Secure Information Recovery for Decentralized Interruption Tolerant Defense Data Network

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ABSTRACT:

Mobile nodes in military environments such as a battlefield or a hostile region are likely to suffer from intermittent network connectivity and frequent partitions. Disruption-tolerant network (DTN) technologies are becoming successful solutions that allow wireless devices carried by soldiers to communicate with each other and access the confidential information or command reliably by exploiting external storage nodes. Some of the most challenging issues in this scenario are the enforcement of authorization policies and the policies update for secure data retrieval. Ciphertext-policy attribute-based encryption (CP-ABE) is a promising cryptographic solution to the access control issues. However, the problem of applying CP-ABE in decentralized DTNs introduces several security and privacy challenges with regard to the attribute revocation, key escrow, and coordination of attributes issued from different authorities. In this paper, we propose a secure data retrieval scheme using CP-ABE for decentralized DTNs where multiple key authorities manage their attributes independently. We demonstrate how to apply the proposed mechanism to securely and efficiently manage the confidential data distributed in the disruption-tolerant military network.

INTRODUCTION
What is networking?

Networking is the word basically relating to computers and their connectivity. It is very often used in the world of computers and their use in different connections. The term networking implies the link between two or more computers and their devices, with the vital purpose of sharing the data stored in the computers, with each other. The networks between the computing devices are very common these days due to the launch of various hardware and computer software which aid in making the activity much more convenient to build and use.
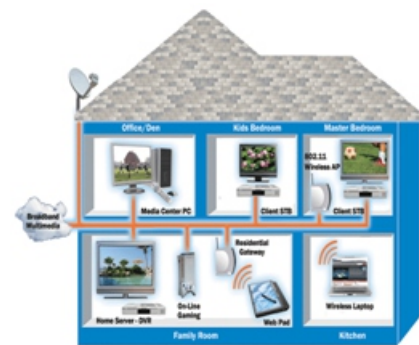

Fig.1.1.Structure of Networking between the different computers.

HOW NETWORKING WORKS:

General Network Techniques - When computers communicate on a network, they send out data packets without knowing if anyone is listening. Computers in a network all have a connection to the network and that is called to be connected to a network bus. What one computer sends out will reach all the other computers on the local network.
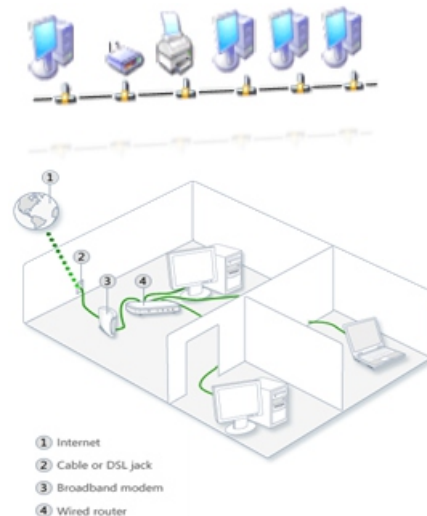

1 Internet
2 Cable or DSL jack
3 Broadband modem
4 Wired router

Fig.1.2.Above diagrams show the clear idea about the networking functions.

For the different computers to be able to distinguish between each other, every computer has a unique ID called MAC-address (Media Access Control Address). This address is not only unique on your network but unique for all devices that can be hooked up to a network. The MAC-address is tied to the hardware and has nothing to do with IP-addresses. Since all computers on the network receives everything that is sent out from all other computers the MAC-addresses is primarily used by the computers to filter out incoming network traffic that is addressed to the individual computer.When a computer communicates with another computer on the network, it sends out both the other computers MAC-address and the MAC-address of its own. In that way the receiving computer will not only recognize that this packet is for me but also, who sent this data packet so a return response can be sent to the sender. On an Ethernet network as described here, all computers hear all network traffic since they are connected to the same bus. This network structure is called multi-drop.

One problem with this network structure is that when you have, let say ten (10) computers on a network and they communicate frequently and due to that they sends out there data packets randomly, collisions occur when two or more computers sends data at the same time. When that happens data gets corrupted and has to be resent. On a network that is heavy loaded even the resent packets collide with other packets and have to be resent again. In reality this soon becomes a bandwidth problem. If several computers communicate with each other at high speed they may not be able to utilize more than 25% of the total network bandwidth since the rest of the bandwidth is used for resending previously corrupted packets. The way to minimize this problem is to use network switches.

CHARACTERISTICS OF NETWORKING:

The following characteristics should be considered in network design and ongoing maintenance:

1)Availability is typically measured in a percentage based on the number of minutes that exist in a year. Therefore, uptime would be the number of minutes the network is available divided by the number of minutes in a year.
2)Cost includes the cost of the network components, their installation, and their ongoing maintenance.
3)Reliability defines the reliability of the network components and the connectivity between them. Mean time between failures (MTBF) is commonly used to measure reliability.

4)Security includes the protection of the network components and the data they contain and/or the data transmitted between them.
5)Speed includes how fast data is transmitted between network end points (the data rate).
6)Scalability defines how well the network can adapt to new growth, including new users, applications, and network components.
7)Topology describes the physical cabling layout and the logical way data moves between components.

TYPES OF NETWORKS:

Organizations of different structures, sizes, and budgets need different types of networks. Networks can be divided into one of two categories:
•peer-to-peer
•server-based networks

1.Peer-to-Peer Network:

A peer-to-peer network has no dedicated servers; instead, a number of workstations are connected together for the purpose of sharing information or devices. Peer-to-peer networks are designed to satisfy the networking needs of home networks or of small companies that do not want to spend a lot of money on a dedicated server but still want to have the capability to share information or devices like in school, college, cyber cafe.

2.Server-Based Networks:

In server-based network data files that will be used by all of the users are stored on the one server. With a server-based network, the network server stores a list of users who may use network resources and usually holds the resources as well.This will help by giving you a central point to set up permissions on the data files, and it will give you a central point from which to back up all of the data in case data loss should occur.

Network Communications:

•Computer networks use signals to transmit data, and protocols are the languages computers use to communicate.
•Protocols provide a variety of communications services to the computers on the network.
•Local area networks connect computers using a shared, half-duplex, baseband medium, and wide area networks

link distant networks.
•Enterprise networks often consist of clients and servers on horizontal segments connected by a common backbone, while peer-to-peer networks consist of a small number of computers on a single LAN.

Advantages of Networking:
1.Easy Communication:

It is very easy to communicate through a network. People can communicate efficiently using a network with a group of people. They can enjoy the benefit of emails, instant messaging, telephony, video conferencing, chat rooms, etc.

2.Ability to Share Files, Data and Information:

This is one of the major advantages of networking computers. People can find and share information and data because of networking. This is beneficial for large organizations to maintain their data in an organized manner and facilitate access for desired people.

3.Sharing Hardware:

Another important advantage of networking is the ability to share hardware. For an example, a printer can be shared among the users in a network so that there's no need to have individual printers for each and every computer in the company. This will significantly reduce the cost of purchasing hardware.

4.Sharing Software:

Users can share software within the network easily. Networkable versions of software are available at considerable savings compared to individually licensed version of the same software. Therefore large companies can reduce the cost of buying software by networking their computers.

5.Security:

Sensitive files and programs on a network can be password protected. Then those files can only be accessed by the authorized users. This is another important advantage of networking when there are concerns about security is

sues.Also each and every user has their own set of privileges to prevent those accessing restricted files and programs.

6.Speed:

Sharing and transferring files within networks is very rapid, depending on the type of network. This will save time while maintaining the integrity of files.

SYSTEM ANALYSIS
EXISTING SYSTEM:

The concept of attribute-based encryption (ABE) is a promising approach that fulfills the requirements for secure data retrieval in DTNs. ABE features a mechanism that enables an access control over encrypted data using access policies and ascribed attributes among private keys and ciphertexts. Especially, ciphertext-policy ABE (CP-ABE) provides a scalable way of encrypting data such that the encryptor defines the attribute set that the decryptor needs to possess in order to decrypt the ciphertext. Thus, different users are allowed to decrypt different pieces of data per the security policy.

DISADVANTAGES OF EXISTING SYSTEM:

* The problem of applying the ABE to DTNs introduces several security and privacy challenges. Since some users may change their associated attributes at some point (for example, moving their region), or some private keys might be compromised, key revocation (or update) for each attribute is necessary in order to make systems secure.
* However, this issue is even more difficult, especially in ABE systems, since each attribute is conceivably shared by multiple users (henceforth, we refer to such a collection of users as an attribute group)
* Another challenge is the key escrow problem. In CP-ABE, the key authority generates private keys of users by applying the authority's master secret keys to users' associated set of attributes.
* The last challenge is the coordination of attributes issued from different authorities. When multiple authorities manage and issue attributes keys to users independently with their own master secrets, it is very hard to define fine-grained access policies over attributes issued from different authorities.

PROPOSED SYSTEM:

In this paper, we propose an attribute-based secure data retrieval scheme using CP-ABE for decentralized DTNs. The proposed scheme features the following achievements. First, immediate attribute revocation enhances backward/forward secrecy of confidential data by reducing the windows of vulnerability. Second, encryptors can define a fine-grained access policy using any monotone access structure under attributes issued from any chosen set of authorities. Third, the key escrow problem is resolved by an escrow-free key issuing protocol that exploits the characteristic of the decentralized DTN architecture.

The key issuing protocol generates and issues user secret keys by performing a secure two-party computation (2PC) protocol among the key authorities with their own master secrets. The 2PC protocol deters the key authorities from obtaining any master secret information of each other such that none of them could generate the whole set of user keys alone. Thus, users are not required to fully trust the authorities in order to protect their data to be shared. The data confidentiality and privacy can be cryptographically enforced against any curious key authorities or data storage nodes in the proposed scheme.

ADVANTAGES OF PROPOSED SYSTEM:

» Data confidentiality: Unauthorized users who do not have enough credentials satisfying the access policy should be deterred from accessing the plain data in the storage node. In addition, unauthorized access from the storage node or key authorities should be also prevented.
» Collusion-resistance: If multiple users collude, they may be able to decrypt a ciphertext by combining their attributes even if each of the users cannot decrypt the ciphertext alone.
» Backward and forward Secrecy: In the context of ABE, backward secrecy means that any user who comes to hold an attribute (that satisfies the access policy) should be prevented from accessing the plaintext of the previous data exchanged before he holds the attribute. On the other hand, forward secrecy means that any user who drops an attribute should be prevented from accessing the plaintext of the subsequent data exchanged after he drops the attribute, unless the other valid attributes that he is holding satisfy the access policy.

SYSTEM DESIGN
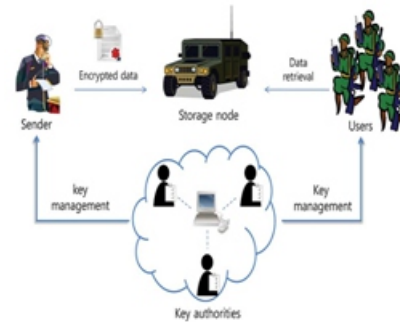## SYSTEM ARCHITECTURE:

Fig.1.3. system architecture:

DATA FLOW DIAGRAM:

1.The DFD is also called as bubble chart. It is a simple graphical formalism that can be used to represent a system in terms of input data to the system, various processing carried out on this data, and the output data is generated by this system.
2.The data flow diagram (DFD) is one of the most important modeling tools. It is used to model the system components. These components are the system process, the data used by the process, an external entity that interacts with the system and the information flows in the system.
3.DFD shows how the information moves through the system and how it is modified by a series of transformations. It is a graphical technique that depicts information flow and the transformations that are applied as data moves from input to output.
4.DFD is also known as bubble chart. A DFD may be used to represent a system at any level of abstraction. DFD may be partitioned into levels that represent increasing information flow and functional detail.

UML DIAGRAMS:

UML stands for Unified Modeling Language. UML is a standardized general-purpose modeling language in the field of object-oriented software engineering. The standard is managed, and was created by, the Object Management Group. The goal is for UML to become a common language for creating models of object oriented computer software. In its current form UML is comprised of two major components: a Meta-model and a notation. In the future, some form of method or process may also be added to; or associated with, UML.

The Unified Modeling Language is a standard language for specifying, Visualization, Constructing and documenting the artifacts of software system, as well as for business modeling and other non-software systems. The UML represents a collection of best engineering practices that have proven successful in the modeling of large and complex systems. The UML is a very important part of developing objects oriented software and the software development process. The UML uses mostly graphical notations to express the design of software projects.

GOALS:

The Primary goals in the design of the UML are as follows:

1.Provide users a ready-to-use, expressive visual modeling Language so that they can develop and exchange meaningful models.
2.Provide extendibility and specialization mechanisms to extend the core concepts.
3.Be independent of particular programming languages and development process.
4.Provide a formal basis for understanding the modeling language.
5.Encourage the growth of OO tools market.
6.Support higher level development concepts such as collaborations, frameworks, patterns and components.
7.Integrate best practices

INPUT DESIGN:

The input design is the link between the information system and the user. It comprises the developing specification and procedures for data preparation and those steps are necessary to put transaction data in to a usable form for processing can be achieved by inspecting the computer to read data from a written or printed document or it can occur by having people keying the data directly into the system. The design of input focuses on controlling the amount of input required, controlling the errors, avoiding delay, avoiding extra steps and keeping the process simple. The input is designed in such a way so that it provides security and ease of use with retaining the privacy. Input Design considered the following things:

» What data should be given as input?
» How the data should be arranged or coded?

» The dialog to guide the operating personnel in providing input.
» Methods for preparing input validations and steps to follow when error occur.

OBJECTIVES:

1.Input Design is the process of converting a user-oriented description of the input into a computer-based system. This design is important to avoid errors in the data input process and show the correct direction to the management for getting correct information from the computerized system.
2. It is achieved by creating user-friendly screens for the data entry to handle large volume of data. The goal of designing input is to make data entry easier and to be free from errors. The data entry screen is designed in such a way that all the data manipulates can be performed. It also provides record viewing facilities.
3.When the data is entered it will check for its validity. Data can be entered with the help of screens. Appropriate messages are provided as when needed so that the user will not be in maize of instant. Thus the objective of input design is to create an input layout that is easy to follow

OUTPUT DESIGN:

A quality output is one, which meets the requirements of the end user and presents the information clearly. In any system results of processing are communicated to the users and to other system through outputs. In output design it is determined how the information is to be displaced for immediate need and also the hard copy output. It is the most important and direct source information to the user. Efficient and intelligent output design improves the system's relationship to help user decision-making.

1. Designing computer output should proceed in an organized, well thought out manner; the right output must be developed while ensuring that each output element is designed so that people will find the system can use easily and effectively. When analysis design computer output, they should Identify the specific output that is needed to meet the requirements.
2.Select methods for presenting information.
3.Create document, report, or other formats that contain information produced by the system.
The output form of an information system should accomplish one or more of the following objectives.

* Convey information about past activities, current status or projections of the
* Future.
* Signal important events, opportunities, problems, or warnings.
* Trigger an action.
* Confirm an action.

CONCLUSION:

DTN technologies are becoming successful solutions in military applications that allow wireless devices to communicate with each other and access the confidential information reliably by exploiting external storage nodes. CP-ABE is a scalable cryptographic solution to the access control and secure data retrieval issues. In this paper, 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.

REFERENCES:

[1] J. Burgess, B. Gallagher, D. Jensen, and B. N. Levine, "Maxprop: Routing for vehicle-based disruption tolerant networks," in Proc. IEEE INFOCOM, 2006, pp. 1–11.

[2] M. Chuah and P. Yang, "Node density-based adaptive routing scheme for disruption tolerant networks," in Proc. IEEE MILCOM, 2006, pp. 1–6.

[3] M. M. B. Tariq, M. Ammar, and E. Zequra, "Mesage ferry route design for sparse ad hoc networks with mobile nodes," in Proc. ACM MobiHoc, 2006, pp. 37–48.

[4] S. Roy andM. Chuah, "Secure data retrieval based on ciphertext policy attribute-based encryption (CP-ABE) system for the DTNs," Lehigh CSE Tech. Rep., 2009.

[5] M. Chuah and P. Yang, "Performance evaluation of content-based information retrieval schemes for DTNs," in Proc. IEEE MILCOM, 2007, pp. 1–7.

[6] M. Kallahalla, E. Riedel, R. Swaminathan, Q. Wang, and K. Fu, "Plutus: Scalable secure file sharing on untrusted storage," in Proc. Conf. File Storage Technol., 2003, pp. 29–42.

[7] L. Ibraimi, M. Petkovic, S. Nikova, P. Hartel, and W. Jonker, "Mediated ciphertext-policy attribute-based encryption and its application," in Proc. WISA, 2009, LNCS 5932, pp. 309–323.

[8] N. Chen, M. Gerla, D. Huang, and X. Hong, "Secure, selective group broadcast in vehicular networks using dynamic attribute based encryption," in Proc. Ad Hoc Netw. Workshop, 2010, pp. 1–8.

[9] D. Huang and M. Verma, "ASPE: Attribute-based secure policy enforcement in vehicular ad hoc networks," Ad Hoc Netw., vol. 7, no. 8, pp. 1526–1535, 2009.

[10] A. Lewko and B. Waters, "Decentralizing attribute-based encryption," Cryptology ePrint Archive: Rep. 2010/351, 2010.