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A Review: Minimization of Handoff by using AODV with WLAN

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Abstract:-Nowadays, the use of low cost wireless networking solutions has enabled a wide variety of applications and services available in laptops, cellular phones or embedded systems, providing ubiquitous access to information. Maintaining the performance of wireless networks in the face of dynamic failures remains a challenging problem in Mobile handoff Approach. The main issue regarding wireless network technology is handoff, due to the limited coverage of access points (APs) or base stations (BS). When a mobile station (MS) moves from one base station or current access point (AP) to another base station then it needs to perform a link layer handover. Due to which lot of data have been lost and there is interruption in communication. Many techniques have come to minimize this problem but it still remains an open matter of research. Here we propose a method to minimize the handoff failure probability by effectively placing a wireless local area network (WLAN) AP using the Ad-hoc on-demand distance vector routing Protocol (AODV) in the handoff region between two neighboring cells. The WLAN coverage, on one hand, provides an additional coverage in the low signal strength region and on the other hand AODV is based on the principle of discover routes as needed.

Keywords: - WLAN, Handoff, Handoff techniques, AODV.

1. Introduction

1.1 WLAN

A Wireless Local Area Network (WLAN) links two or more devices using some wireless distribution method (typically spread-spectrum), and usually provides a connection through an access point to the wider internet. This gives users the mobility to move around within a local

coverage area and still be connected to the network[4]. In mobile network WLAN is used to transmits and receives radio signals between mobile station (MS) and access point (AP) which can be either a main, relay or remote base station. A main base station is typically connected to the wired Ethernet. A relay base station relays data between remote base stations, wireless clients or other relay stations to either a main or another relay base station. A remote base station accepts connections from wireless clients and passes them to relay or main stations. Connections between "clients" are made using MAC addresses [4].

1.2 Handoff

When a MS moves out of reach of its current AP it must be reconnected to a new AP to continue its operation. The search for a new AP and subsequent registration under it constitute the handoff process which takes enough time (called handoff latency) to interfere with proper functioning of many applications.

Handoff can be of many types:

1. **Hard & soft handoff:** Originally hard handoff was used where a station must break connection with the old AP before joining the new AP thus resulting in large handoff delays. However, in soft handoff the old connection is maintained until a new one is established thus significantly reducing packet loss as shown in figure 1:
2. In NGWS (next generation wireless system), two types of handoff scenarios arise: horizontal handoff, vertical handoff [3] [4].
3. **2. Horizontal Handoff**: When the handoff occurs between two BSs of the same system it is termed as horizontal handoff. It can be further classified into two:
4. ***Link layer handoff***: Horizontal handoff between two BSs that are under the same foreign agent (FA).
5. ***Intra system handoff***: Horizontal handoff between two BSs that belong to two different FAs and both FAs belong to the same gateway foreign agent (GFA) and hence to the same system.
6.
7. **3. Vertical Handoff:** When the handoff occurs between two BSs that belong to two different GFAs and hence to two different systems it is termed as vertical handoff

8. ***A vertical handover (VHO)*** is the mechanism by which an ongoing connection is transferred from one BS to an AP and vice versa. VHO can be classified in two categories namely upward-downward handover techniques and imperative-alternative handover techniques.

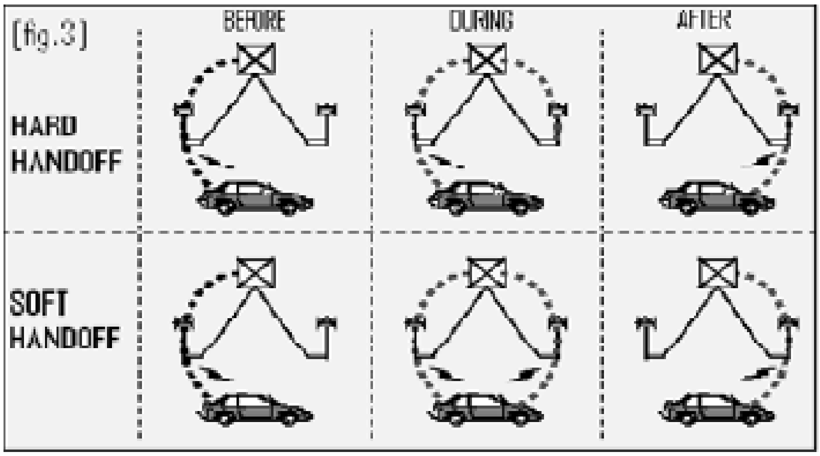

Fig 1 with Ref [1]

An upward handover (VHO) occurs from a network with small coverage and high data rate to a network with wider coverage and lower date rate. On the other hand, a downward VHO occurs in the opposite direction. As an example for this classification let's consider the case of two of the most important current wireless technologies: 3G cellular networks and WLANs. The WLAN system can be considered as the small coverage network with high data rate while the 3G cellular system is the one with wider coverage and lower data rate.

An imperative VHO occurs due to low signal from the BS or AP. In other words, it can be considered as an HHO. The execution of an imperative VHO has to be fast in order to keep on-going connections. On the other hand, a VHO initiated to provide the4 user with better data-rate is called the alternative VHO.

Handoff Process

1.2.1 Scanning

When a mobile station is moving away from its current AP, it initiates the handoff process when the received signal strength and the signal-to-noise-ratio have decreased significantly. The mobile station (MS) scans the channels which the new base station (BS) uses. The STA now begins MAC (Medium access control) layer scanning to find new APs. It can either opt for a passive scan (where it listens for beacon frames periodically sent out by APs) or chose a faster active scanning mechanism wherein it regularly sends out probe request frames and waits for responses for TMIN (min Channel Time) and continues scanning until TMAX (max Channel Time) if at least one response has been heard within TMIN. Thus, $n*TMIN \leq$ time to scan n channels $\leq n*TMAX$. The information gathered is then processed so that the STA can decide which AP to join next. According to [7], 90% of the handoff delay comes from channel scanning.

1.2.2 Authentication

Authentication is necessary to associate the link with the new AP. Authentication must either immediately proceed to association or must immediately follow a channel scan cycle. In pre-authentication schemes, the MS authenticates with the new AP immediately after the scan cycle finishes.

1.2.3 Re-Association

Re-association is a process for transferring associations from old AP to new one. Once the STA has been authenticated with the new AP, re-association can be started. Previous works has shown re-association delay tobe around 1-2 ms. The range of scanning delay is given by:-N × Tmin _ Tscan _ N × Tmax Where N is the total number of channels according to the spectrum released by a country, Tmin is Min Channel Time,Tscan is the total measured scanning delay, and Tmax is Max Channel Time. Here we focus on reducing the scanning delay by minimizing the total number of scans performed.

1.3 AODV

The AODV protocol is designed for mobile nodes in ad-hoc networking, where there often are changes in topology [5]. The AODV protocol is based on on-demand route discovery. Because of that every node has different and limited local knowledge of the network. The fact that a node seeks information about the network, only when needed, is causing low overhead since a node does not have to maintaining unnecessary route information. To handle router information AODV uses 3 different kinds of messages Route request (RREQ), Route Reply (RREP) and Route Error RERR [6]. AODV is using ring expansion when discovering new routes to limit flooding of the network and thereby reducing overhead. The protocol is ideal for discovering neighbor nodes. If a node needs a route to a node in the other end of the network1 the protocol will course a reasonable flooding of the network. Expansion ring search is a better strategy than doing a full scale search for the node. Likely some other node in the network has a valid route to the destination, and will send a RREP to source, and thereby reducing overhead. By every RREQ a node sends, a sequence number is increased, this is used by the protocol to guarantee loop-freedom in paths found.

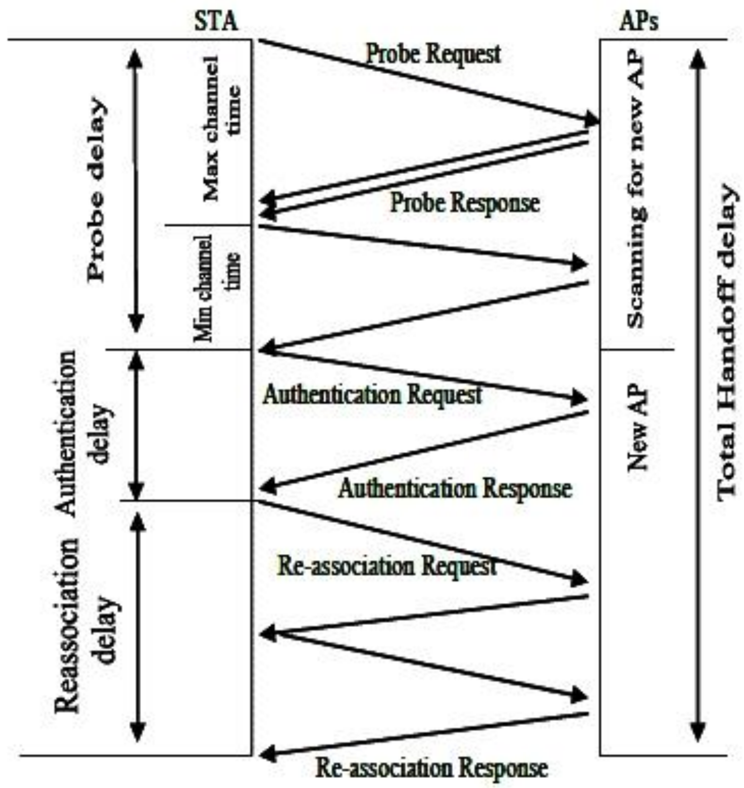

Fig2. With Ref [1]

2. Related Works

In recent times, a large amount of research is done in improving the handoff technologies of cellular as well as IEEE 802.11 based networks. In the past few years, in [8] Li Jun Zhang et a. proposes a method to send probe requests to the APs one after the other and perform handoff immediately after any AP sends the response. This allows us to scan fewer channels. Man methods based on neighbor graph [7] and geo-location on APs has been proposed, where the authors have proposed selective channel mechanisms. All these processes involve scanning of APs, it may be selective or all APs may be scanned. These methods are therefore time consuming as well as have a certain probability of handoff failure. In [9] and [10], authors use GPS based access point maps for handoff management.

3. Proposed Work

Here, we propose to reduce the handoff failure ratio by placing a WLAN router using AODV routing protocols in effective handoff region. A high traffic density increases the ratio of handoff failure. Thus by integrating a AODV in WLAN with cellular networks, the traffic density of the cellular network (CN) is less, by this way we minimizing the handoff failure ratio to a great extent.

3.1 Change of Base Station in Cellular Network

Now the mobile station is under WLAN network coverage in the handoff region between the two cells. As it is in the WLAN coverage area, it is still connected and the mobile station user can enjoy seamless connectivity.

When the mobile station is to move into a particular base station, it starts the scanning process for the channels in the new base station, being under the coverage area of WLAN .AODV allows mobile nodes to scan routes quickly for NBS and does not require nodes to maintain routes to destinations that are not in active communication. Hence the number of channels to be scanned obviously becomes very low.

This scanning process occurs under the network coverage of WLAN. Hence, there is minimum handoff failure ratio because of AODV protocols scans the channel very quickly and find the appropriate channel for the OBS. By using AODV during

scanning causes less overhead, guarantee loop-freedom in paths found and consumes very less time to find NBS during a handoff process.
As the scanning process terminates, the mobile station sends authentication requests and then the re-association requests.

3.2 Normal Handoff Vs Proposed Handoff

There are many reasons that proposed handoff have many advantageous as compare to the normal handoff. In proposed handoff MS leaves the handoff region before establishing a connection with the new BS, it will be connected to WLAN and AODV finds the new channel very quickly which is nearer to the MS until it connected with the new BS and provide a smooth path which causes less overhead therefore in this scenario , handoff failure is minimum. In normal handoff, if the scanning process is time consuming due to high traffic density and high overhead. The mobile station leaves the handoff region before establishing connection with new BS, resulting in handoff failure.

4. Conclusion

Thus by our proposed method, we can reduce handoff failure as well as handoff latency quite a remarkable amount as we can reduce the traffic in the cellular network by introducing a AODV in WLAN AP. By doing this we can finds a NBS as much as early. So, in an application where there is a fast change in network topology and a requirement of stable rate therefore, AODV is more preferable.

References

[1] D. Sarddar et. all, "Minimization of Handoff Failure by Introducing a New Cell Coverage Area in the Handoff Region" ,IJCSI International Journal of Computer Science Issues, Vol. 8, Issue 3, No. 2, May 2011
[2] D. Sarddar et all, "Minimization of Handoff Latency by Angular Displacement Method Using GPS Based Map", IJCSI International Journal of Computer Science Issues, Vol.7, Issue 3, No 7, May 2010.
[3] AKYILDIZ, I. F., XIE, J., and MOHANTY, S., "A survey on mobility management in next generation all-IP based wireless systems," IEEE Wireless Communications, vol. 11,no. 4, pp. 16-28, 2004.
[4] STEMM, M. and KATZ, R. H., "Vertical handoffs in wireless overlay networks," ACM/Springer Journal of Mobile Networks and Applications(MONET), vol. 3, no. 4, pp. 335-350, 1998
[5] Rahaman et al., "Preemptive Ad-Hoc On-demand Multipath Distance Vector Routing for Mobile Ad-Hoc Networks", International Journal of Advanced Research in Computer Science and Software Engineering 2 (12),December - 2012, pp. 200-205
[6] C.Perkins, et. all, "Ad hoc On-Demand Distance Vector (AODV) routing"Feb.2003.http://www.ietf.org/internet-drafts/draftietf-manet-aodv-13.txt
[7] Hye-Soo Kim et. all, “Selective Channel Scanning for Fast Handoff in Wireless-LAN Using Neighbor-graph” Japan, July2004, International Technical Conference on Circuits/Systems Computers and Communication.
[8] Li Jun ZHANG and Samuel Pierre : " Optimizing thePerformance of Handoff Management in Wireless LANs " IJCSNS,Vol .8 No.7,July 2008
[9] Ashutosh Dutta, S Madhani, Wai Chen, "GPS-IP based fast Handoff for Mobiles”.
[10] Chien-Chao Tseng, K-H Chi, M-D Hsieh and H-H Chang," Location-based Fast Handoff for 802.11 Networks”,IEEE COMMUNICATIONS LETTERS,VOL 9, NO 4 April 2005.
[11] Shantidev Mohanty and I.F.Akylidiz “A Cross Layer (Layer2+3) Handoff Management Protocol for Next-Generation Wireless Systems”, IEEE TRANSACTIONS ON MOBILE COMPUTING, Vol-5, No-10 OCT 2006.

