Indian Institute of Information Technology Dharwad

Project

On

HANDOFF IN WIRELESS NETWORK

For the course

Cellular Mobile Communications

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Abstract:

Handover is an essential process in wireless networks that enables a mobile device to maintain a seamless connection with a network as it moves from one cell to another. Two common handover policies are the basic threshold policy and the best threshold policy based on hysteresis value. The normal threshold policy involves setting a fixed threshold value for handover, while the best threshold policy based on hysteresis value considers the historical signal strength values to set a threshold range for handover. In this paper, we compare the performance of these two policies and conclude that the best threshold policy based on hysteresis value provides a more stable and reliable connection by reducing the number of unnecessary handovers. This policy considers the varying signal strengths in different locations and provides a better approach for handover in wireless networks.

INTRODUCTION:

Over the past few decades, wireless communications technology has advanced in ways that are nothing short of astounding. Any wireless network's main objective is to give a lot of stationary or mobile users access to the fixed network. One of the essential elements of wireless networks is mobility.Mobile users roam around the service area of the wireless mobile communication system from time to time. Require wireless connectivity to the fixed network for communication services. In this case, the fixed base stations (BS), dispersed over the area, provide the actual two-way physical link between mobile users and the network. When a mobile user goes from one BS's service region into another, issues with mobility develop. A mobile subscriber connecting with one BS is shifted to another BS that is delivering the higher connection quality during a call, which is known as a handoff or handover in cellular communication.Given the restricted resources at each cell site, handoff management is a difficult part of wireless networks to enable mobility. The handoff is initiated based on a number of BSi-MS connection variables , including the MS's distance from the BS, the relative and absolute signal strengths, and the estimated quality levels of the relevant radio link.If sufficient resources can't be allocated in the new wireless cell, a call that's already in progress could have to be terminated during the handoff. A well-planned handoff of the use of an algorithm is crucial for lowering the switching load on the system while preserving quality of service (QoS).

Hard and soft handoffs are the two broad categories into which handoffs are divided:-
Hard handoff: In cellular networks, a hard handoff is a handoff mechanism that necessitates the user's connection being completely severed from a current base station before being moved to another base station. It makes it possible for cellular and mobile service providers to offer users ongoing service, especially while those users are moving away from one base station or cell and towards another.

Soft handoff : A mobile phone can connect to two or more cells (or cell sectors) simultaneously during a call using the CDMA and W-CDMA soft handover or soft handoff capability. Softer handoff is used when the sectors come from the same physical cell site.
The likelihood of handoff is often planned to maximise at the cell boundary when an MS is travelling from its serving BS to the target adjacent BS. The two steps of handoff execution and handoff initiation are typical. A new candidate BS is selected if necessary after

measuring the RSS using radio propagation-based techniques during the commencement phase. A new radio channel will be assigned during the execution phase, and another BS will take over the call. Monitoring the radio channel, choosing whether to start the handoff procedure, and choosing a new BS are all considered to be part of the handoff initiation phase.

OBJECTIVE:

- Implementation of both the threshold policy which uses only the old signal strength and the new signal strength to make a handover decision .

- And the best policy which uses the hysteresis value(h) such that the new signal strength should be h times the old signal strength then the handover will take place.

- And comparing their performance based on the unnecessary handoffs and handover delay variables.

Methodology:

In this project is to visualise handoff and make the concept of handoff in wireless networks easy to understand. Different policies are implemented to perform the handoff in different situations. The goal is to make the users try out all the different policies, understand the differences, and find out the most efficient policy.
We are using two types of policies in our project :
1)Threshold policy
2)Best policy

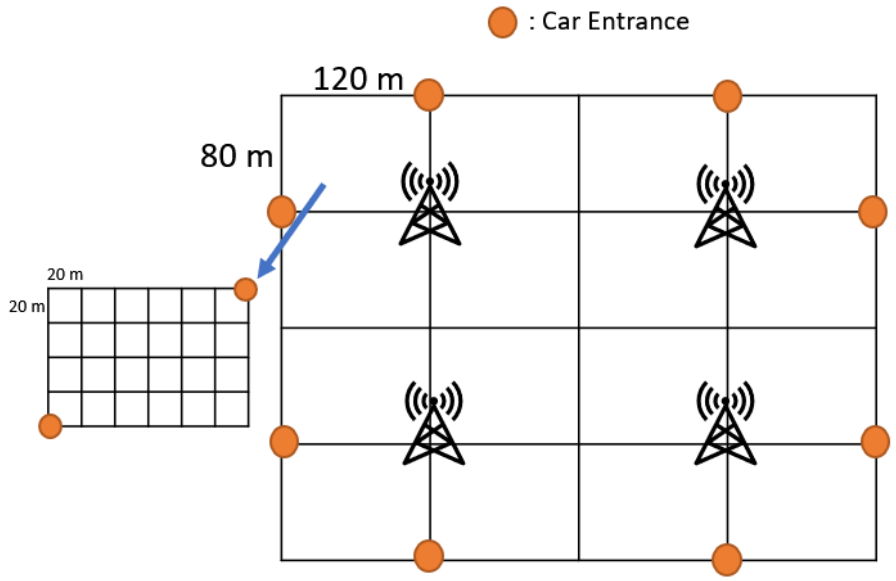
1)Threshold policy: In threshold policy we fixed a value. if received signal power is increasing then handoff occurs .
t=threshold value;
Pold =old signal strength
Pnew =new signal strength

```
if (pNew > pOld && pOld < t) {
            car.bs = newBS;
            car.power = pNew;
            handoff = true;
            console.log("threshold");
        }
```

2)Best policy: In best policy, the user chooses the best signal power from the available power **.**

```
if (pNew > pOld) {
            car.bs = newBS;
            car.power = pNew;
            handoff = true;
            console.log("best");
        }
```

Simulation Structure:



Each node is a 20 * 20 (m^2) square. A block is composed of 24 nodes, which makes the block size 120 * 80 (m^2). Cars are assummed to be moving on an extremely thin line path between blocks, the path doesn't take up any space. The velocity of the car is 20m/s. In our simulation, we iterate once in a second. The cars move one node, and all the data are calculated and updated every second.

Possibility of turning:

Direction	Possibility
Go straight	1/2
Turn right	1/3
Turn left	1/6

Intersection with three roads:

Direction	Possibility

Turn right	1/2
Turn left	1/2

TECH. USED IN PROJECT:

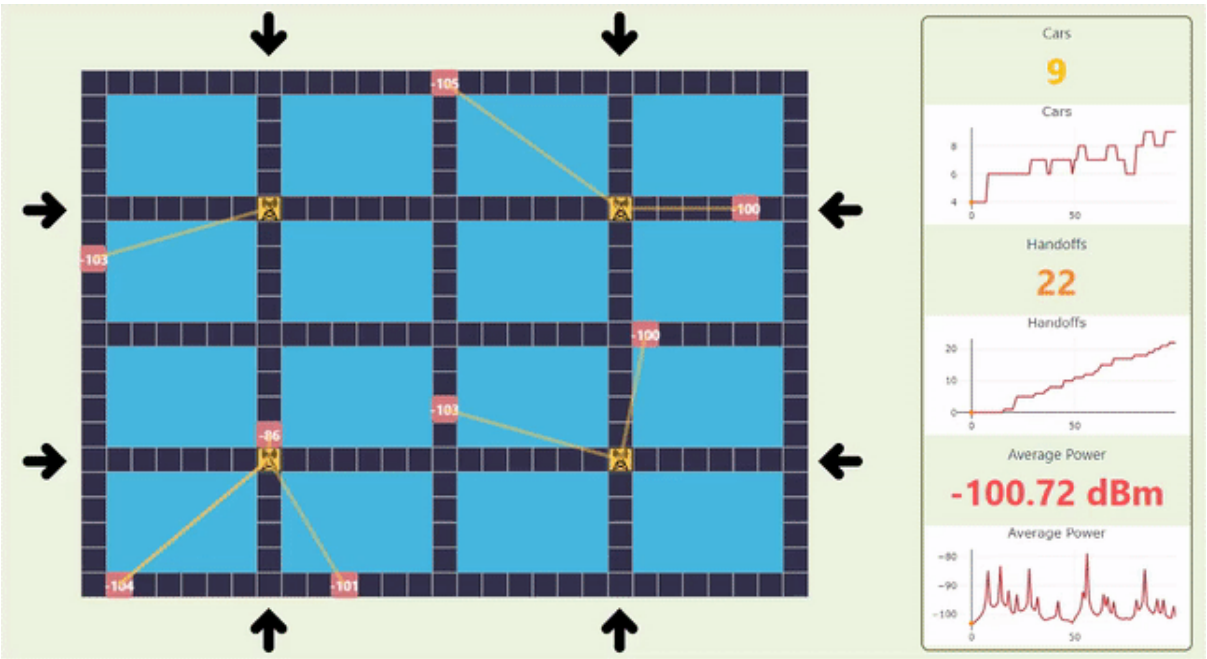
- HTML
- CSS
- Bootstrapped
- Java script
- React

How to run this project in your pc:
1)install nodejs and setup
2)After that you can run

- Npm start

  Runs the app in the development mode.
  view it in the browser.
  The page will reload if you make edits.
  You will also see any errors in the console.

Demo:



Project link:
https://handoffproject.netlify.app/

Code link:

https://github.com/Spsunil8682/CMC_PROJECT

Conclusion:

Handover in wireless networks is a crucial process that enables a mobile device to maintain a seamless connection with a network as it moves from one cell to another. Two common handover policies are the normal threshold policy and the best threshold policy based on hysteresis value.

The normal threshold policy involves setting a fixed threshold value, and when the received signal strength falls below this value, the device initiates a handover to the next available cell. This policy is simple to implement but may result in frequent handovers, leading to unnecessary network signaling and potential disruptions in service.

The best threshold policy based on hysteresis value considers the historical signal strength values and sets a threshold range for handover. This policy reduces the number of handovers as it takes into account the varying signal strengths in different locations. As a result, it provides a more stable and reliable connection.
In summary, the best threshold policy based on hysteresis value is a better approach for handover in wireless networks as it takes into account the historical signal strength and provides a more stable and reliable connection compared to the normal threshold policy.

Contribution:

- First we took some research papers. After that, we implement on a paper.
- Mainly all the Team members worked together but mainly Sawai Ram and Manjunath worked on the CSS part of the project, while Rishabh gautam, Sunil Patidar, anil kumar, and Vishnu worked on the HTML, Bootstrapped, Java script, React part of the project. In the end, all the members worked together with their full dedication to get the desired output of our project.

References:

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6)https://ieeexplore.ieee.org/document/6587998