

Ad- Hoc Network Based Simplified Method For Smooth Handoff And Faster Authentication Among 4G Networks

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Abstract

This paper proposes a simplified method for getting authentication from a selected target network. Formation of ad-hoc network is utilized to share the knowledge of all the available networks between the mobiles. Any terminal that needs access to a new network due to forced or user specific handoff can use the other terminal which is already connected to the target network as its guard mobile. The guard mobile forwards the request of the first mobile, get access details from the new network and gives it back. Since the request forwarded through guard mobile already connected in the target network the resource wastage is avoided and authentication becomes simple.

I. Introduction

The main objective of 4G networks is seamless roaming for all the users. The user should be able to access any network available in the graphical area. The user selects the networks according to his own preferences. The selection of a target network depends upon the application they want to get access to or the other factors like quality cost etc. The way the user is allowed to select or get connected to a network has lot of challenges. The options before the user are, specifying their needs during runtime or selecting a fixed scheme of network selection based on their needs.

The user may want to switch to a new network provider for more than one reason.

Many users give first preference to quality of service. In a particular region depends on the application selected the quality of service varies. The coverage area of a provider is also a important factor to be considered. When the terminal crosses the coverage area of the home network it has to enter into a roaming network. Out of the coverage area means handoff must occurs to maintain the connections. Within the coverage area of the home network the user may still want to switch over to a new network based on his application requirements. Independent of the type of handoff the terminal must register itself with new network for getting services from the new network.

II.Existing methods

The existing methods use direct conversation methods to get connected to a new network. When new network is selected then the mobile terminal intimates it to the target network. First the mobile terminal searches for the new network frequency bands available. Then chooses a frequency which is free, and then send a request message through control signaling to the new network. When the new network base station receives this kind of request from a new entrant, it verifies the information with the main control centre. After verification the network generates a temporary address for the roaming mobile. This temporary address is registered with the new network used for billing information and roaming services.

The network which generates the temporary address sends it to the new entrant mobile. The mobile receives the address and uses it for it operations. Initially when the mobile submitted the request to the network it immediately receives the acknowledgement from the target network in the same frequency chosen by the mobile. The exchange of information between the mobile and the network uses protocols like UDP, a connectionless protocol. When the mobile get authorization to get connected to the new network it detaches itself from the home network temporarily.

III. Difficulties of existing method

The above explained existing method takes comparatively longer duration of time and wastage of resources are more. If the target network is busy at the time when the user submitting the request then the request may not be processed immediately. The use may have to wait till the network responds or it has to resend the request. Some time the user may have to check and select other options available. The continuity of the application it connected may get affected. Twice or thrice acknowledgement messages has to be transferred between the new base station and the mobile terminal. Initially when the request submitted the user looks for an acknowledgement. When the network selects a temporary address and send it to the mobile the network expects and waits

for the mobile to send acknowledgement. Even after receiving this hand shaking signals the networks again send the supervisory signals to the mobile which should be received and sent back by the mobile for final authentication.

IV. Proposed method

This paper presents a simple method to avoid these difficulties. Considering the intelligent mobile terminals for end users this authentication can be made easy. Every mobile is capable of communicating to the nearest mobile directly. Without the intervention of the network provider mobile can directly communicate to other terminals.

Formation of ad-hoc network is used for this idea. Currently ad-hoc network is used to extend the coverage area of the existing provider. This ad-hoc networking capability of the mobile can be used to get authentication from a new network. Any mobile want to access to a new network should check its

surroundings. It has to identify a mobile which is already connected to the target network. This is possible by ad-hoc formation. The original user (home terminal) who wants a new network must select a guard mobile which is already using the services of the other network.

All the mobile terminals in a network are expected to know the surrounding mobile information through ad-hoc networking. Periodic update of the details of the other mobiles is must here. Every mobile shares the details about the network and the resource utilization with nearby mobiles. Especially the mobiles with different access network are expected to share this information. If the user preferences are predefined then the mobile can send information to nearby mobile and attach it as its guard mobile. Similarly the home mobile can act as a guard mobile to other terminals.

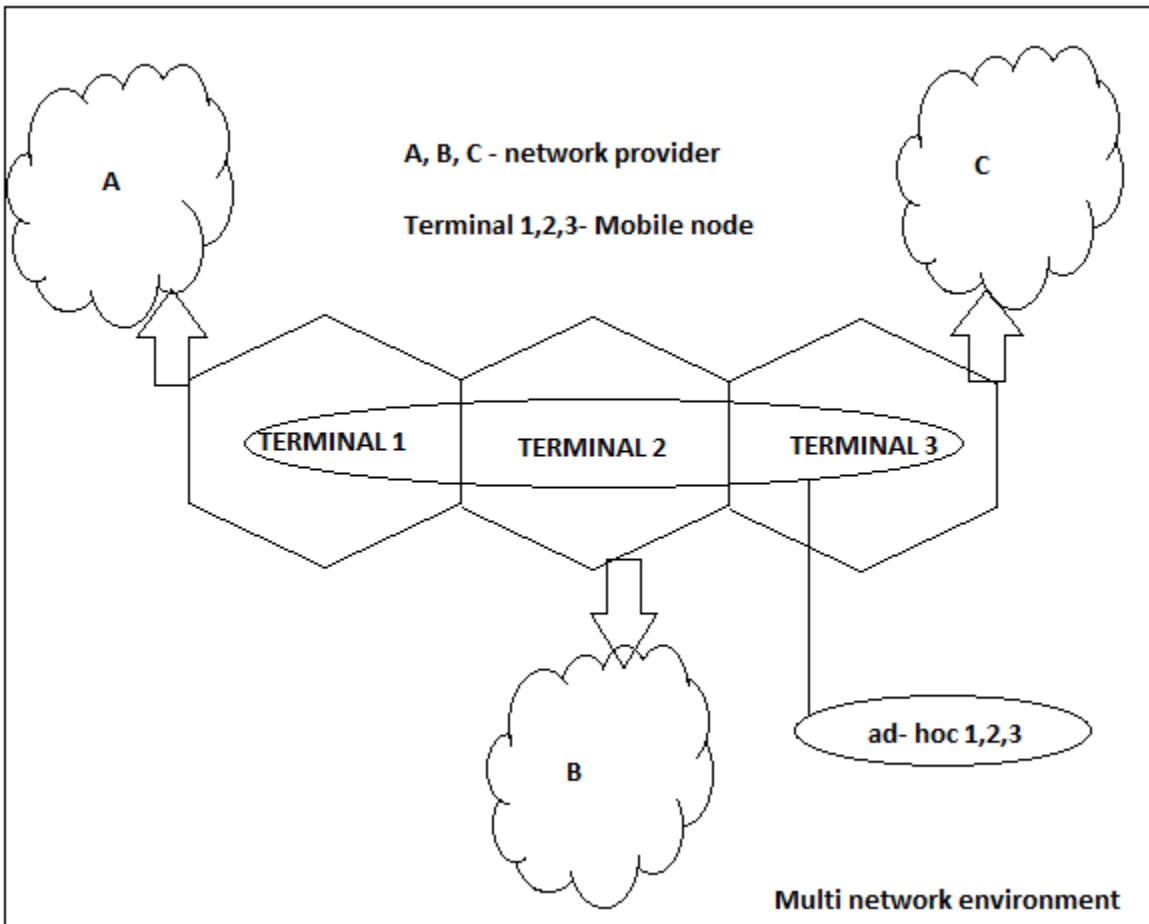


Fig. 1.

VI. Getting access

In Fig. 1. Consider the nearby mobiles, terminal 1 connected to network A, terminal 2

Proposed scenario

connected to network B and terminal 3 connected network C. Here the terminals 1,2,3 share their information with the other. When a terminal want to

switch to a new network, the corresponding mobile is intimated first.

For example if terminal 1 want to get connected to network B then it send this information to terminal 2 and request it to act as guard mobile. Terminal 2 on receiving this request from terminal 1 start sending this information to his home provider network B. Since the terminal 2 already connected to network B and utilizing the services it is easy for terminal 2 to send or forward the request of terminal 1 to network B. Terminal 2 just adds the request of

terminal 1 into its control signaling. The target network of terminal 1 network B on receiving this information understands that a new mobile is trying to get access to it. The advantage of sending request through a mobile which is already connected network is ease of signal transfer and faster authentication. No allocation of resources needed for direct request and acknowledgement. Terminal 2 will receive the authentication information from network 2 and act as guard mobile and intimates it to terminal 1.

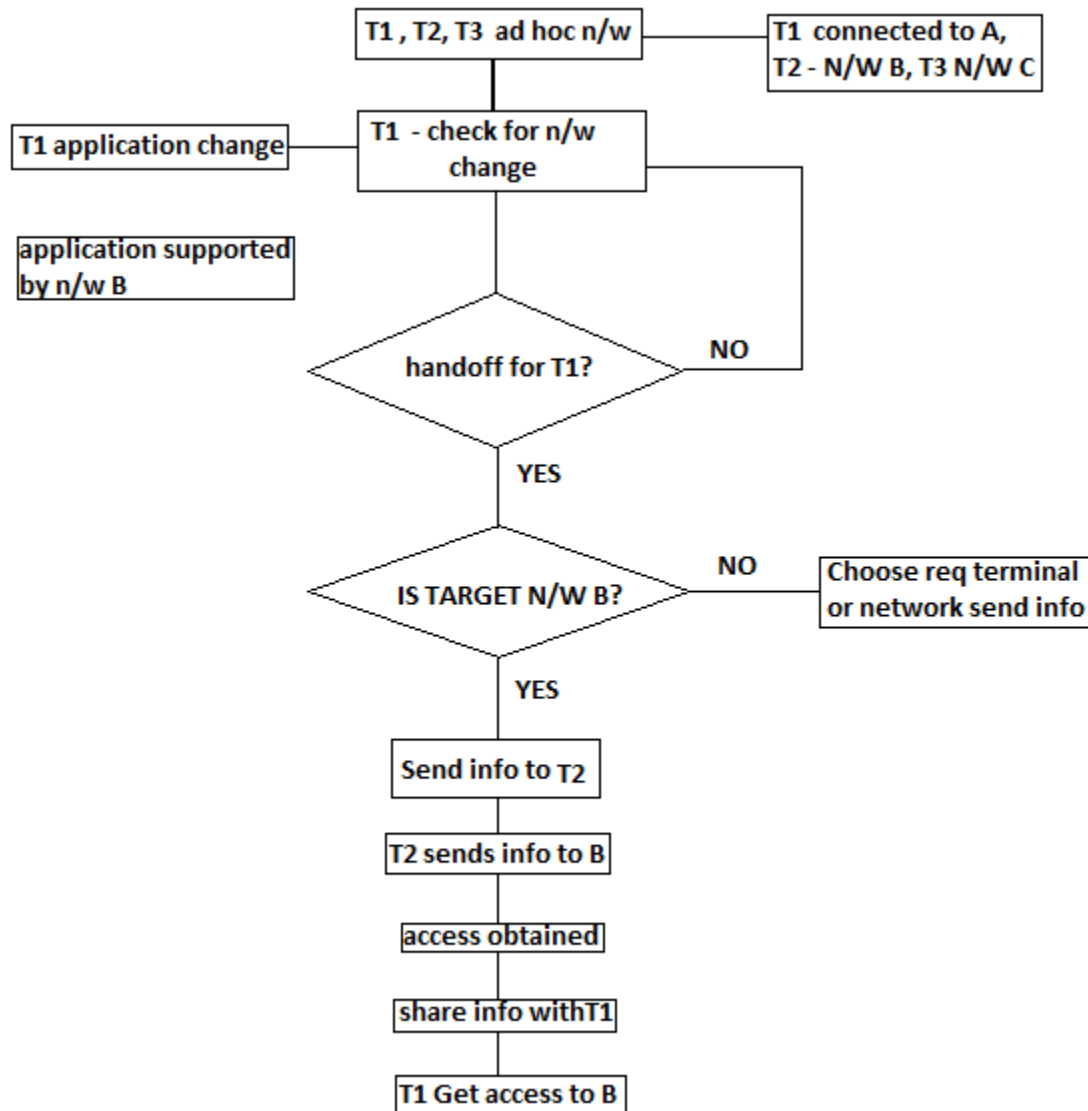


Fig.2. Flow diagram-ad

hoc initiated handoff

Then terminal one get direct connection form network B and works as if it belong to network. It is always easy to enter new network with known

terminals. Formation of simple ad-hoc makes it easier to get access to new network. Terminal 1 and 2 share these conversational details with terminal 3 which

updates its information about terminal2 and
1. Now all the terminals update the details and try to get in touch with a mobile which uses network A say another mobile terminal 4. Fig 2. Explains the flow of the Whole process.

VII. Improvements and advantages

Information sharing between mobile terminals via ad-hoc networking can still be simplified by using Bluetooth networks. Every mobile apart from all the works finds a mobile in that nearby region. A blue tooth network is formed between the terminals of different network affiliations. The information that these terminals share are QoS, data rate, signal strength etc. A terminal can get selected information from the other based on its need. The data which is not available in general sharing of information can also be obtained. For example terminal 3 gets a particular service form network C, if it wants to know the service quality of the same application in other network say B then it can request terminal 2 to get this details from network 2. After receiving this details terminal 3 can opt for a forced handoff. In this way the proposed method also provides a way to improve forced handoff selection.

VIII. Conclusion

The proposed method simplifies the authentication mechanism during handoff. Utilizing the services of nearby mobile terminal as guard mobile resource wastage and time delay reduced. Apart from extending the coverage, ad-hoc networking is used to simplify the authentication mechanism. This method does not require any additional implementations or services. The user is given options to select a network based on complete information available about the network. This method also provides way to improve runtime forced handoff methods.

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