STAMP: Enabling Privacy Preservation Location Proofs for Mobile Users

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***Abstract* - Location-based services are very popular now. When adding work to the user's current location, many possible services rely on the user's location or records of temporal and spatial sources. If there is no security solution designed for users to prove their past location, cruel users can lie about their time and space origin. We propose a mutual authentication time and space source assurance scheme (STAMP). Temporary mobile users use the STAMP program to generate location tests for everyone in the decentralized environment. This easily includes reliable mobility and fewer contact connections. STAMP guarantees the authenticity and non-transferability of installed certificates and protects the privacy of users. Based on the light-entropy confidence estimation trend, the semi-trusted document capability is used to distribute encryption keys and check whether users conflict. Our implementation examples at the personnel stage show that STAMP has very low cost in computing storable expression s. The universal copy experiment shows that our entropy-based trust copy can obtain a higher accuracy rate of conspiracy discovery.**

I.INTRODUCTION

ASLOCATION is booming; Location-based services are very popular. Most location-based services currently used for mobile devices are based on the user's current location. The user finds their location and separates them from the server. In turn, the server sequentially performs location-based calculations and provides data/services to users. In the accumulation of the user's current location, it is possible to test confirm that the mobile user's past geographic location has further development and motivation. This provides a large number of the latest mobile applications based on location testing. Salo yuttar. Several possible applications are described. We created three examples: The store should offer discounts to ordinary customers. Frequent visitors must be there to show that they come often. Another example is that travel agencies that promote green transport and health may reward employees who walk or commute by bicycle. The company may be cheering for Pony's mileage every day. Employees must show the company their past travel routes and past time. Participate in one or more certificates they provide to intermediary verifiers to keep the company in a certain position.

II.EASE OF USE

2.1 Problem description

The system most relevant to our work is the location authentication system, which also generates location authentication for mobile devices based on co-location.

Privacy policy can be protected by the following aspects: local authentication server, certificate authority, and final verifier. Mobile devices use periodic changes to protect their true identity to prevent mutual intrusion and location verification servers.

2.2 Purpose

It focuses on spatial top-k queries and notes two basic shortcomings of current top-k query services. First, LBSP usually has a very small dataset containing points of interest. Comment. This will greatly affect the practicability, and ultimately make the more common use of top-k space query services difficult.

2.3 Methodology

We use the AES algorithm to find the location, because the message is encrypted by the sender, and the receiver can find the location by entering a private key that cannot be shared by a third party or anyone

else, so the message will be decrypted and can be seen through the certificate.

A. Preliminaries

1) Location granularity level: We assume that each location has a granularity level, which can be expressed as L1, L2,...Ln

By and Where represent the finest location granularity (for example, precise geographic coordinates) and the nearest location granularity (for example, city).

Below, we Shortened location level, means location accuracy level. When a position level is known, we assume that a corresponding higher position level is available. The semantic representation of the location level Ly, where y>x. Assuming that the entire system is standardized

2) Encrypted building blocks: STAMP uses the concept of compromise to ensure the privacy of testers. Commitment plans allow a person to commit to information, while at the same time hiding information from others and the ability to disclose information.

The promised value. The original message cannot be changed after sending. The promise to C(M, r) can be used as a message, r can be used as a random number i, that is, as a random promise, M cannot be reconstructed by the receiver. When the sender displays both at the same time, you can view the promise.

3) Distance limitation: An authenticator is required for the positioning authentication system, and the authenticator can be safely located. Distance border agreement.

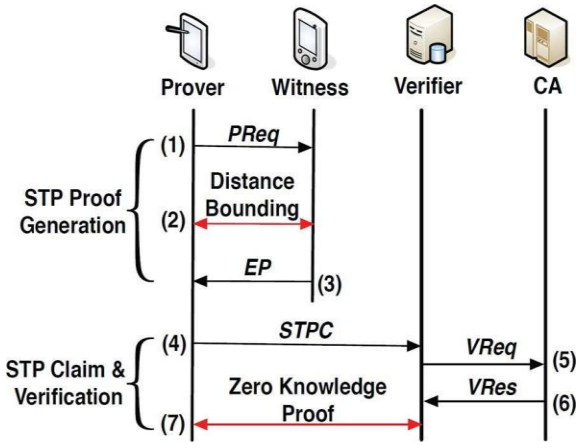

Figure 1 Schematic diagram of STAMP protocol.

Witness: The observer receiving A decides whether to allow the requested signal. If allowed, the observer will respond.

Public key. The approved STP certificate provides the location of the witness ID. finally,

The audience sent someone to verify. Use your private key encryption to protect the identity of the witness that the tester can see. This one has never seen CA.

Tester: Assuming that the tester finally receives information from the set of st p events to be tested, the tester consumes this information through the preposition.

And local spatio-temporal information (that is, the sum). Now the certification body has been established. stp declaration and confirmation: certifier: the verifier will extract the necessary data from the stp declaration and confirmation at the beginning

The corresponding STP test is STP, and the tester intends to expose the lowest location level. Based on the operation of the hash chain.

Verifier: Receive those from the verifier. A request was made.

ca:ca gets A, then it can crack everything except the promised site level, because the certificate authority does not know the value

Witnesses submitted to the scene. CA does two things: ep verification and pwconspiracyfinding. Beginners, CAperform EP confirms that the next step has passed the review

• Sign and accept the public key
• agree
• You can cancel the shipment

For all those who passed the verification, CA began to hope to evaluate and restore the effectiveness of the P-W conspiracy test.

We enter the information of the process pw separately. If all verifications fail, a positive result will appear after the PW cools down, and a verifier failure notification will be sent through the verifier. Because, the CA returns it and sends it to the validator as follows: Extract it from the large integer generated in the location boundary stage. Please note that the value of S comes from the bit promise prepared by the tester. Testers use promises as the same STP test.

Authenticator: After receiving it, perform 2 functions: Zero knowledge test: based on zy

The prover kp +. Perform multiple rounds of interaction to minimize the chance of testers cheating. stpr open: The validator obtains STPR1, STPR2...STPRn from VRes. T can be used as the information time. STRP is first checked with the test declared by t. Then publish each completed promise

and get it from STPC. Inconsistent or unresolvable position promises will invalidate the corresponding pledge pledge verifier. Take the verified valid EP as an example. Finally, the validator must check the number of valid EPs to determine whether the tester's STP statement has been executed .

III.LITERATURE SURVEY

[1] Z. Zhu, G. Cao, "Privacy Protection and Collusion Resistance in the Location Test Update System", IEEE Trans. Mobile computing, volume. 12. Page 1. January 51-64, 2011

They proposed a system based on the original location service to understand the exact location of the customer to improve reliability. This allows malicious users to access restricted resources by spoofing your location or providing a spoofed alibi. To solve this problem, they proposed position authentication system that protects confidentiality (APPLAUS) where the mobile device that support Bluetooth mutually generate location authentication and send the update to the location authentication server. Use pseudonyms on mobile devices

Change regularly to protect the privacy of the source location from the other party and the location verification server. Starting from the assumption of a minimum password with a one-way function, a statistical hidden commitment scheme (a scheme in which hidden attributes theoretically contain information) is constructed. It is constructed using the two-phase commitment scheme recently constructed by Nguyen, Ong, and Vadhan (FOCS '06) and the one-way universal function Ha (Greek).

[2] D. Singelee, B. Preneel, "Location Verification Using Safe Distance Border Protocol", Proc. MISA IEEE, 2005.

They proposed that system authentication on traditional networks (such as the Internet) generally depends on what you know (passwords, etc.), what you have (smart cards, etc.) or your identity (biometrics). Mobile ad hoc networks can also use location information to authenticate devices and users.. They focus on how testers

You can safely indicate that there is a certain distance between him or her and the verifier. Brands and Chaum have proposed a distance limitation protocol as a safe solution to this problem.

However, this transaction is vulnerable to so-called "terrorist fraud attacks." How to modify the scope limitation protocol to deal with this type of attack. recent, the other two safe distances

The border agreement was announced. They discussed the characteristics of these protocols and showed how to use them as building blocks for location verification schemes.

IV.SYSTEM ANALYSIS AND DESIGN

4.1 System model

Wireless infrastructure cannot be ubiquitous, so creating STP for wireless AP-based systems proved to be inappropriate for this situation. In addition, if we need a large number of wireless APs with the ability to generate STP certificates, the implementation cost will be a very feasible multi-segment multi-segment feature. We made a decentralized protocol, and then we proved that this also applies to centralized situations

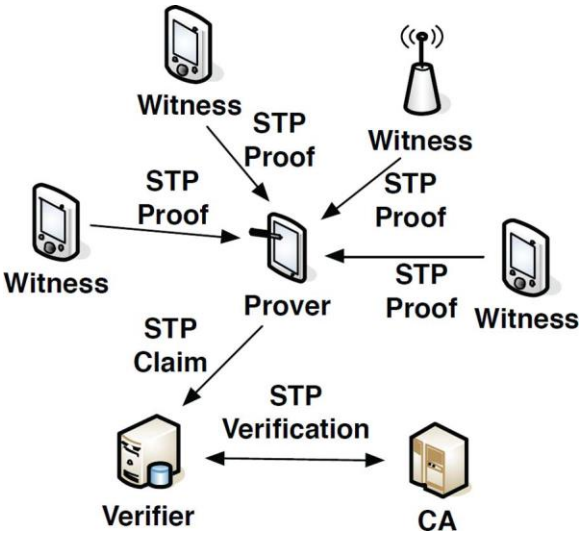

Figure 1. System architecture diagram

According to different roles, there are four types of entities:

- Certification agency: provide STP certification to the location
- Witness: similar to the prover, because it receives a request from the prover and wants to generate stp
- May be reliable or unreliable, and the reliability of the witness may be mobile or fixed (wireless access point). Don't trust connected mobile users.

1. STAmp requirements and challenges
First, we will see the agreement. Let us introduce and discuss the important challenges and problems facing us in order to intuitively understand the goals of our agreement.

A. Protection
The security of STP certification has two aspects: authenticity and non-transferability. Work with any other trusted party to generate the required reliability attributes for the forged STP certificate.
The non-transferable attributes are there and you can claim that you have a valid STP certificate
From another validator.

Option 1: The certifier cannot reach a legal solution without a witness. Since the user will not reveal the private key, the tester cannot use the private key of other people.
username. The plain text STP certificate must be a digital file of a legal person, so that the witness can become a legal certificate.
Monitor and protect REST, HTTP, and WebSocket APIs of any size. The server can only use one method (service hosting or custom identity provider) to authenticate users, and this method cannot be changed after the server is created

Option 2: Do not collude with witnesses. When the designated time is not in the designated place, the witness cannot legalize the witness. According to Proposal 1, the witness must require the witness to be a legal witness. Now take 2 as an example: the tester inserted the wrong position/time in a; this
The tester secretly talks to the agent, talks to the agent at the expected location, or asks the agent to provide a tunnel (ie P-P collusion). Since legal witnesses receive it, they can check whether the location boundary stage is needed so that the witness can determine whether the sender is within that range. Since there is no signal emission faster than the speed of light, rapid bit swapping at the distance limit will detect that the tester can be contacted from different locations. Therefore, it is easy for witnesses to spot the attack. Based on this agreement, the zero-knowledge proof stage can ensure that the parties and witnesses in the restricted stage actually have the same ownership.

Option 3: The tester can change the space and time out of order. The token sends the assigned level as a password. Unable to get validator
The private key of the CA, therefore, the promise of decryption and display space may not be fulfilled.
option 4: Testers cannot use one, but the other tester is trained. By binding the promise attribute and the tester id, the tester is encrypted to 1, so the tester cannot use a to change the limit. If the verifier uses the sand of himself and other verifiers to file a claim against the verifier, the CA will detect that it is inconsistent with the information submitted by the verifier. Without revealing the identity, the verifier will pass the zero-knowledge proof stage of the test and will not infer the corresponding public key.

Option 5: The witness cannot deny the legality of his creation. Legality includes. Your private key has been compromised.

Option 6: The certifier and the witness cannot be jointly determined. In the sTP certificate process of genre of the certificate, the certifier identity will be sent. Since the witness did not know, he could not release the promise and get it. The identity of the witness is contained in
It is encrypted by the public key of the CA. The CA's private key will not be owned by the verifier, nor can it be decrypted or obtained. In addition, the identities of both parties will not be revealed during the distance restriction phase.

Option 7-Multiple stP events collected and sent by the same tester cannot be linked to
witness. The verifier makes different choices in different locations. Even witnesses received
Share anything with several identical witnesses from different distances.

Option 8: The STP evidence generated by the actual witness's STP forensic event cannot be associated with the tester. Witnesses choose different STP tests. The fragment got a clue to the witness's location.

Option 9: The validator understands that the lowest position level can open the promise. Due to the randomness introduced by's, it is not feasible to attack all possible positions at the position level of the dictionary.

Option 10: The certificate authority does not read the details of the verifier or the location of the token.
The CA cannot cancel the commitment to submit any location level, and therefore cannot obtain the relevant certificate authority and relevant certificates. Due to the introduction of randomness, dictionary attacks on all possible positions are not feasible.

Option 11: No trusted user is specified, so when there is no AP connected, the source is required
Trust in the form of CA. When a user or a witness endorses the user, the revised entropy evaluation system will increase the entropy, and at the same time it will be signed by a trusted person.
option 12: No one can claim to be a trusted user.
Because this scheme involves using these asymmetric keys for encryption.
Since existing users will not sacrifice or give up their public/private keys, no one else can pretend to be a relying party.
The authorized stp certificate can be decoded with the verifier's private key, so they should know where to go. Certification bodies can pass additional certification
witness. Therefore, it is limited to specific applications. Alternatively, a trusted witness can use his private key to sign the STP certificate so that any verifier can view the endorsed STP
Prove. P=C(IDp,Rp)|STPR|EK+(z)
EP=EK-(IDw|p|EK-(H(p))

$M_1 \| M_2$	Concatenation of messages M_1 and M_2
K_u^+	Public key of user u
K_u^-	Private key of user u
$E^K(M)$	Encryption of message M with key K
$H(M)$	One-way hashing of message M
$C(M, r)$	Commitment to message M with nonce r

Table I-Symbol list

• Diversity: less. The stp generation adds different transactions for customers. Less diversity means that nothing depends on the witness.

• Fairness: Multiple transactions are conducted through quantity. stp has proven a generation of Iof customers. High distribution means low collusion. We use entropy to measure coexistence.

Existing system:
The current location service completely depends on the user's device, such as GPS positioning. However, malicious users may in turn pretend to deceive STP. Therefore, to realize the authenticity of the STP certificate, a third party must participate in the creation of the STP certificate. However, this adds a lot of safety and security

- The proposed system is based on the testimony of verifying the location of wireless APs such as Hassan and approving mobile peers that support Bluetooth, and customers can use mobile and other peers at the same time. It cannot be forged.
- For the creation of the alibi system, their security system relies on nearby mobile users t (i.e. location proof). For everyone in front of you, the system is an alibi.

Shortcoming
1. The breathing STP authentication process used for transmission generation or normal authentication relies on wireless communication (such as WiFi AP). However, one of them, such as the identification and illegal provision of wireless AP, and the immature commuting battlefield.
2. A confidential or semi-confidential third party is the main policy holder.

Recommended system:

- At a series We define the past location of the mobile user at a certain point in time as the user's stp, and the user's digital certificate at a specific time as the STP certificate.
- We propose a stp proof scheme called stamp. Its main goal is to ensure the integrity and non-transferability of the sTp certificate, and to have the ability to protect user privacy.
- We propose a trust model based on entropy to detect collusion scenarios.

Introduces a distributed STP test generation and validation protocol (seal) to achieve STP test integrity and non-portability.
Except for semi-trusted CA, no additional trusted third party is required.
Its purpose is to maximize user anonymity and website privacy. Users can control particle size at STP authentication locations.
In order to detect false proofs between users, a trust model based on entropy is proposed. STAMP uses an entropy-based trust model to protect users from

evidence-witness collusion. To oppose selfish behavior is to encourage witnesses.

Benefits:

1. The scope of application is wider.
2. Based on distributed architecture.
3. Only a semi-trusted third party that can embed a certificate authority (CA) is required.
4. The purpose of our design system is to protect the anonymity and location privacy of users.
5. In addition to the verifier, no party can see the user's identity and STP information at the same time (the verifier needs to verify and provide services through the identity and STP information).
6. Low computational cost.
7. Provide security analysis to prove that STAMP has achieved its security and privacy goals

V.SYSTEM REQUIREMENTS

4.1 Software requirements:

- Operating system: Windows 7
- Coding language: java /j2EE
- Tool: Net bean 8.2.1 v
- Database: Mysql

4.2 Hardware requirements:

- Hard disk: 120 GB
- Memory: 1 GB
- Display: "17" LED inches
- Input devices: keyboard and mouse

VI.CONCLUSION

We recommend that STAMP provide security and privacy guarantees for evidence of past location visits by mobile users. STAMP relies on nearby mobile devices to mutually generate location certificates or use wireless APs to generate location certificates.
The integrity and non-transferability of the location proof and the user's location privacy are the main design goals of STAMP.

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