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Enhanced Network Selection Scheme for Cognitive Network based on Budget constraints

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***Abstract*-Exponential growth of user demands on a single convergence platform has brought researchers to explore various aspects/features of Fourth Generation Mobile Communication System. Selection of application as per the user preference based on QoS is one salient feature of 4G [1].**

In this a selection algorithm has been proposed which provides a better way to implement user preferences as per the features of 4G [1]. Rank based on distance function has been computed for various available services/access technologies, called networks. Weighted distance function is obtained based on multiple QoS parameters as per user needs [1].

***Index Terms*-Cognitive radio networks, Link scheduling, Uncertain spectrum supply, Multi-hop multipath routing, Optimization.**

I. INTRODUCTION

In the next generation of wireless communication systems, there will be a need for the rapid deployment of independent mobile users [1-2]. Significant examples include establishing survivable, efficient, dynamic communication for emergency/rescue operations, disaster relief efforts, and military networks. Such network scenarios cannot rely on centralized and organized connectivity, and can be conceived as applications of Mobile Ad Hoc Networks[5].

Cognitive radio (CR) will lead to a revolution in wireless communication with significant impacts on technology as well as regulation of spectrum usage to overcome existing barriers [4]. CR, including Software Defined Radio SDR as enabling technology, is suggested for the first time in and to realize a flexible and efficient usage of spectrum [4].

Applications in the context of CR are often included in its definition because of the compelling and unique applications afforded by CR. Additionally, there are many existing software radio techniques that CR is expected to enhance. The following are frequently advocated applications of cognitive radio [4]:

1. Improving utilization and efficiency.
2. Improving link reliability.
3. Advanced network topologies.
4. Automated radio resource management [4].

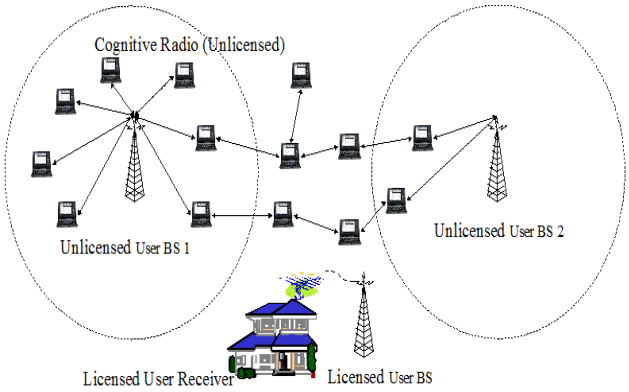

Fig 1: CR Network in Spectrum

II. RELATED WORK

[1] In this paper, author describe a framework for QoS support in such NGNs, Next Generation networks where multi-interface terminals are given end-to-end QoS guarantees regardless of their point of attachment. The framework supports media independent handovers, triggered either by the user or by the network, to optimize network resources distribution.
Pros and cons:

-- This Framework not only flows are provided with service guarantees seamlessly, but also operators are given the ability to reconfigure the distribution of network resources to optimize performance.
-- This framework does account for the challenges to be tackled in NGNs with a flexible and scalable solution.

[2] In this paper, author proposed a cognitive framework using an evolutionary algorithm, Swarm Intelligence, is proposed. This framework uses a novel approach that utilizes a cost function that chooses the optimal parameters to provide an adaptive quality of service (QoS) based on the user's needs.
Pros and cons:
-- This approach ensures interoperability and scalability between different modulation techniques in the physical layer and enhances security against Denial of Service attacks such as jamming attacks and signaling attack.
-- Modulations such as OFDM, W-CDMA, to evaluate real-time 4G network are not incorporated in our present work.

[3] In this paper, author proposed a framework for quality of service provisioning over the air interfaces in future wireless networks, including 3G enhancement and 4G mobile networks. The framework is based on the paradigm of service classes, wherein each class can exhibit a characteristic behavior in terms of resource allocation over the air interface.
Pros and cons:
-- In this approach the user application can choose the service class that best suits its expectations in terms of QoS and cost of access.
--But it may be necessary to restrict the number of classes of applications the user runs simultaneously.

[4] In this paper, author proposes the idea of developing a novel QoS optimization architecture that will judge the user requirements and knowing peak times of services utilization can save the bandwidth/cost factors.
Pros and cons:
-- The proposed architecture can be customized according to the network usage priorities so as to considerably improve a network's QoS performance.
-- The concept will be refined by a field trial with real users after an initial test phase in controlled environments

[5] In this paper, author analysed that a system combining extensions of two radio access technologies, IEEE 802.11 and IEEE 802.16 4G requirements.
Pros and cons:
-- Real-world use cases for such handovers include responding to applications, operators, or users asking for higher data rates, lower costs, higher quality of service, or improved traffic management, as well as to changes in mobility status or coverage.
--Voice call continuity (VCC) potentially applies to 802.16m/802.11 VHT handover.VCC increases network complexity.

III. EXISTING SYSTEM

In the current cellular systems, which are based on a star-topology, if the base stations are also considered to be mobile nodes the result becomes a 'network of mobile nodes' in which a base station acts as a gateway providing a bridge between two remote ad hoc networks or as a gateway to the fixed network.

A final agreement on what features characterize 4G mobile system, is yet to be reached. Sharing the 4G objectives within research community is still open and lot of features and applications have been suggested by the researchers.

Delivery of services to users in different location, under different conditions with QoS available in fixed environment, was some of the major issues.

IV. PROBLEM STATEMENT

In different an environment, a terminal must be able to discover all networks that are available for use.

A more challenging issue is to discover and select the best network whenever a handoff is necessary.

V. PROPOSED SYSTEM

In this, a multi-attribute algorithm for network selection is proposed for 4G systems.

In a user-centric environment, flexibility and ease-of-access at the user level are essential requirements for the people to adopt the new technology.

Advantage:

It is a common observation that, while accessing any network or service, a user demands low billing rate, high bandwidth and data rate, adequate security, low call drop etc. With the increase in number of quality parameters required by the user, the complexity of the network selection is likely to increase.

VI. MODULES

The major motivation of the proposed method is to utilize the radio more efficiently, and to be able to maintain the most efficient form of communication without interference and mobility model.

To make the proposed method as efficient we divided this into small modules, such as given as bellow [6].

- **Application selection**
- **Wireless network evolution**
- **Customizing parameters**
- **Network selection**

1. Application selection

In real time, user can select any type of application like as video calling, voice calling, internet and e-transfer and so on…

We are taking three different applications video, audio, e-transf. In the proposed method, we included application selection module for setting the specific application with some fixed properties preference as given as below [6].

Table1: Application selection with fixed properties

Applications	**Bandwidth**	**cost**	**security**
video	**high**	Less	medium enough
voice	Low enough	**Should be low**	Low enough
E-trans	Medium enough	Cost is negligible	**Should be high**

2. Wireless network evolution

Here we are design the network which is capable of selecting various networks. The proposed network selection algorithm works on the choice of the user specified QoS parameters. A discovery and selection mechanism to find a new Base Station must be done [6].

3. Customizing parameters

In this module, after getting the network detail we are separating the different parameters. After separating the parameters for each network, we are comparing that parameter to select best network [6].

4. Network selection

After comparison we are providing the Rank list for each parameter. Multi-parameter selection technique is required to meet user needs in terms of automatic network selection during handover [6].

All the parameter values are normalized so that they take on values in the range of zero and one and also in negative. After getting the rank for given application, the device going to select the best network automatically

VII. ALGORITHM AND FLOWCHART

Step1: Initialize the application properties.

Step2: Collecting the Network information.

Step3: Initializing network parameters.

Step4: Sorting.

Step5: Input application.

Step6: Comparison (analyzing parameters).

Step7: Giving Rank to the network.

Step8: Selection of network.

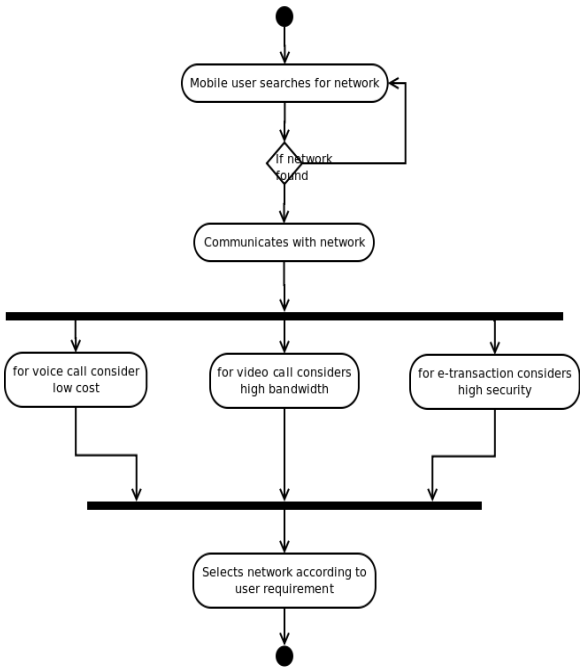

Fig 2: Flow chat of proposed method

Analysis

1) Checking Bandwidth level.
2) Checking Security level.
3) Checking the Cost level.
4) Giving Rank.

VIII. EXPERIMENT RESULTS

In our proposed method we are going to show the output in two ways one is Nam window and X graph.

In proposed method, we are giving the input in terminal. There are the three options to select the services such as voice, video, and E-transaction.

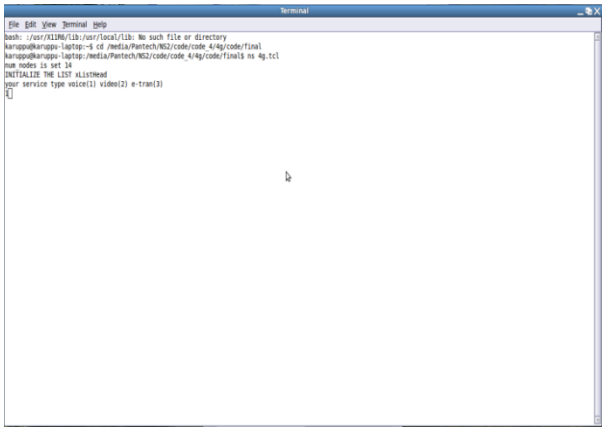

Fig 3: Giving input in terminal

To select the services we need to give the input as numeric number 1, 2, 3 respectively voice, video and E-transaction.

After giving input, system will generate the rank list for cost value, Bandwidth value and security value.

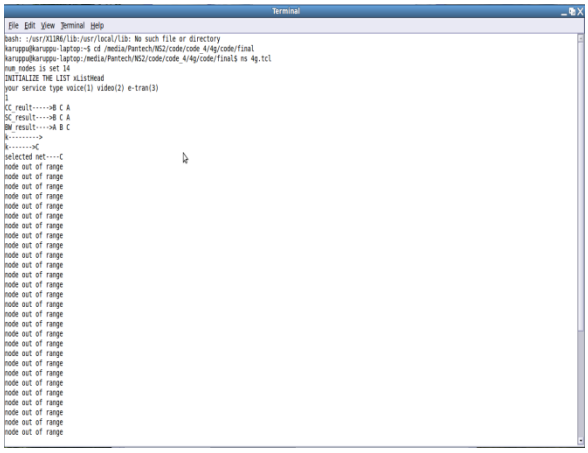

Fig 4: Generating rank list

From this rank list our system will select one best network by using the Spearman foot rule.

In the proposed method we are setting the three networks named as airtel, BSNL and IDEA. And there are the two users moving from different directions, is given below in Fig 5.

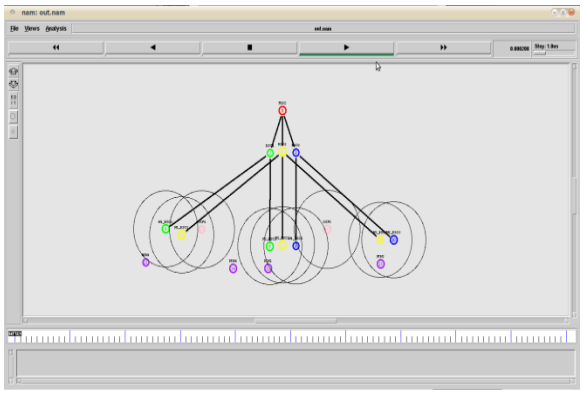

Fig 5: Initialize Network

In initial setup there is no network is selected, after getting the rank list and then only network selection will be there, and it is shown below in Fig 6.

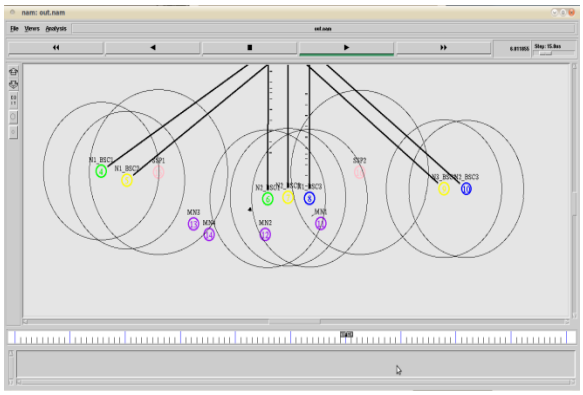

Fig 6: Selection of new best network and Handoff

We are showing the output in x-graph as below Fig 7 which gives the rank for the different networks IDEA, BSNL, AIRTEL. Based on the rank we can know the selected network.

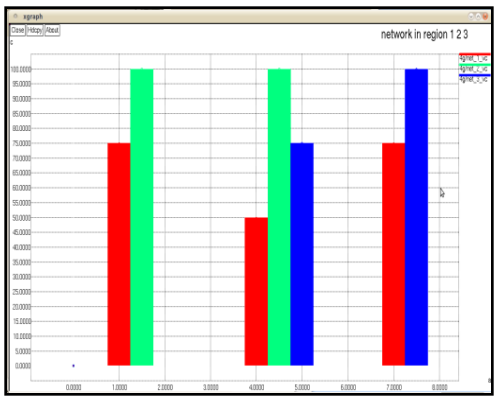

Fig 7: X-graph

Here BSNL is the best network based on the rank shown in the above graph which is for the given input parameters and application. So, the selected network is BSNL.

Here in output we also get 2 graphs in x-graph. They are Throughput Vs nodes and Throughput Vs Budget.

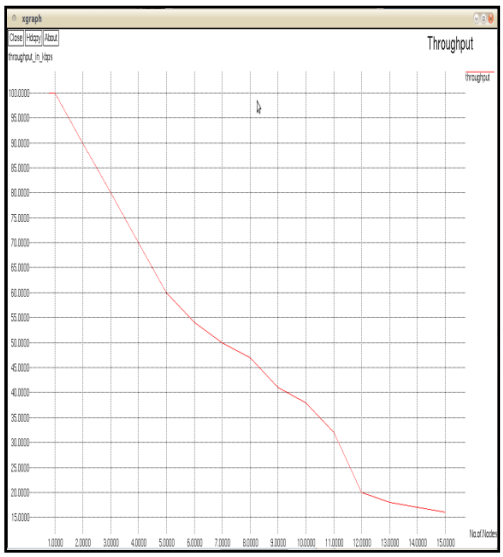

Fig 8: Graph for Throughput Vs Nodes

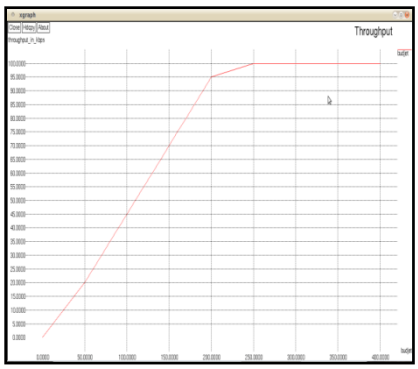

Fig 9: Graph for Throughput Vs Budget

IX. CONCLUSION

In this proposed method we evaluate the QOS performance of the various cellular networks available and compose the performance cost at the given locations. We have introduced a new service provider, called secondary service provider, to help CR sessions to select the paths for packet delivery. Considering the price of bands and the potential returning of primary services at different CR links, the SSP purchases the licensed spectrum and jointly conducts flow routing and link scheduling under the budget constraints. The user selects the best performance network with low cost. The paper proposes a novel algorithm for optimal network selection based on multiple user preferences under heterogeneous network. As 4G system supports multi-mode and reconfigurable devices to support inter-working of heterogeneous networks. The algorithm selects appropriate network during handoff based on user preferences and interests. The user can opt for multiple QoS parameters like bandwidth, cost of service, security level, call drop probability etc., to select appropriate networks. The proposed algorithm uses a distance function to generate an ordered list of various available access networks in a particular region according to the multiple user preferences and level of interest The results clearly show that the proposed algorithm always best connect the user, as per his preferences of QoS parameters in a 4G System. Consumers demand that software and hardware be user-friendly and perform well. Indeed, it seems part of our culture that customers expect the highest quality and the greatest features from what they buy. The cellular telephone industry, which now includes a myriad of wireless devices, is no exception. Meanwhile, competition in the industry is heating up.

In this we have tested the proposed program with the different type of testing, while testing we have solved so many errors and we verified output result. After error debugging we got perfect result as our main objective. Due to time duration we have not implemented in real time and we have not tested in real time, in future we will implement it in real time and we will test it.

In future we will test with more parameters like signal strength, different data rate access.

X. REFERENCE

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