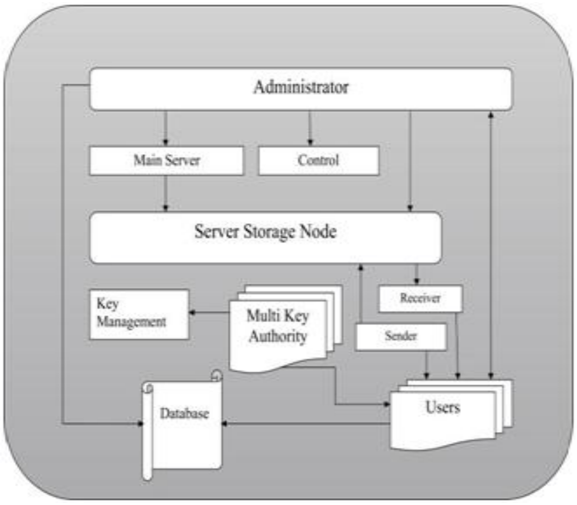
The user will upload some data's in the User Page. The system will calculate size of the file and sends through Storage node. Therefore storage node can get the data without traffic and also transmit the data in less time. The data confidentiality and privacy can be cryptographically enforced against any curious key authorities or data storage nodes in the proposed scheme. This is an entity that stores data from senders and provide corresponding access to users. We also assume the storage node to be semi trusted, that is honest-but-curious.

7.3 Store-carry and forward

This is an entity who owns confidential messages or data (e.g., a commander) and wishes to store them into the external data storage node for ease of sharing or for reliable delivery to users in the extreme networking environments. A sender is responsible for defining (attribute based) access policy and enforcing it on its own data by encrypting the data under the policy before storing it to the storage node. If a user possesses a set of attributes satisfying the access policy of the encrypted data defined by the sender, and is not revoked in any of the attributes, then he will be able to decrypt the cipher text and obtain the data.

7.4 Decentralized user

We provide a multi-authority CP-ABE scheme for secure data retrieval in decentralized DTNs. Each local authority issues partial personalized and attribute key components to a user by performing secure 2PC protocol with the central authority. Each attribute key of a user can be updated individually and immediately. Thus, the scalability and security can be enhanced in the proposed scheme. Communicate with every user in network.



VIII. CONCLUSION & FUTURE WORK

Mobile nodes in military environments such as a battlefield are likely to suffer from intermittent network connectivity. Disruption-tolerant network (DTN) technologies are becoming affluent solutions. The concept of attribute based encryption (ABE) is used in the DTN. Cipher text-policy attribute-based encryption (CP-ABE) is a promising solution to the access control issues. To solve Key Revocation, Escrow Problem and Coordination of attribute issued from different authorities, we introduce backward/forward secrecy method, Key issuing protocol and define fine grained access policy methods are introduced. In this project, we propose a secure data retrieval scheme using CP-ABE for decentralized DTNs where multiple key authorities manage their attributes independently.

We proposed an efficient and secure data retrieval method using CP-ABE for decentralized DTNs where multiple key authorities manage their attributes independently. The inherent key escrow problem is resolved such that the confidentiality of the stored data is guaranteed even under the hostile environment where key authorities might be compromised or not fully trusted. In addition, the fine-grained key revocation can be done for each attribute group. We demonstrate how to apply the proposed mechanism to securely and efficiently manage the confidential data distributed in the disruption-tolerant military network. The overall monitoring system also enhances the security and betterment of the system.

In future, we would like to hide attribute keys and transmits information among soldiers. So that soldiers can work more efficiently.

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