

# Analysis Of Wireless Network Performance Using External Sensor Hints

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## Abstract

*In current time Wireless technology becomes popular and prime source of communication due to its versatile characteristics in the field of telecommunication. In daily life People of all sections of society usage wired and wireless devices for their each day communication. In wired devices features like effective data transfer and performance is remarkable but due to constrain in mobility it's usage is limited, such constrain pave the way for development of wireless devices with feature of all wired devices and with mobility.*

*With the rapid development of wireless devices like smart phones, Tabs etc enhancement in wireless protocol performance in mobile state and quick Adaptability at various settings in becomes very crucial*

*Keywords— Energy, NS2 , Performance, Rapid Sample Algorithm.*

## 1. Introduction

### 1.1 General overview

By virtue of accessing internet at high speed and with a option of mobility, the number of users and growing demand of smart phone surpassing sale of personnel computer in past years [2].

With the development of mobile devices like smart phones, tablets etc it has become a paramount important for wireless network protocol to have flexibility in dealing of static and mobile usage of devices within short span of time. Smart phone facilitate its user to roam freely in workplaces while having continuous in touch with internet access or other operation activity. Compared to stationary internet access, accessing network during motion creates a lot of problem to wireless protocol. For instance ,in motion losses are high quality of receiving data , response of channel changes rapidly .Quick changes in state of channel and peculiar

behaviour of network causes nodes to fail in recording data for long time and make them less effective . Required remedies that overcome such mobility related problem may not be workable in static conditions. By careful observation of packet data in stationary conditions nodes can ascertain channel quality and calculate path for long time period, by analysis of packet data static wireless network very swiftly deals with momentary variations. Research work done before introduction of Hint aware architecture does not differentiate between these modes.

The key area in this work is to analyzing usage of external sensor hints by nodes to augment wireless network protocol performance [1 ]. External sensors of mobile phone like GPS, accelerometer are used as a clue about mobility state of device. Mobility mode of any device states condition of that device, whether that particular device is moving or in static position, its direction of motion. This protocol easily adapts its behaviour and action according to the current mode of the device. This approach is feasible because most of the mobile phone devices come equipped with these types of sensors.

### 1.2 Report Organization

The flow of paper is organized as follows .Introduction is given in section 1, which describes objective and motivation. Section 2 covers background work, which gives knowledge about work already done in that particular domain. Next section is background Review which is actually summary of background work. Section 4 is review of emerging technology which gives details of tools and utilities used in project. In Section 5 we have proposed solution to existing setback. Section 6 draws conclusion from the work described in the previous sections. Future section discusses possibilities

for further development. Finally in the last section we have provided references from journals and research papers that are referred in the paper.

## 2. Background

Hint aware protocol architecture adds the utility of external sensors in the wireless network protocol which is totally different from traditional architecture that uses in-house information. In this section we will discuss Hint aware protocol architecture. Mobility mode of the device is described by using hints from the mobile phone sensors.

### 2.1 Hint Aware Protocol Architecture

This architecture consist of Sensor hint service as shown in figure 1 ,sensor hint services hides all details regarding querying and hint extraction .This service provides an interface to achieve above mentioned goals. Sensor hint services have three components. First one is Sensor Library which is used to extract hint from raw data. Second is hint transport layer that provides independent way for hint to communicate. Sometimes it happens that hints from other nodes are used. For example when bit rate adaption protocol uses movement hints of other protocol with which communication was going on. Here Sensor hint manager comes into picture, it construct message which is required while sending hint to another node. This message is delivered to Hint Transport Layer, which will send the hint. For the purpose of sending and receiving hints two mechanism are given in Hint Transport Layer. First is UDP and other one is HINT port.

Along with Sensor aided network architecture following four schemes are also considered. Sensor Hints can also be augmented with other protocols.

#### 2.1 Hint Aware bit rate adaptation

Traditionally all the wireless protocols changes their nature based on domestic network information. Later on introduced Hint Aware Architecture which adapt differently according to node status. As discussed in the previous section mobility of node adversely affects wireless channel condition, in affect of which external

sensors are added in bit rate adaptation scheme [5]. Here we will be discussing two such protocols

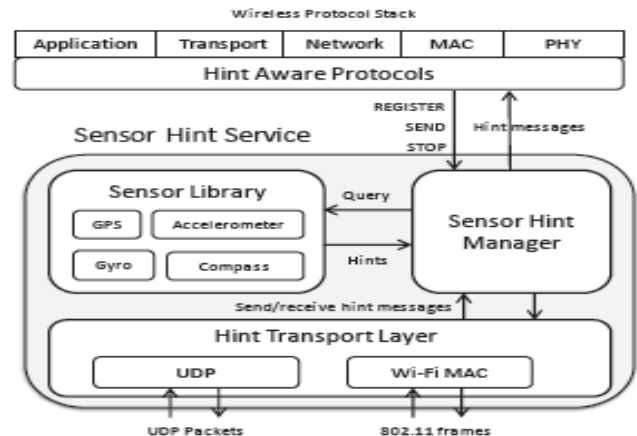


Figure 1: Hint Aware Protocol Architecture [1].

#### 2.1.1 Rapid Sample Protocol

Rapid sample protocol is a frame based rate adaptation protocol which is constructive for channels with swift changes. Its working begins with fastest bit rate ,and if acknowledgement does not received , switch to next lowest rate. Time of failure is recorded. If it succeeds at any bit rate for more than  $\delta$  ms, switch to sample higher rate. If the faster rate fails, revert to original rate.

#### 2.1.2 Hint Aware Bit Rate Adaptation Protocol

This protocol of bit rate adaptation uses different protocol according to node state. For instance it uses Rapid Sample Protocol [1] for moving nodes and Sample Rate [5] protocol for static nodes. Sample Rate is used for static case as it gives better performance than any other protocol

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RapidSample(lastbr, gotack):
  if (!gotack) then
    failedTime[lastbr] ← CurrTime()
    if (sample) then
      br ← oldbr
    else
      br ← max{0, lastbr - 1}
      sample ← 0
  else
    sample ← 0
    if (CurrTime() - pickedTime[lastbr] >  $\delta_{success}$ ) then
      br ← max{i |  $\forall j \leq i$ :
        CurrTime() - failedTime[j] >  $\delta_{fail}$ }
      sample ← 1
      oldbr ← br
    else br ← lastbr
  if br ≠ lastbr
    pickedTime[br] ← CurrTime()
  return br

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Figure 2: Rapid Sample bit rate adaptation algorithm [1]

## 2.2 Hint Aware AP Association:

Major problem with wireless network is of disturbance created during transmission in form of noise. SNR (signal to noise ratio) value of mostly wireless customer is high. So client triggers handoff when RSSI value is below some fixed threshold. Also client searches all channel for highest RSSI value. This scheme is known as standard scheme. [7].

With these concerns in mind a new and better approach is designed called as Hint Aware Association Protocol. In this scheme GPS lock hints are used to describe state of node. To judge motion walking hints are used for indoors. Two basic configuration is used in this protocol maximize throughput or minimize handoff. In case of large amount of data transfer maximized throughput is useful while minimized handoff is favourable for interactive applications [8].

## 2.3 Topology Maintenance

For wireless mesh network accuracy and efficiency of topology is described under this section. List of neighbour nodes are maintained along with connectivity to each neighbour by every node in the system. Sending periodic probe packets is standard method for recording

information. Major question over here is about frequency of periodic message.

Here two opposite thoughts strikes, first is if we send frequent probes than it will be easier for nodes to maintain accurate information about link quality and varying topologies. Second thought is frequent probe consumes large bandwidth and can cause network congestion. After consistent analysis it is found that during movement channel conditions varies greatly. When node receives movement hints from its neighbour it probes frequently as compared with static case.

## 2.4 Vehicular Network Path Selection

In Vehicular mesh network dynamic tabling of neighbor nodes is done due to which rate of the broken path increased. Broken path results in increased overhead. Here in this section discussion about improvement in path selection is done. Here three metrics Connection time estimate which uses heading and speed hints are designed to decide whether a particular path is long lived or not.

## 3. Background Review

In the last section we have discussed four different schemes under Sensor augmented wireless network. In this section we will figure out advantages and disadvantages of these schemes.

### 3.1 Rapid sample bit rate adaptation protocol

Main highlights of this algorithm are first, it allows mobility to achieve good performance and second it explicitly adopts device behaviour, parameter to current mobility mode. During study and analysis it is find that device that uses Rapid sample protocol reduces battery lifetime by consuming more energy.

### 3.2 Hint Aware AP association

Main gains of Hint Aware AP association protocol is that it provides improved throughput and minimized handoff as compare with standard scheme.

### 3.3 Topology Maintenance

It continues to send at the fast probe rate for one second after the node stops moving in order to estimate the correct metric, before slowing the probe rate down.

### 3.4 Vehicular network path selection

Such a system can increase throughput and reduce the load on the more expensive cellular links. Major issue with this system is that when route breaks due to node movement, packets are lost in the buffers of the intermediate node on the route, and will have to retry after discovering a new route, increasing overhead and latency.

## 4. Emerging Technology

In the perception of our paper, we are going to use the Network Simulator2 to evaluate, justify the results and X Graph utility to graphically represent the result of simulation. Below is the brief introduction about the tools.

### 4.1 Network Simulator

NS2 [ 5] also known as discrete event simulator that is designed especially for networking research work. NS2 is based object oriented concepts, preserve number of events and executes one after other. So knowledge and understanding of this language is required. It uses TCL as scripting language. NS2 is primarily UNIX based, but it can also be installed on windows. Even if we want to use it on Linux it is possible, one thing to remember it is to install Linux under windows.

### 4.2 X Graph

X Graph [4 ] is a utility provided to graphically symbolize result of simulation performed. Graph can be easily plotted by using output file of TCL script as data set .X graph utility is fully flexible in terms of manifestation of components of the graph. It consists of number of options which are either specified in comment line or in data files.

## 5. Proposed Work

There are two types of network available one is wired and another is wireless. Wired network offers high performance as compared with wireless network. To

enhance the performance of wireless network Hint Aware probing protocol [1 ] is designed. In context of vehicular mesh network hint aware probing protocol reduces bandwidth consumed and increase route stability. In course of further development Rapid sample algorithm [1 ] is proposed, Rapid sample algorithm allows mobility along with excellent performance. Key point here is, this protocol explicitly adapt in accord with current mobility mode of device. Besides above mentioned positive features Rapid sample protocol reduces battery lifetime by consuming more energy of mobile device.

To resolve above sought issue there is a need to optimize the solution. In our research work we are intended to improve the performance of Rapid sample algorithm by reducing energy consumption in mobile devices.

## 6. Conclusion

In this paper we have explored Sensor augmented wireless architecture along with four other algorithms. As discussed above Rapid sample protocol is one amongst them. A major issue in this Protocol is that it reduces battery life of mobile devices. Subsequently we have proposed to enhance its performance in terms of energy consumption of mobile devices.

## 7. Future Work

In the future we are looking ahead to implement above by means of NS2 under guidance of our respected guide Asst. Prof. Sravan Kumar.

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