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Security Performance on the Basis of Service Provider in WSN

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Abstract *— Induced by including the powerful data storage space and data processing skills of cloud computing (CC) and along with ubiquitous data acquiring together capacity of wireless sensor systems (WSNs), CC-WSN integration received a whole lot of attention from both in statute and industry. Nevertheless authentication as well as trust and reputation calculation and management of cloud companies (CSPs) and sensor network providers (SNPs) are two very critical and scarcely explored issues for this kind of new paradigm. To fill up the gap, this paper proposes a novel verified trust and reputation computation and management (ATRCM) program for CC-WSN integration. Looking at the authenticity of CSP and SNP, the characteristic requirement of cloud services user (CSU) and CSP, the cost, trust, and trustworthiness of the services of CSP and SNP, the proposed ATRCM program achieves the subsequent three capabilities: 1) authenticating CSP and SNP in order to avoid malicious impersonation attacks; 2) calculating and managing trust and status service of CSP and SNP; and 3) helping CSU choose desired CSP and assisting CSP in selecting appropriate SNP. Detailed analysis and style as well as further more functionality analysis results happen to be presented to demonstrate the effectiveness of ATRCM implemented with system security evaluation.*

Keywords: *Cloud Computing (CC), CSP(Cloud Service Provider), WSN (Wireless Sensor Network),CSU(Cloud Service User)ATRCM(Authenticated Trust and Reputation Computation Management),*

I. INTRODUCTION

Computer is being transformed to a model consisting of services that are commoditized and delivered in a manner similar to classic utilities just like water, electrical energy, gas, and telephony. In such a model, users access services based upon their requirements without respect to where the companies are hosted or just how they are delivered. Cloud computing (CC) is known as a version can be described as to {permit} convenient, on demand network access to get a distributed pool of configurable processing resources (e. g., web servers, networks, storage, applications, and services) that could become rapidly provisioned and introduced with minimal management efforts or service agency interaction. cellular sensor networks (WSNs) will be networks consisting of spatially distributed autonomous sensors, which in turn are capable of realizing the physical or environmental conditions.

Cloud Computing (CC): CC is featured by simply that users can elastically make use of the infrastructure (e. g., networks, servers, and storages), platforms (e. g., operating systems and middleware services), and software's (e. g., application programs) proposed by cloud providers in a great on-demand manner. Not just the operating cost and business risks as very well as maintenance expenses of companies can be considerably lowered with CC, yet also the service level could be expanded on demand and web-based easy gain access to for clients could get provided benefiting from CLOSED CIRCUIT.

Wireless Sensor Networks (WSNs): WSNs are widely concentrated as a result of their great potential in areas of civilian, industry and military (e. g., forest fire recognition, professional process monitoring, site visitors monitoring, battlefield surveillance, and so on.), which could alter the traditional way for folks to interact with the physical world. For example, regarding forest fire recognition, since sensor nodes may be strategically, randomly, and densely deployed in a forest, the specific source of a forest open fire can be relayed to the owners before the forest fire turns unmanageable without the vision of physical fire. In addition, regarding battlefield surveillance, because sensors are able to be deployed to continually monitor the condition of critical terrains, approach paths, paths and straits in a battlefield, those activities of the opposing forces could be closely watched by monitoring center without the participation of physical scouts.

CC-WSN Integration: Induced by including the powerful data storage space and data processing skills of CC as good as the ubiquitous info gathering capability of WSNs, CC-WSN integration received very much attention from both educational and professional communities. This incorporation paradigm is driven by simply the potential application situations displayed. one particular. Specifically, sensor network companies (SNPs) provide the physical data (e. g., visitors, video, weather, humidity, temperature) collected by the used WSNs to the cloud companies (CSPs). CSPs make use of the powerful cloud to store and process the sensory data after which additional on demand provide the prepared

sensory data towards the impair service users (CSUs). As a result CSUs can get access to their particular required sensory data with simple client to access the cloud.

II. LITERATURE REVIEW

1) A Study of Trust and Reputation Management Systems in Wi-Fi Communications:
Authors: By Han Yu, Zhiqi Shen, Chunyan Miao, Cyril Leung, and Dusit Niyato.
Description: Trust can be an important principle in human relationships which helps the development and continued presence of functional individual societies. Within the first 10 years of the 21st century, computational trust models have been put on solve many problems in cellular communication systems. This combination disciplinary research has yielded many progressive solutions. In this particular paper, we analyze the latest methods which were proposed by experts to control trust and reputation in cellular communication systems. Specifically, we market research the status of the art work in the use of trust models in the areas of mobile random networks (MANETs), cellular sensor systems (WSNs), and cognitive radio systems (CRNs). We classify the mainstream methods into natural categories and demonstrate how they enhance the other person in reaching design goals. Major research guidelines are also laid out.

2) A study on communication and data management issues in mobile sensor systems.
Authors: C Zhu1, Lei Shu, Takahiro Hara, LeiWang, Shojiro Nishio and Laurence T. Yang1.
Description: Cellular sensor systems (WSNs) which is suggested in the later 1990's have obtained unprecedented attention, for their fascinating potential applications in armed service, professional, and civilian areas (e.g., environmental and habitat monitoring). Although WSNs have become more and more possible in human life with the development of hardware and communication technologies, Although WSNs have become more and more possible in human life with the development of communication and hardware technologies, there are a few natural restrictions of WSNs (e.g., network connection, network life span) because of the static network style in WSNs. Furthermore, increasingly more application situations require the detectors in WSNs to be mobile alternatively than static to be able to make traditional applications in WSNs become smarter and permit some new applications. All of this induce the mobile cellular sensor systems (MWSNs) which can greatly promote the development and software of WSNs. However, to the best of our knowledge, there isn't a thorough study about the communication and data management issues in MWSNs. there isn't a thorough study about the info and communication management issues in MWSNs In this particular paper, concentrating on researching the communication issues and data management issues in MWSNs, we discuss different research methods regarding communication and data management in MWSNs and propose some further open research areas in MWSNs.

3) A Cloud Design for User-controlled Storage space and Control of Sensor Data.
Authors: Rene Hummen, Martin Henze, Daniel Catreiny, Klaus Wehrle.
Description: Ubiquitous sensing conditions such as sensor systems gather huge amounts of data. This data amount is destined to develop even more with the perspective of the web of Things. Cloud computing guarantees to store and process such sensor data elastically. As another advantage, storage and processing in the Cloud permits the efficient aggregation and analysis of information from different data sources.
However, sensor data often contains privacy-relevant or elsewhere sensitive information. For current Cloud platforms, the info owner loses control over her data once it enters the Cloud. This imposes adoption obstacles credited to legal or personal privacy concerns. Hence, a Cloud design is necessary that owner can trust to take care of her very sensitive data securely. In this particular paper, we examine and design properties a respected Cloud design must fulfill. Predicated on this analysis, we present the security structures of Sensor Cloud. Our proposed security architecture enforces end-to-end data access control by owner reaching from the sensor network to the Cloud storage and processing subsystems as well as strict isolation up to the service-level. We measure the validity and feasibility in our Cloud design with an evaluation of your prototype. Our results show our proposed security architecture is a promising extension of today's Cloud owners.

4) Secured Trust: A Dynamic Trust Computation Model for Secured Communication in Multi-Agent Systems
Authors: Anupam Das and M. Mahfuzul Islam, Member, IEEE.
Description: Security and privacy issues have become critically important with the fast expansion of multi-agent systems. Most network applications such as pervasive computing, grid computing and P2P networks can be viewed as multi-agent systems which are open, anonymous and dynamic in nature. Such characteristics of multi-agent systems introduce vulnerabilities and threats to providing secured communication. One feasible way to minimize the threats is to evaluate the trust and reputation of the interacting agents. Many trust/reputation models have done so, but they fail to properly evaluate trust when malicious agents start to behave in an unpredictable way. Moreover, these models are ineffective in providing quick response to a malicious agents oscillating behavior. Another aspect of multi-agent systems which is becoming critical for sustaining good service quality is the even distribution of workload among service providing agents. Most trust/reputation models have not yet addressed this issue. So, to cope with the strategically

altering behavior of malicious agents and to distribute workload as evenly as possible among service providers; we present in this paper a dynamic trust computation model called Secured Trust. In this paper we first analyze the different factors related to evaluating the trust of an agent in a and then propose a comprehensive quantitative model for measuring such trust. We also propose a novel load balancing algorithm based on the different factors defined in our model. Simulation results indicate that our model compared to other existing models can effectively cope with strategic behavioral change of malicious agents and at the same time efficiently distribute workload among the service providing agents under stable condition.

5) A Survey of Attack and Defense Techniques for Reputation Systems
Authors: Kevin Ho_man, David Zage, and Cristina Nita-Rotaru**.**
Description: Reputation systems provide mechanisms to produce a metric encapsulating reputation for a given domain for each identity within the system. These systems seek to generate an accurate assessment in the face of various factors including but not limited to unprecedented community size and potentially adversarial environments. We focus on attacks and defense mechanisms in reputation systems. We present an analysis framework that allows for general decomposition of existing reputation systems. We classify attacks against reputation systems by identifying which system components and a design choice is the target of attacks. We survey defense mechanisms employed by existing reputation systems. Finally, we analyze several landmark systems in the peer-to-peer domain, characterizing their individual strengths and weaknesses. Our work contributes to understanding 1) which design components of reputation systems are most vulnerable, 2) what are the most appropriate defense mechanisms and 3) how these defense mechanisms can be integrated into existing or future reputation systems to make them resilient to attacks.

6) Cloud computing: state-of-the-art and research challenges.
Authors: Qi Zhang Lu Cheng Raouf Boutaba
Description: Cloud computing has recently emerged as a new paradigm for hosting and delivering services over the Internet. Cloud computing is attractive to business owners as it eliminates the requirement for users to plan ahead for provisioning and allows enterprises to start from the small and increase resources only when there is a rise in service demand. However, despite the fact that cloud computing offers huge opportunities to the IT industry, the development of cloud computing technology is currently at its infancy, with many issues still to be addressed. In this paper, we present a survey of cloud computing, highlighting its key concepts, architectural principles, and state-of-the-art implementation as well as research challenges. The aim of this paper is to provide a better understanding of the design challenges of cloud computing and identify important research directions in this increasingly important area

7) Enabling Dynamic Data and Indirect Mutual Trust for Cloud Computing Storage Systems.
Authors: Ayad Barsoum and Anwar Hasan Department of Electrical and Computer Engineering, University of Waterloo, Ontario, Canada.
Description: Storage-as-a-Service offered by cloud service providers (CSPs) is a paid facility that enables organizations to outsource their sensitive data to be stored on remote servers. In this paper, we propose a cloud-based storage scheme that allows the data owner to benefit from the facilities offered by the CSP and enables indirect mutual trust between them. The proposed scheme has four important features: (i) it allows the owner to outsource sensitive data of a CSP, and perform full block-level dynamic operations on the outsourced data, i.e., block modification, insertion, deletion, and append, (ii) it ensures that authorized users (i.e., those who have the right to access the owners) receive the latest version of the outsourced data, (iii) it enables indirect mutual trust between the owner and the CSP, and (iv) it allows the owner to grant or revoke access to the outsourced data. We discuss the security issues of the proposed scheme. Besides, we justify its performance through theoretical analysis and a prototype implementation on Amazon cloud platform to evaluate storage, communication, and computation overheads.

III. SURVEY of PROPOSED SYSTEM

- This paper proposes a novel authenticated trust and reputation calculation and administration (ATRCM) system for CC-WSN integration considering:
  1. The authenticity of CSP and SNP.
  2. The feature requirement of cloud services user (CSU) and CSP.
  3. The cost, reliability and trustworthiness of the service of CSP.

- In the proposed ATRCM program, the SNP achieves the following goals:
  1. Authenticating CSP and SNP to prevent malicious impersonation attacks;
  sequel payments on your Determining and managing trust and reputation about the service of CSP and SNP;
  Helping CSU choose desired CSP and assisting CSP in selecting appropriate SNP.

- Advantageous of Proposed Program:
  1. There are diverse security policies for several domains.
  2. The unit considers the transaction framework, the historical data of entity influences and the measurement of trust benefit dynamically.
  3. The reliability model works with the firewall and does not really break the firewall‘s localized control policies.

- Contributions of this paper:
  This paper is the first study work exploring the reliability and reputation calculation and management with authentication intended for the CC-WSN integration, which usually plainly distinguishes the uniqueness of the work and the scientific effect on current techniques integrating CC and WSNs.
  This paper further offers an ATRCM system intended for the CC-WSN integration. This incorporates authenticating CSP and SNP, after which considers the attribute dependence on CSU and CSP and also price, trust and trustworthiness of the service of CSP and SNP, to {permit} CSU to choose traditional and desirable CSP and assists CSP in choosing genuine and appropriate SNP.

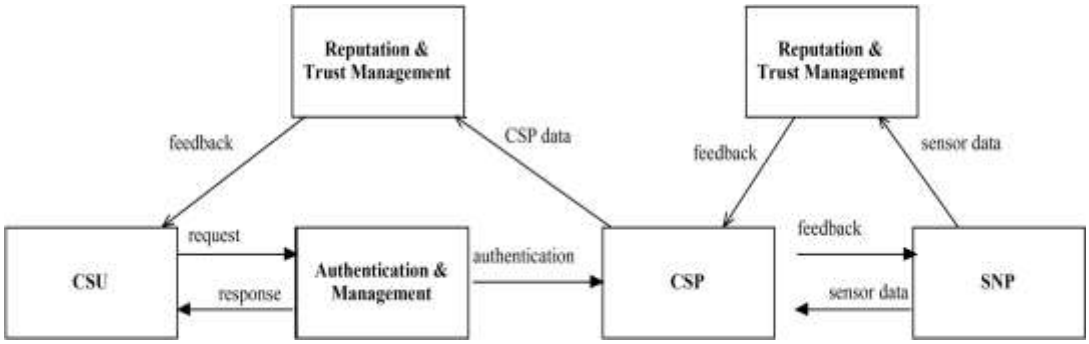
IV. Mathematical Model

Let S be the Whole system which consists,
S={$c_{tc}, c_{tk}, T_{cu}, T_{scu}, R_c, R_{sc}, C_c, C_{bc}, T_{kc}, T_{skc}, R_k, R_{sk}, C_k, C_{bk}, M_k, M_c, \alpha_k, \alpha_c, \beta_k, \beta_c, \gamma_k, \gamma_c$}.

Where,

1. c_{tc} is the certificate of CSP.
2. c_{tk} is the certificate of SNP i.e. Sensor Network Provider.
3. T_{cu} is the trust value from CSP to CSU.
4. T_{scu} is the minimum trust value of service from CSP to CSU.
5. R_c is the Reputation value of service provided by CSP.
6. R_{sc} is the Minimum acceptable reputation value for service of CSP.
7. C_c is the cloud service charge with data service pay.
8. C_{bc} is the Acceptable range for Cc.
9. T_{kc} is the Trust value of service from SNP to CSP.
10. T_{skc} Minimum acceptable trust value of service from SNP to CSP.
11. R_k Reputation value of service provided by SNP.
12. R_{sk} Minimum acceptable reputation value for service of SNP.
13. C_k SNSC-SNSP i.e. Sensor Network Service Charge and Sensor Network Service Pay.
14. C_{bk} Acceptable range for Ck.
15. α_k is the Weight with respect to the importance of Cc
16. α_c Weight with respect to the importance of Ck.
17. β_k, Weight with respect to the importance of Tcu.
18. β_c Weight with respect to the importance of Tkc.
19. γ_k Weight with respect to the importance of Rc.
20. γ_c Weight with respect to the importance of Rk.

V. SYSTEM ARCHITECTURE



VI. IMPLEMENTATION

A) Authentication flowchart of CSP and SNP:

Step 1: CSPs provide the certificate C_{tc} to CSU and CSU checks whether the signature of the certificate is valid and whether the certificate is revoked. CSU filters the CSPs that are not qualified.

Step 2: SNPs offer the certificate C_{tk} to CSP and CSP checks whether the signature of the certificate is valid and whether the certificate is revoked. CSP filters the SNPs that are not qualified.

B) Trust and reputation calculation and management between CSU and CSPs:

Step 1: CSU checks whether the characteristics of CSPs satisfy the attribute requirement of CSU. Filter the CSPs that are not satisfied.

Step 2: CSU issues requests to TCE and achieves the T_{cu} value of the service from CSP to the CSU. CSU checks whether the T_{cu} value is greater than or equal to the T_{scu} value. Filter the CSPs that are not satisfied.

$$T_{cu} \geq T_{scu}$$

Step 3: CSU issues requests to TCE and achieves the R_c value of the service offered by the CSP. CSU checks whether the Rc value is greater than or equal to the R_{sc} value. Filter the CSPs that are not satisfied.

$$R_c \geq R_{sc}$$

Step 4: CSU calculates the C_c value between CSC of CSP and DSP of CSU and checks whether the Cc value is within the C_{bc} range. Filter the CSPs that are not satisfied.

$$C_c \in C_{bc}$$

Step 5: CSU checks whether ctc is revoked and chooses the service offered by the CSP with the maximum Mc and informs TCE about signed SLA or PLA.

$$M_c = -\alpha_c \cdot \frac{C_c}{|C_{bc}|} + \beta_c \cdot T_{cu} + \gamma_c \cdot R_c$$

Step 6: CSU checks whether ctc is revoked before using the service from the CSP. CSU sends feedbacks about the service of the CSP to TCE (Trusted Center Entity) based on PLA (Privacy Level Agreement) and SLA(Service Level Agreement) after the termination of service. TCE stores and updates the T_{cu} value as well as the R_c value.

3) Trust and reputation calculation and management between CSP and SNPs

Step 1: CSP checks whether the characteristics of SNPs satisfy the attribute requirement of CSP. CSP also checks whether the characteristics of SNP satisfy the attribute requirement of CSU. Filter the SNPs that are not satisfied.

Step 2: CSP issues requests to TCE and receives the T_{kc} value of the service from SNP to the CSP. CSP checks whether the T_{kc} value is more than or equal to the T_{skc} value. Filter the SNPs that are not satisfied.

$T_{kc} \geq T_{skc}$

Step 3: CSP issues requests to TCE and receives the R_k value of the service offered by the SNP. CSP checks whether the R_k value is more than or equal to the R_{sk} value. Filter the SNPs that are not satisfied.

$R_k \geq R_{sk}$

Step 4: CSP calculates the C_k value between SNSC of SNP and SNSP of CSP and checks whether the C_k value is within the C_{bk} range. Filter the SNPs that are not satisfied

$C_k \in C_{bk}$

Step 5: CSP checks whether ctk is revoked and chooses the service offered by the SNP with the maximum Mk and informs TCE about signed SLA or PLA.

Step 6: CSP checks whether c_{tk}, is revoked before utilizing the service of the SNP. After the end of service, CSP sends feedbacks about the service of SNP to TCE based on SLA and PLA.

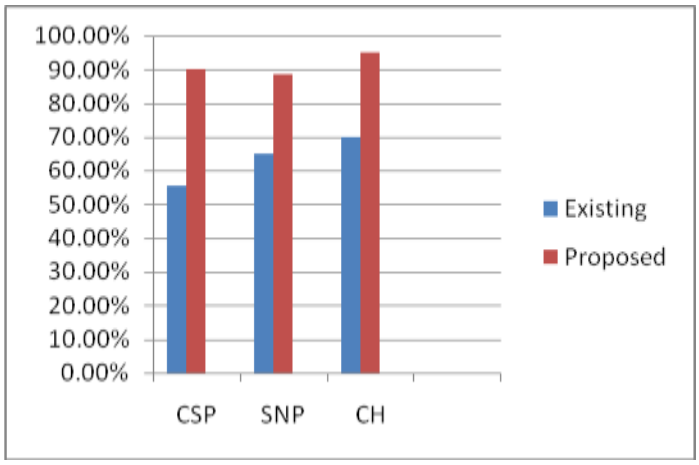
$$M_k = -\alpha_k \cdot \frac{C_k}{|C_{bk}|} + \beta_k \cdot T_{kc} + \gamma_k \cdot R_k$$

VII. RESULT ANALYSIS

Analysis 2 Title: Performance analysis of existing & proposed system with respect to CSP,SNP& CH

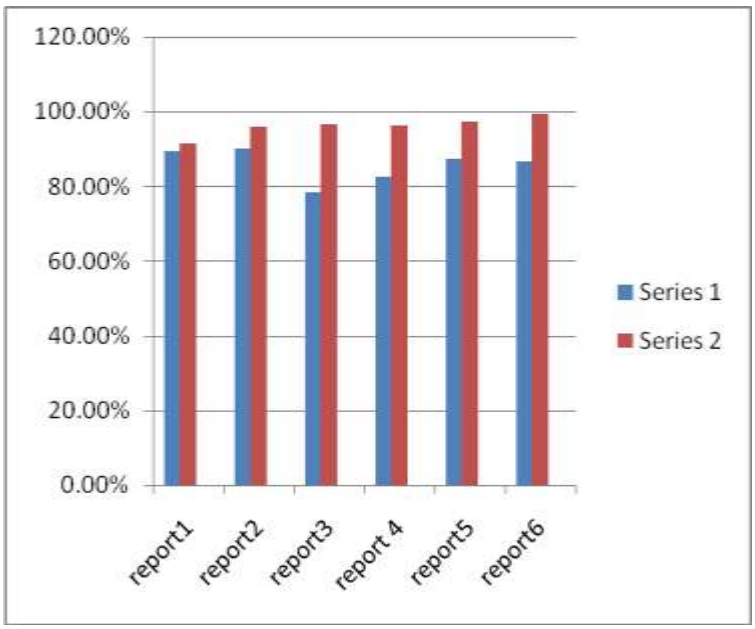
Analysis 1:

	Existing	Proposed
CSP	55.60%	90%
SNP	65%	88.70%
CH	70%	95%



Analysis 2 Title: Data confidentiality with respect to proposed system

	Existing	proposed
report1	89.50%	91.30%
report2	90.20%	95.80%
report3	78.30%	96.50%
report4	82.5	96.20%
report5	87.20%	97.30%
report6	86.5	99.20%



VIII.CONCLUSION AND FUTURE WORK

We all advancingly explored the authentication as well as reliability and reputation calculation and management of CSPs and SNPs, that are two extremely critical and barely discovered issues with respect to CC and WSNs incorporation. Further, we proposed a novel ATRCM system intended for CC-WSN integration. Discussion and analysis about the authentication of CSP and SNP as well as the trust and reputation with respect to the support given by CSP and SNP have already been presented, followed with detailed design and features analysis about the recommended ATRCM

system. All these types of demonstrated that the suggested ATRCM system achieves the following three functions intended for CC-WSN integration:
1) Authenticating CSP and SNP to prevent malicious impersonation attacks.
2) Calculating and managing reliability and reputation about the support of CSP and SNP.
3) helping CSU select desirable CSP and helping CSP in selecting suitable SNP, based on
(i) the authenticity of CSP and SNP;
(ii) the attribute requirement of CSU and CSP;
(iii) the cost, trust and status of the service of CSP and SNP.

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