

Context Aware Secure message forwarding using WCF service in selfish mobile social network

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Abstract — Context-aware computing has attracted increasing attention in computing and communication communities since it allows automatic adaptation according to the context of devices, systems, and applications to user. Context aware message forwarding regards with communication aware about specific interest between communicating nodes. Interest of communication of communicating nodes is depends on their Environment, Situation and Location. There is a need of providing security to the context of the communicating nodes by securing context and identity of user. Cryptography is can be best solution to provide security in context aware message forwarding. WCF(Windows communication foundation) service by Microsoft foundation allows cryptography and it uses default cryptographic algorithm called custom crypto algorithm. Context Aware secure message forwarding can be done by using WCF service cryptography and for hiding users identity integration of authentication and cryptography can be used. WCF allows node to use multiple protocols as it supports multiple protocol binding (WCF service supports various protocol binding such as basicHttpBinding , netTcpBinding, wsFederationHttpBinding, wsHttpBinding. As per generalized concept of selfish node, selfish node is the node which refuses to accept or share the information. But here we have to consider node selfishness in positive point of view. We regard selfishness as a basic requirement of system and allow nodes to behave selfish behaviors for resource and energy conservation.

Keywords— Context Awareness, Cryptography, interest of communication, Protocol binding, Selfishness, WCF.

I. INTRODUCTION

In Mobile Social Networks are networks wireless mobile users of similar context are cooperate to establish network connectivity and communicate with each other in the absence of network infrastructure[4]. The context is the information related to the situation of an entity such as the present status of people, places, things and devices in the environment. An entity is a person, device, place, or object relevant to the interaction between a user and an application, such as location, time, activities, and services [2]. The context is the information related to the situation of an entity such as the present status of people, places, things and devices in the environment. An entity is a person, device, place, or object relevant to the interaction between a user and an application, such as location, time, activities, and services Mainly the Context Awareness is awareness about user's location, Situation and Environment. Context encompasses more than just the user's location, because other things of interest are also mobile and changing

situation [3]. Context is the any information that can be used to characterize the situation of entities (i.e. whether a person, place or object) that are considered relevant to the interaction between a user and an application, including the user and the application themselves [2]. In Context Aware Communication user's interest of communication is the context. In that case user's interest should be confidential and should be secure. Here security should provide to the context on which communication between two nodes is going on i.e. nodes location, situation and environment must have to keep confidential. This can be possible by cryptography and hiding user's identity. In cryptography message gets transferred in encrypted form and it decrypted at the receiver node and it can also secure users identity by passing users identity related data in encrypted format. User's interest can be confidential thing to expose it.

WCF (Windows communication foundation) service by Microsoft foundation can be integrated with context aware message forwarding applications for security purpose. WCF service of Microsoft Corporation provides default security

in the message transmission by doing encryption of message. For encryption of message WCF service uses Custom crypto algorithm. WCF service also contains various protocol bindings for protocol independent transmission of data. WCF service supports various protocols binding such as basicHttpBinding, netTcpBinding, wsFederation, HttpBinding wsHttpBinding. Along with security there is another one factor in context aware message forwarding i.e. Selfishness. Selfishness is willingness to communicate with another node of specific node. Selfish nodes refuse to forward messages for all or some nodes in a network to conserve limited resources. We have to consider selfishness in positive point of view. We have to consider selfishness as a basic requirement of systems and allow nodes to behave selfish behaviors. However, selfishness has a profound influence on routing performance [1] as it can reduce resource, energy consumption. Generally selfishness of a node can be measured by using CAMF (Context aware message forwarding) algorithm. . CAMF algorithm exploits the context information to calculate the forwarding and receiving capability of nodes and utilizes them to make forwarding decisions [1]. We consider selfishness as per user's interest which depends on his specific context. According to generalized concept selfish nodes share their information in only their specific community. Community of the selfish node depends on their context.

II. CONTEXT AWARE MESSAGE FORWARDING

The context is the information related to the situation, location environment of user. Situation encompasses present status of the user, location is the place of user, environment is depends on the behavior of physical things around the user. User's interest is depends on context of the user. Communication on the basis of specific interest according to his context i.e. location, situation and environment between two nodes is the context aware message forwarding. Besides context there are many constraints in the Context aware message forwarding like node selfishness, forwarding capability of sending node, receiving capability of receiving node, Energy consumption in transmission of message. To measure these constraints CAMF (Context aware message forwarding) algorithm is used. CAMF algorithm also used to achieves selfishness for energy and resource conservation.

CAMF Algorithm:

CAMF algorithm is used to set forwarding set mechanism for the context aware message forwarding. In

forwarding set mechanism forwarding capability, receiving capability are calculated.

Forwarding capability:

Forwarding capability can be calculated by two factors i.e. Similarity between nodes and selfishness of the node.

$$F(m)_i = Sel_{i,m_s} \times Sim_{i,m_d}$$

Sel_{i,m_s} Represents node i's selfishness to the source node of message m, Sim_{i,m_d} represents similarity of the node.

Receiving capability:

Receiving capability can be quantified by two factors i.e. buffer size and reserved energy of the receiving node Buffer size can be calculated by

$$B(m)_i = B(init)_i - \sum_{n \in C(m)_i} S_n$$

$B(m)_i$ denotes the largest possible buffer capacity that node i can supply to message m.

Reserved energy can be calculated by

$$E(m)_i = E(real)_i - \sum_{n \in C(m)_i} S_n \times \delta$$

Where $E(m)_i$ represent receiver has energy to send the stored message out or not, i represent node may accept & store message.

Working of CAMF

In order to illustrate how CAMF works, we take the transmission process between nodes i and j as an example.

1. When nodes i and j are in contact, they first deliver the messages destined to the peer, and then exchange their state information, including selfishness and forwarding capability.
2. Based on the acquired selfishness, i evaluates j's receiving capability, and initializes the forwarding set $Fi(i$'s forwarding set) by including those messages meeting the following conditions:
 - 1) it belongs to C_i (a set of messages i have stored);
 - 2) its reserved buffer size exceeds itself;
 - 3) its reserved energy is sufficient to send itself out.
3. Based on the forwarding capability of the two nodes, i calculates the forwarding profit of each message in Fi ,

and only retains those messages whose forwarding profit is greater than zero.

4. i sorts F_i in decreasing order of forwarding profits to determine the delivery order.

5. i transmits messages in F_i one by one until no message left in F_i or the connection is disconnected. Node j does so in similar ways.

III. SELFISHNESS

In general selfishness is regards with refusing to share some information with someone. But we take selfishness in positive point of view, as selfishness can reserve energy and resources. So we promote the node to behave like selfish. There are two types of selfishness: individual and social selfishness [5]. For individual selfishness a node exhibits the same forwarding willingness to any others [5]. While for social selfishness, nodes are interested in receiving and forwarding messages for the nodes in the same community, but are less interested in receiving and forwarding messages for the nodes outside their communities [6]. Context aware computing regards with Location, Situation and Environment of the particular user. Selfishness in context aware computing is the willingness to communicate with another node on specific context. Context aware computing in mobile social network poses social selfishness. By promoting selfishness routing performance can be enhanced. Selfishness can be achieved by using CAMF algorithm. We have to consider node selfishness from a different perspective; we regard node selfishness as a primary requirement of applications or systems, and utilize the selfish characteristic of nodes to reduce resource consumption and extend the network lifetime[1]. It is difficult to achieve an acceptable routing performance when selfishness is taken in consideration, because selfish nodes may refuse to accept or forward information from other nodes in the network. Thus, our goal is to achieve high delivery performance with a low cost when nodes are allowed to exhibit selfish behaviors. When we consider selfishness we have to set forwarding set mechanism by implementing CAMF algorithm. In forwarding set mechanism by CAMF algorithm two communicating nodes have to share their selfishness with each other before start the communication. According to selfishness receiving and forwarding capability of receiving and sending node can be calculated. Priority of the message can be set using selfishness. The larger the value of selfishness is, the higher the priority and the more the message can gain. In order to better quantify the receiving capability of nodes, we first gather a number of messages which have to send then

according to selfishness we have to set priority of them. Priority of message is used for buffer management in message transmission.

IV. WCF SERVICE

WCF (Windows communication foundation) is the service by Microsoft foundation. WCF service allows us to access other application in our application remotely by creating proxy. WCF service helps in secure transmission of data. WCF is a unification technology, which unites the multiple technologies:- .NET remoting, MSMQ, Web services, COM+.

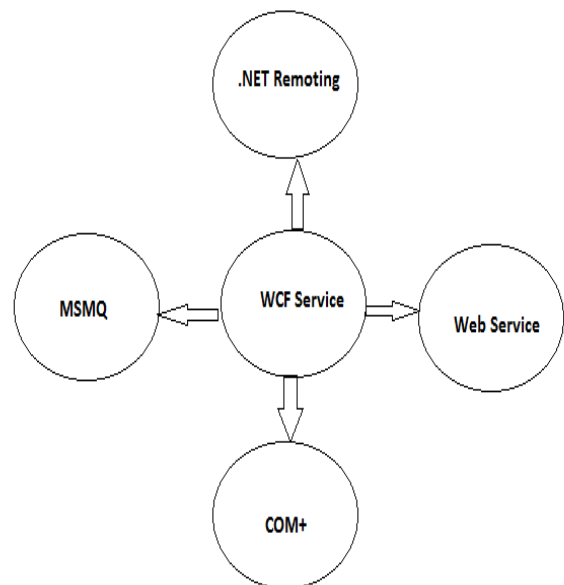


Fig-1:WCF Components

WCF service provides security in web services for remotely accessing information from third party system. So we can integrate context aware computing application with WCF service for security purpose. WCF service uses cryptography for secure transmission of data. For applying cryptography WCF uses custom crypto algorithm. WCF service has great advantage on the secure message forwarding. WCF provides multiple special services in message transmission like: Messaging, Security, Reliability, Transactions, Metadata..

1. *Messaging (WS-Addressing)*:- SOAP (Simple object access protocol) is the default protocol for web services. WS Addressing defines some enhancement in SOAP headers, which makes SOAP free from underlying transport protocol i.e. protocol independent.

2. *Security (WS-Security, WS-Trust, and WS-Secure Conversation)*:- All these security WS specifications

regards with Authentication, security, data integrity and privacy for a service.

3. *Reliability (WS-Reliable Messaging)*:- Reliability ensures end-to-end interaction when we want SOAP messages to be traversed reverse and forward many times.

4. *Transactions (WS-Coordination and WS-Atomic Transaction)*:- These WS specifications enable interaction using SOAP messages.

5. *Metadata (WS-Policy and WS-Metadata exchange)*:- WSDL (Web Services Description Language) is implementation of WS Metadata exchange protocol. WCF service also contains various protocol bindings for protocol independent transmission of message. By integrating application with WCF service. WCF supports multiple protocol binding (WCF service supports various protocol binding such as basicHttpBinding, netTcpBinding, wsFederationHttpBinding, wsHttpBinding.

V. CONTEXT AWARE SECURE MESSAGE FORWARDING

In context aware message forwarding application user have to share his context with another node i.e. system, service or another user. This information can get transfer according to users willingness and securely. Because that information can be confidential in some cases e.g. If human is considered as a system then Health related contextual information can be confidential and it should get transfer according to users willingness and securely. In Context aware message forwarding application WCF service can be used for securing the interest of the user according to the context of the user and user identity related data. If WCF Service layer is inserted in the context aware message forwarding the user identity and user interest or user contextual information like user's location, situation, and environment can be secured by encryption and decryption done by custom crypto algorithm which the default algorithm used by WCF service for cryptography. WCF service also hides user identity by providing facility of Authentication. By using WCF protocol independent transmission of message can be possible as it supports protocol binding that means use of single protocol transmission is not bottleneck for the system.

VI. CONCLUSION

In context aware computing application mainly context of communication should be secure because it can be confidential in some cases. In communication, node selfishness should get promoted as it conserves energy and resources. In context aware message forwarding user identity and user's context both should get secure. WCF service by Microsoft foundation can be a better solution for secure transmission of message in context aware message forwarding application as it supports encryption, authentication and secure remote access to data from third party system. By using WCF service in context aware message forwarding application protocol independent transmission of the messages can be possible.

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