# BROKER LESS SYSTEM SECURITY WITH ENCRYPTION BASED ON UNIQUENESS

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## ABSTRACT

The proposed system presents a useful platform for delivering data from Publisher to Subscriber in an anonymous fashion in distributed network. We present scalable solutions for confidentiality, integrity, and authentication for the systems. We present new approach to provide confidentiality guarantee, So we would like to encrypt messages so that only interested subscribers can read the message. In this worst case, for n clients, there can be 2n subgroups, and each event can go to a potentially different subgroup .To handling encrypted data for the purpose of routing based on protected content and encrypted subscription information. We suggest a solution based on a commutative multiple encryption schemes in order to allow brokers to operate in-network matching and content based routing without having access to the content of the packets. To enable efficient routing of encrypted events searchable encryption is provided. For support weak subscription confidentiality, multi credential routing a new event distribution method is provided.

Keywords: *Key Analyzer*, *Role* Management, *Attack monitoring, Encryption technique*

## INTRODUCTION

The publish/subscribe model most popular model evolved from last few years as a tool for distributed applications in which information has to be dispersed from event producers to event consumers. Publishers inject information into the pub/sub system; subscribers specify the events of interest by means of subscriptions. In more recent systems, broker-less routing infrastructure is used by making event forwarding overlay. [1]

if an event is generated and published, the pub/sub infrastructure are responsible for checking the event against all current subscriptions and delivering it to all users whose subscriptions match the event. Content based pub/sub systems allow filters that is complex on the event content which enabling the use of constraints such are prefixes, suffixes, ranges. Expressiveness of subscription language and scalability of the infrastructure poses an interesting challenge.

Access control of pub/sub system means that only authenticated publishers are allowed to disseminate events in the network and only those events are delivered to authorized subscribers.

The flexibility of pub-sub comes on the other hand with a high cost in increased exposure in terms of data privacy and security is a part from classical data security concerns such as the confidentiality and integrity of messages, authentication of the source, access control authorization of subscribers, publish-subscribe also raises new challenges inherent to the collapsed forwarding scheme that is the underpinning of pub-sub. Layered communication systems, the application layer information can be protected with various security mechanisms like encryption and message authentication without the underlying data forwarding mechanisms implemented in the network layer.

An emerging paradigm of messaging technology is pub-sub. In such systems, customers (or subscribers) specify the type of content they want to receive via subscriptions. Publishers publish messages (events), and the publish subscribe system delivers them only to that interested subscribers. The Publishers are often decoupled from subscribers, then creating more scalable solutions.

This paper presents and compares several algorithms for secure delivery of events from a broker to its subscribers. The content of events should not be exposed to the routing infrastructure and a subscriber should receive all relevant events without revealing its subscription to the system. For solving these security issues in a content-based pub/sub system imposes new challenges.

Using a public key infrastructure (PKI) conflicts with the loose coupling between publishers and subscribers, a key requirement for building scalable pub/sub systems. For PKI, publishers must maintain the public keys of all interested subscribers to encrypt events. Subscribers must

know the public keys of all relevant publishers to verify the Access right of the received events. Moreover, traditional mechanisms to provide confidentiality by encrypting the whole event message conflict with the content-based routing paradigm. New mechanisms are needed to route encrypted events to subscribers without knowing their subscriptions and to allow subscribers and publishers authenticate each other without knowing each other get Authentication.

## 1. OBJECTIVES

We present a new approach to provide authentication and confidentiality in a broker-less publish/subscribe system. A publisher associates each encrypted event with a set of credentials we adapted identity based encryption mechanisms. Our approach allows subscribers to maintain credentials according to their subscriptions. A private keys assigned to the subscribers are labelled with the credentials.

## 2. PROBLEM STATEMENT

Cloud server is used for register publishers and subscriber as well all transactions are storing on cloud server.

Whatever the book or data publisher want to publish he need to send the copy to Broker and then Broker will publish data on cloud.

As same Subscriber need to request for his subscription to Broker. So in existing technique broker is Interface between publisher and subscriber.

And also Broker has complete access of all transaction of cloud and that's why there will be possibilities like publishers data will be share with other publishers. And there is no security for publishers and subscribers data.

It is very hard to provide subscription confidentiality in a broker-less publish/subscribe system, where the subscriber's are arranged in an overlay network according to the containment relationship between their subscriptions. In which case, regardless of the cryptographic primitives used, the maximum level of attainable confidentiality is very limited.

## 3. EXISTING SYSTEM

### 4.1. CONTENT-BASED PUBLISH/SUBSCRIBE

We consider a classical CBPS model as described in many papers like [6, 20].

– Publisher which publish information in the form of event notifications,

– Subscriber which expresses their interests in certain content in the form of subscription filters,

The CBPS infrastructure composed of brokers (intermediate nodes) whose task is to disseminate notifications sent by publishers to the subscribers.

Assume that the CBPS infrastructure can be viewed, from the perspective of publisher, as a tree whose root node is the publisher itself and whose leaf nodes are the subscriber. Belongs to this model, we only consider the case of a network with one publisher for the sake of simplicity. Information contained in each event should fit within an event schema, and the subscription filters are predicates against this schema. In this model of subscription is equality filters with only one keyword and events are composed of two parts: one routable attribute and a second part is the payload. The equality matching is the frequently used filtering function in the literature since it can be used as a basis to support range queries as introduced in . Brokers use this matching operation between filters and routable attributes to route published content.

### 4.2 ATTACKER MODEL

There are two entities in the system publishers and subscribers. Such entities are computationally bounded and do not trust each other. Moreover, all the peers participating in the pub/sub overlay network are honest and do not deviate from the designed protocol. Such as authorized publisher only disseminate valid events in the system. So, malicious publishers may masquerade the authorized publishers and spam the overlay network with fake and duplicate events. We do not intently to solve the digital copyright problem; So, authorized subscribers do not reveal the content of successfully decrypted events to other subscribers.

Subscribers are, however, curious to discover the subscriptions of other subscribers and published events to which they are not authorized to subscribe. Same as, curious publisher may be interested to read events published in the system. Also additionally, passive attackers outside the pub/sub overlay network can eaves drop the communication and try to discover content of subscriptions.

Finally, we assume the presence of secure channels for the distribution of keys from the key server to the publisher and subscribers. A confidential channel can be easily realized by using transport layer.

### 4.3. SECURITY GOALS AND REQUIREMENTS

These are three major goals for the proposed secure pub/ sub system, namely to support confidentiality, scalability and authentication.

Confidentiality- In a broker-less environment, two aspects of confidentiality are of interest: 1) the events are only visible to authorized subscribers and are protected from illegal changes, and 2) the subscriptions of subscribers are confidential and un-forgeable.

Scalability- The secure pub/sub system should scale with the number of subscribers in the system. Three aspect are important to preserve scalability: 1) the number of keys to be managed and the cost of subscription should be independent of the number of subscribers in the system, 2) the key server and subscribers must maintain small and constant numbers of keys per subscription, and 3) Because of rekeying the overhead should be minimized without compromising the fine-grained access control.

Authentication-To avoid non-eligible publication, only authorized publisher should be able to publish events in the system. Similarly, subscriber should only receive those messages to which they are authorized to subscribe

## 5. PROPOSED SYSTEM

Publisher will publish his books on cloud server without Broker and adding key for subscriber for those he want to give access to read or edit the published data. At the time of registration subscriber get one master key which is provided by publisher. So whenever he wants to access publisher's data he need to provide his private key. So in this way in proposed system the avoid overhead and misbehaviors actions of Broker on publishers data. According to diagram 1.publish data 2.add subscriber's keys 3.subscriber get access only when his key added for particular Published document.

### 5.1. IDENTITY-BASED ENCRYPTION

While a traditional PKI infrastructure requires maintaining for each publisher or subscriber a private/public key pair which has to be known between communicating entities to encrypt and decrypt messages, identity-based encryption provides a promising alternative to reduce the amount of keys to be managed. In identity-based encryption, any valid string which uniquely identifies a user can be the public key of the user. A key server maintains a single pair of public While a traditional PKI infrastructure requires to maintain for each publisher or subscriber a private/public key pair which has to be known between communicating entities to encrypt and decrypt messages, identity-based encryption gives a promising alternative to reduce the amount of keys to be managed. In identity-based encryption, any valid string which uniquely identifies a user can be the public key of the user. A key server maintains a single pair of publication private master keys. The master public key can be used by the sender to send the messages to a user with any identity, for example, an e-mail address. To successfully decrypt the message, a receiver needs to obtain a private key for its identity from the key server.

We want to stress here that although identity-based encryption at the first glance appears like a highly centralized solution, its properties are ideal for distributed applications. A sender needs to know only a single master public key to communicate with any identity. Similarly, a receiver only obtains private keys for its own identities. Moreover, an instance of central key server can be easily replicated within the network. Finally, a key server maintains only a single pair of master keys and, therefore, can be realized as a smart card, provided to each participant of the system.

Has laid the foundation of practical implementation of identity-based encryption. Pairing-based cryptography establishes a mapping between two cryptographic groups by means of bilinear maps. This allows the reduction of one problem in one group to a different usually easier problem in another group. We utilize bilinear maps for establishing the basic security mechanisms in the pub/sub system and, therefore, introduce here the main properties. Let $G_1$ and $G_2$ be cyclic group of order q, where q is some large prime. A bilinear map is a function e^ : $G_1$ _ $G_1$ ! $G_2$ that associates a pair of elements from $G_1$ to elements in $G_2$. A bilinear map satisfies the following conditions:

1. Bilinearity. e^ðu$^{x}$; v$^{y}$Þ ¼ e^ðu$^{y}$; v$^{x}$Þ ¼ e^ðu; vÞ$^{xy}$, for all u; v 2 $G_1$, and x; y 2 Z

2. Nondegeneracy. e^ðu; vÞ 6¼ 1, for all u; v 2 $G_1$.

3. Computability. e^ can be efficiently computed.

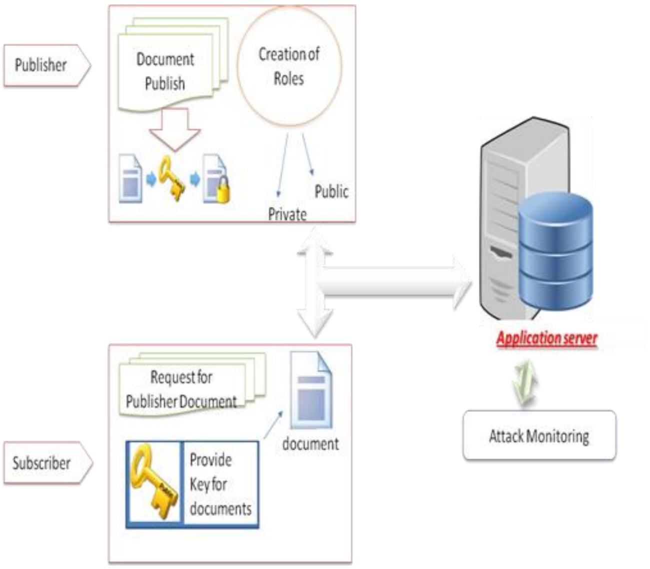

Fig 1..System flow diagram

5.2 Contributed Work

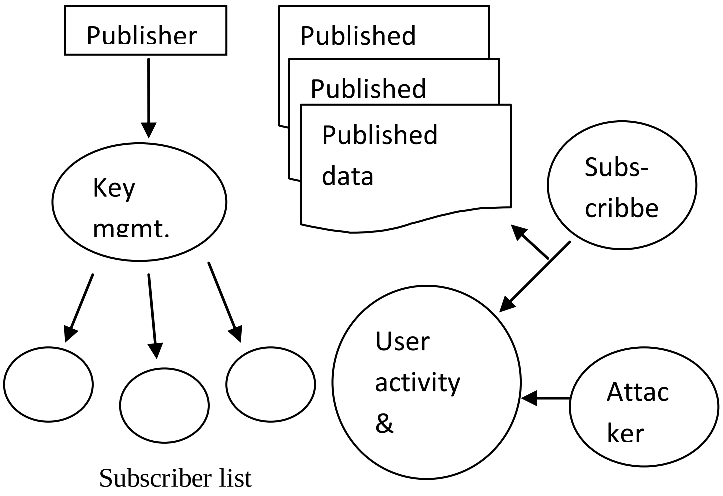

Fig2. Contributed work

- Attacker will enter in system in behalf of Subscriber.
- To detect attacker we will monitor every subscriber's activities :

  →Attacker trying to using same user's public key to access different publisher's data

  →Attacker trying to changing public key of same user

## 6. APPROACH OVERVIEW

For providing security mechanisms in pub/sub, we prestige the principles of identity-based encryption to support many-to-many interactions between subscribers and publishers. Although we subsequently express the implementation of our security methods in terms of a concrete variant called attribute-based encryption, it is important to remark that our approach also benefits from other identity-based encryption schemes in our approach, publisher and subscribers communicate with a key server. They provide credential to the key server and in turn receive keys which fit the expressed capabilities in the credentials. Then, those keys can be used to encrypt, decrypt, and sign relevant message in the content based pub/sub system, i.e., the credential becomes authorized by the key server. A credential consists of two parts:1) a binary string which describes the capability of a peer in publishing and receiving events, and 2) a proof of its identity. After it is used for authentication against the key server and verification whether the capabilities match the identity of the peer. While this can happen in a variety of ways, for example, relying on challenge response, hardware support, and so on, we pay attention mainly at expressing the capabilities of a credential, i.e., how subscribers and publishers can create a credential. This process needs to account for the many possibilities to partition the set of events expressed by an advertisement or subscription and exploits overlaps in subscriptions and publications. Subsequently, we use the term credential only for referring to the capability string of a credential .The keys assigned to publishers and subscribers, and the cipher texts , are labeled with credentials. In particular, the identity-based encryption ensures that a particular key can decrypt a particular cipher text only if there is a match between the credentials of the cipher text and the key. Publishers and subscribers maintain separate private keys for each authorized credential.

### RECEIVING EVENTS

Decryption On receiving the cipher texts, a subscriber tries to decrypt them using its private keys. The cipher texts for each attribute are accurately ordered according to the containment relation between their associated credentials; hence, a subscriber only tries to decrypt the cipher text whose position coincides with the position of its credential in the containment hierarchy of the corresponding attribute. The location of a credential can be easily determined by calculating its length. For e.g. for a numeric attribute, credential 0000 occupies fourth position in the containment hierarchy, i.e., after 0, 00, and 000. Subscribers decrypt the cipher text in the following manner:

- Step 1. The symmetric key SK is retrieved from the cipher text CT1 by performing the following pairing-based cryptographic operations.

## 7. SUBSCRIPTION CONFIDENTIALITY

In this section, we address to achieve subscription confidentiality in a broker-less pub/sub system.

### 7.1. PUBLISH/SUBSCRIBE OVERLAY

The pub/sub overlay is a virtual forest of logical trees, where to each tree is associated with an attribute (cf. Fig. 3). A subscriber joins the trees corresponding to the attributes of its subscription. Same as, a publisher sends an event on all the trees associated with the attributes in the event.

Within each attribute tree, subscribers are connected according to the containment relationship between their credentials associated with the attribute. The subscriber with coarser credentials (e.g., the ones mapped to coarser subspaces in case of numeric attributes) is placed near the root of the tree and forward events to the subscriber with finer credentials. The subscriber with more than one credentials can be handled by running multiple virtual peers on a single physical node, every virtual peer maintaining its own set of tree links. To connect to an attribute tree, a newly arriving subscriber $s_n$ sends the connection request along with its credential to a random peer $s_r$ in the tree. The peer $s_r$ compares the request credential with its own; if the peer's credential covers the request credential and the peer can accommodate more children, it accepts the connection. Elsewhere, the connection request is forwarded to all the children with covering credentials and the parent peer with the exception of the peer from which it was received. By this method, the connection request is forwarded by many peers in the tree before it reaches the suitable peer with covering credential and available connection.

### 7.2. WEAK SUBSCRIPTION CONFIDENTIALITY

It is infeasible to provide strong subscription confidentiality in a broker-less pub/sub system because the maintenance of the overlay topology requires each peer to know the subscription of its parent as well as its children. To know this issue, a weaker notion of subscription confidentiality is required.

Definition 8.2. Let $s_1$ and $s_2$ denote two subscribers in a pub/sub system which both possesses credentials for an attribute $A_i$. The weak subscription confidentiality ensures that at most the following information can be inferred about the credentials of the subscribers:

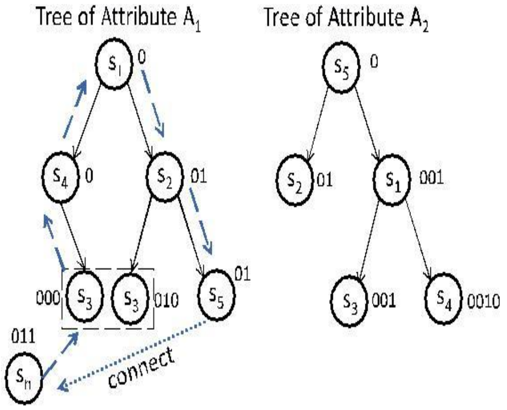

Fig.3. *Pub/Sub system with two numeric attributes*.

1. The credential of $s_1$ is either coarser or equal to the credentials of $s_2$.
2. The credential of $s_1$ is either finer or equal to the credentials of $s_2$.
3. The credentials of $s_1$ and $s_2$ are not in any containment relationship.

## 8. CONCLUSION

1) To convince that a particular subscriber can decrypt an event only if there is a match between the credentials associated with the event and its private keys and

2) To allow subscribers to verify the authenticity of received events. Also, we developed a secure overlay maintenance protocol and proposed two event dissemination strategies to preserve the weak subscription confidentiality in the presence of semantic clustering of subscribers.

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