International Journal of Engineering Research & Management Technology ISSN: 2348-4039
July-2016 Volume 3, Issue-4
Email: editor@ijermt.org www.ijermt.org

A NEW ARCHITECTURE FOR OPTIMIZATION AND TROUBLESHOOTING FOR TODAY'S AND TOMORROW'S RAN TECHNOLOGIES AND SERVICE BY USING TEMS TOOL

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ABSTRACT: *Nowadays, In Technology era, information sharing and devolution has enhanced fatly. TEMS Investigation is an active, end-to-end testing solution used to verify, optimize and troubleshoot the QoE (**Quality of experience**) of HetNet (heterogeneous Network) RAN and services from a subscriber perspective for in-vehicle, in-building and pedestrian-area testing scenarios. By the using of TEMS tool we can easily trace the MCC, MNC, LAC & CI and we can easily find out the actual FER & BER & SQI of our operator in RAN. TEMS Discovery is the wireless industry's most comprehensive network analytics and optimization platform, providing mobile operators and their service providers with unparalleled insight into network performance as perceived by subscribers at the device, application and network level. This holistic approach is unique to TEMS Discovery, empowering operators to lock-in premium subscribers by validating that they are receiving the service levels they demand, around-the-clock, from any location, and across voice, data and integrated media services. It provides early test availability of new technologies, features and devices, constantly updated to meet evolving needs during both pre & post-launch stages of network developments. It enables MNOs, managed service providers and OEMs to streamline their drive test process to address increasing network complexity while reducing OPEX. Focusing on speed, simplicity, and reproducibility it reduces process errors, complexity and time spent in the field.*

KEYWORDS: *RAN Technology Investigation, RAN Technology Optimization, RAN Technology Troubleshooting.*

1. INTRODUCTION

In Today's many tools are going for the network testing like – nemos, TEMS & So on. The TEMS is one of them, in general terms; TEMS is a Time Investigation System Drive testing tool that is used for the Investigation, Optimization & Troubleshooting problems of RAN technology operators. By using of TEMS we can done easily optimization for the RAN bands like- 900, 1800, 2100 & 2300 of any Operators. TEMS Investigation is an active, end-to-end testing solution used to verify, optimize and troubleshoot the QoE of HetNet RAN and services from a subscriber perspective for in-vehicle, in-building and pedestrian-area testing scenarios. It provides early test availability of new technologies, features and devices, constantly updated to meet evolving needs during both pre & post-launch stages of network developments. It enables MNOs, managed service providers and OEMs to streamline their drive test process to address increasing network complexity while reducing OPEX. Focusing on speed, simplicity, and reproducibility it reduces process errors, complexity and time spent in the field. TEMS is used for both pre & post drives. And TEMS

provide a vital information of radio parameters, current channels, active sets, neighbors, & information about the all events. We can use the map to see more details of the drop call. Notice that the cells in the Active Set do not look like the ideal servers. DXU4325W is closer to the Ue and should be a better server, at least, than DXU3013Z. It looks like DXU3013Y is over shooting. And by using the TEMS we can check the HSDPA, HSUPA, Ec/No, RSCP and resolve the problems of our RAN. It support for multiple technologies & capability to simultaneously collect and present data from GSM, GPRS, EDGE, WCDMA & HSDPA(all in tool). And support for route analysis (data selector, work with multiple log files simultaneously, Map views (route & binning)), support for WCDMA RAN Tuning report, support for additional UEs & scanners.

RAN

A wireless network that uses radio frequencies, which includes the technologies used in the air interface, base stations, core network and user devices. The term radio access network (RAN) is widely used when referring to cellular networks. For example, it is used with GSM and UMTS systems.

A radio access network (RAN) is part of a mobile telecommunication system. It implements a radio access technology. Conceptually, it resides between a devices such as a mobile phone, a computer, or any remotely controlled machine and provides connection with its core network (CN). Depending on the standard, mobile phones and other wireless connected devices are varyingly known as user equipment (UE), terminal equipment, mobile station (MS), etc. RAN functionality is typically provided by a silicon chip residing in both the core network as well as the user equipment.

2. BACKGROUND

In the present work, a novel approach to increase the system resource utilization and to provide better QoS, the above schemes are investigated with following methods

1. Hybrid Channel Allocation with Queuing (HCAQ)
2. Priority on Resource Allocation (PRA)
3. Resource Estimation and Reservation (RER)

From these investigations the conclusions are

- ✓ Firstly from hybrid channel allocation with queuing of new calls and handoff calls shows that, queuing of new calls only

In general HCA strategy resulting an increased call dropping probability (pd) on the handoff calls. This situation should be

Avoided However, at the same time, queuing of handoff calls only gives reduced call dropping probability (Pd) of the handoff calls with single space queue Since in a single space queue method of adding queues in the handoff calls does not affect the call blocking probability (pb) of the new calls. In wireless environment, resource allocation for a particular multimedia call is very complex and complicated process. This directly affects the overall system performance and the mobile users. The results of HCAQ strategy shows that, as compared with commonly used Fixed Channel Allocation (FCA), Dynamic Channel Allocation (DCA) and Hybrid Channel Allocation (HCA) strategies, the new call blocking and handoff call dropping probabilities are reduced in a reasonable amount and thus this increases the micro and pico cellular wireless system performance. The HCAQ strategy gives an inference that, the queuing of the handoff calls are more important than the queuing of new calls. Because the call drops during the handoff will disturb the mobile users more than getting a new call connection with delay.

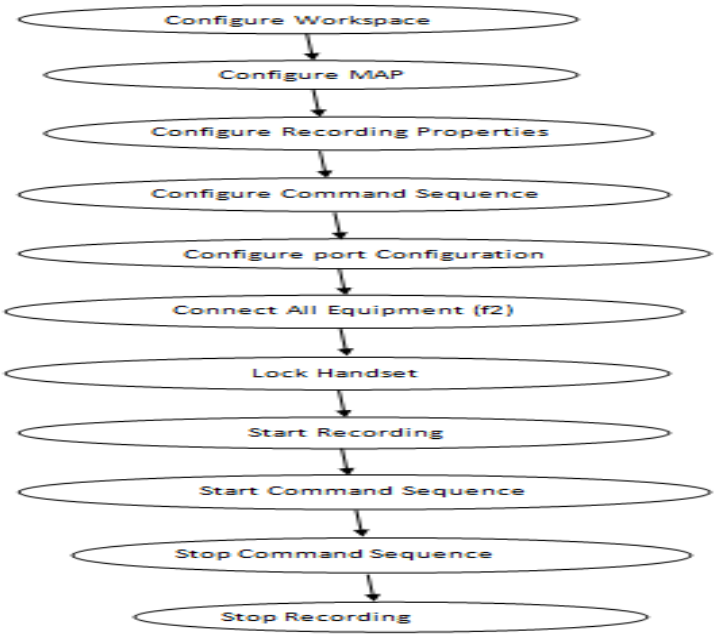
3. PROPOSED Methodology

Drive Test is one of the most comprehensive procedures of testing and analyzing a Radio Frequency Network

–Coverage evaluation

–System availability

–Network capacity
–Network retainability
–Call quality



(Fig: proposed Architecture of Troubleshooting, Investigation, using TEMS)

DIFFERENT TYPES OF DRIVES

1) Drive For GSM:

✓ ***Pre Drive:-***

I. ***Idle Mode –*** In this mode firstly we connect our equipment to our TEMS kit in Idle mode then start the drive and check RxLev & RxQual parameters. The RxLev range is (0 to -120) . 0 to -65 is best & -65 to -75 is average & -75 to -85 are acceptable and above is worst. And RxQual range is (0 -7). 0 – 3 is best & 4- 5 is average and 6 – 7 is acceptable and above is worst.

II. ***Dedicated Mode Drive(Long Call, Short Call):***

In this dual mode connect our equipment to our TEMS kit in idle mode and run the script for both Long & Short calls then start the drive and check RxLev & RxQual parameters. The RxLev range is (0 to -120). 0 to -65 is best & -65 to -75 is average & -75 to -85 is acceptable and above is worst. And RxQual range is (0 -7). 0 – 3 is best & 4- 5 is average and 6 – 7 is acceptable and above is worst.

III. ***Data (Dl & Ul*)**: In this we check the Data Throughput (RLC Throughput in kb/ps).

IV. ***Cutover***

✓ **Post Drive: - It** is start after the optimization & follows same as pre drive process.

I. ***Idle Mode –*** In this mode firstly we connect our equipment to our TEMS kit in idle mode then start the drive and Check RxLev & RxQual parameters. The RxLev range is (0 to -120) . 0 to -65 is best & -65 to -75 is average & -75 to -85 are acceptable and above is worst. And RxQual range is (0 -7). 0 – 3 is best & 4- 5 is average and 6 – 7 is acceptable and above is worst.

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III. ***Data (Dl & Ul*)**: In this we check the Data Throughput (RLC Throughput in kb/ps).

IV. ***Cutover*.**

2) Drive for WCDMA: -

In this mode firstly we connect our equipment to our TEMS kit in idle mode then start the drive and **Check -**

1). **Ec/NO** (0 - 7) 0 – 3 is best & 4- 5 is average and 6 – 7 is acceptable and above is worst.

2). **RSCP** (0 to -120). 0 to -65 is best & -65 to -75 is average & -75 to -85 are acceptable and above is worst.

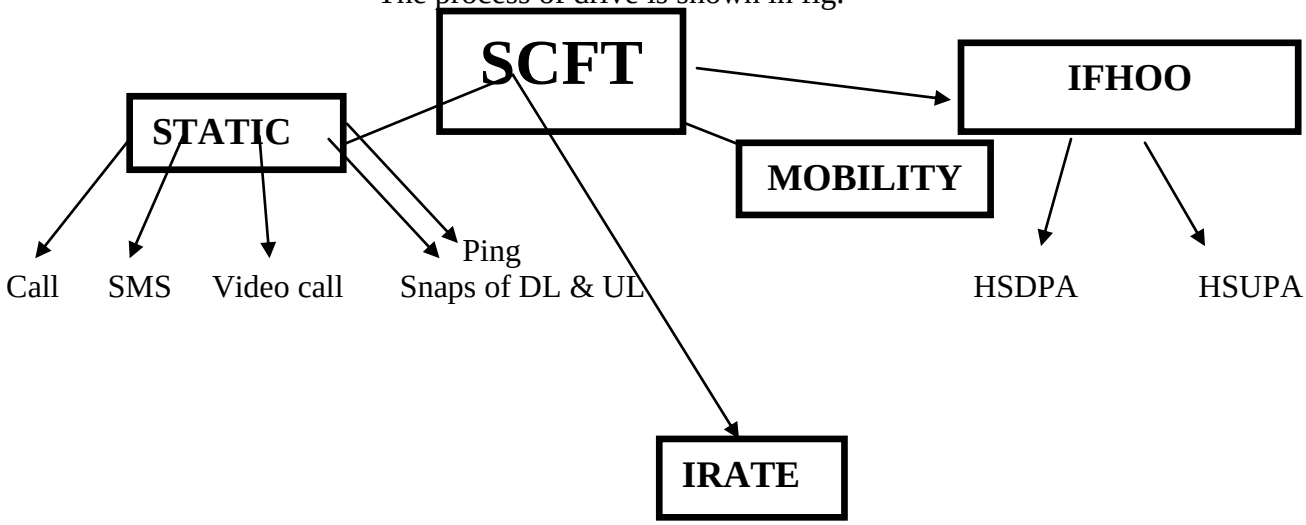
3). **HSDPA.**

4). **HSUPA.**

5). IFHO.

6) IRATE

The process of drive is shown in fig.



4. RESULT

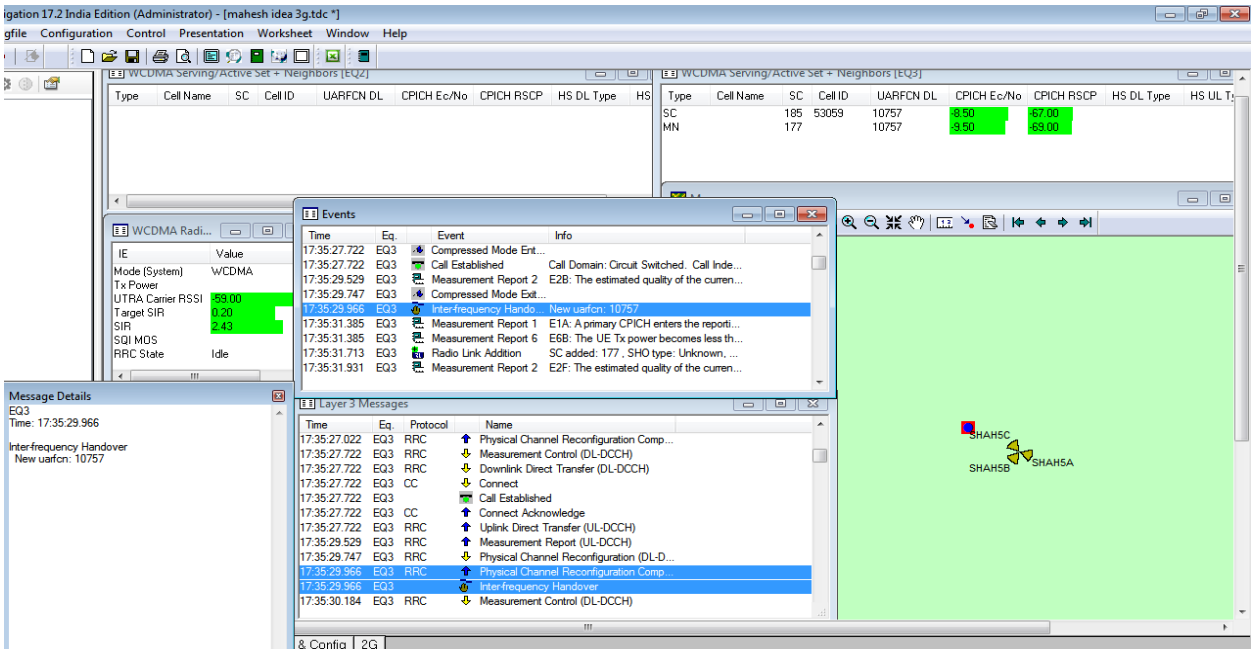
Drive testing is a method of measuring and assessing the coverage, capacity and Quality of Service (QoS) of a mobile radio network.

The technique consists of using a motor vehicle containing mobile radio network air interface measurement equipment that can detect and record a wide variety of the physical and virtual parameters of mobile cellular service in a given geographical area.

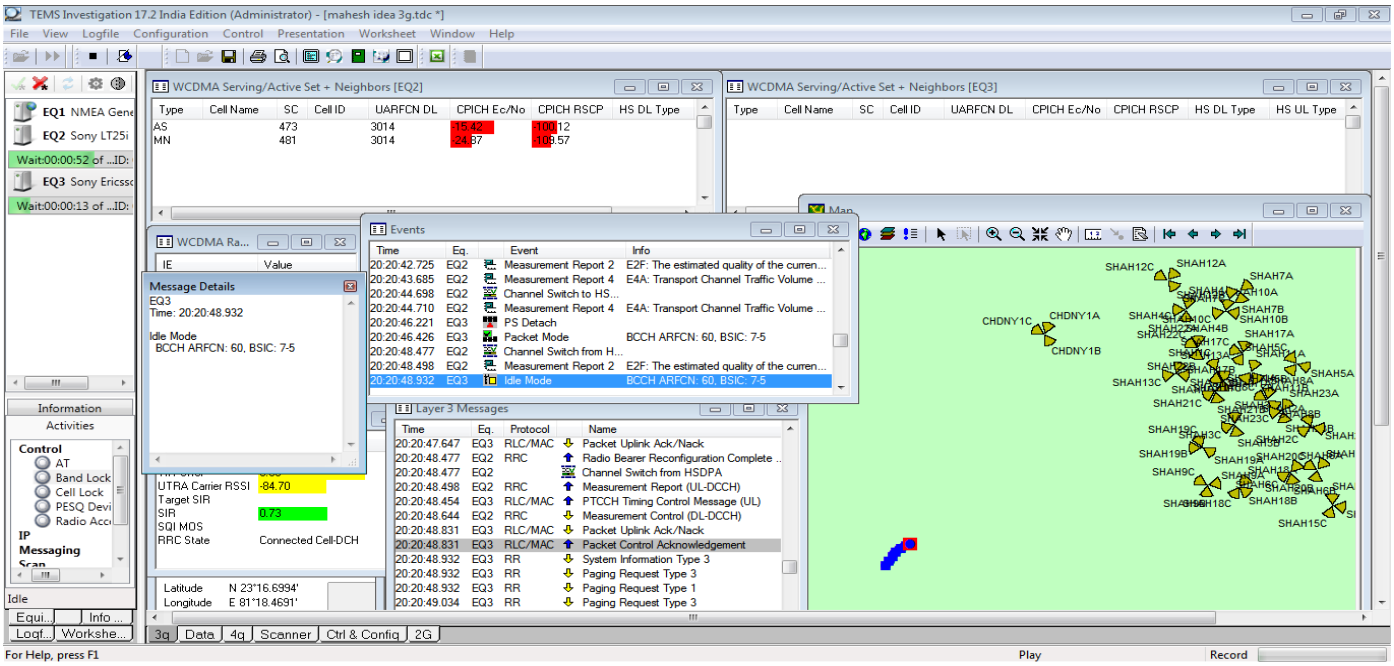
By measuring what a wireless network subscriber would experience in any specific area, wireless carriers can make directed changes to their networks that provide better coverage and service to their customers.

Drive testing requires a mobile vehicle outfitted with drive testing measurement equipment. The equipment is usually highly specialized electronic devices that interface to OEM mobile handsets. This ensures measurements are realistic and comparable to actual user experiences.

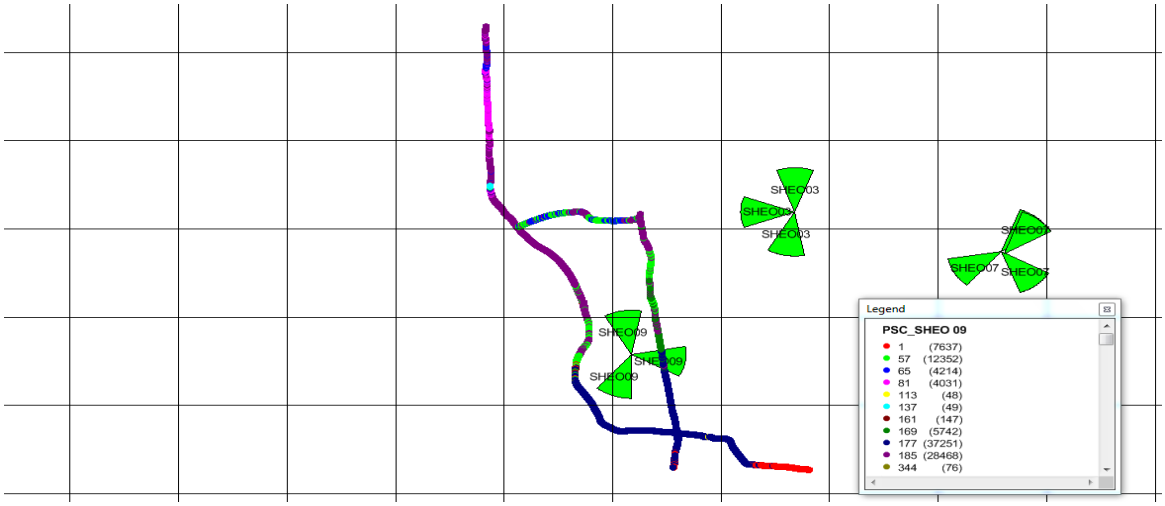
IFHO


WCDMA Serving/Active Set + Neighbors [EQ2]
WCDMA Serving/Active Set + Neighbors [EQ3]
Events
Message Details
Layer 3 Messages
WCDMA Radi...
Inter-frequency Handover
New uarfcn: 10757
SHAH5C
SHAH5B
SHAH5A

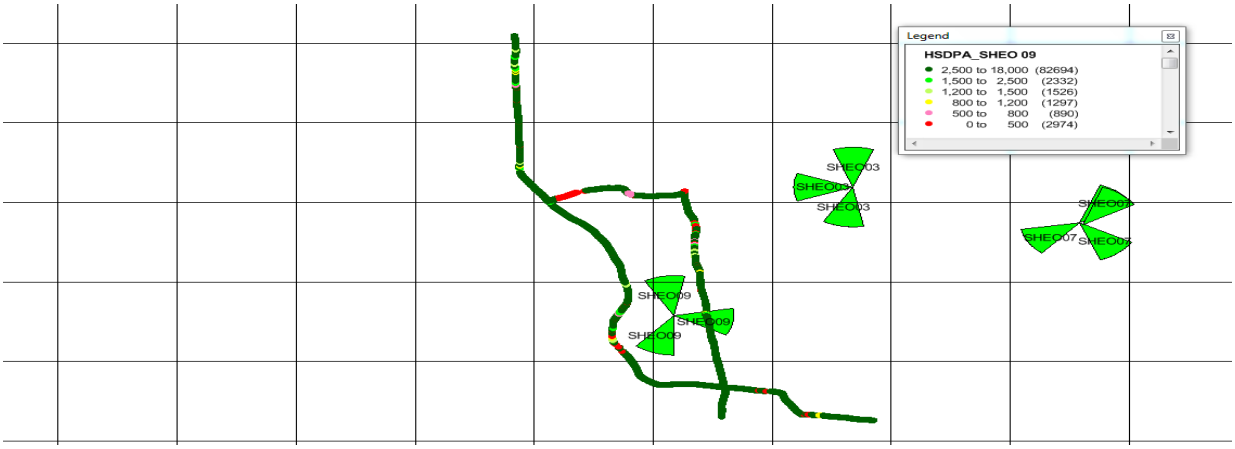
IRATE


TEMS Investigation 17.2 India Edition (Administrator) - [mahesh idea 3g.tdc *]
WCDMA Serving/Active Set + Neighbors [EQ2]
WCDMA Serving/Active Set + Neighbors [EQ3]
Events
Message Details
Layer 3 Messages
Map
Idle Mode
BCCH ARFCN: 60, BSIC: 7-5
CHDNY1C
CHDNY1A
CHDNY1B
SHAH12C
SHAH12A
SHAH5A
SHAH23A
SHAH15C

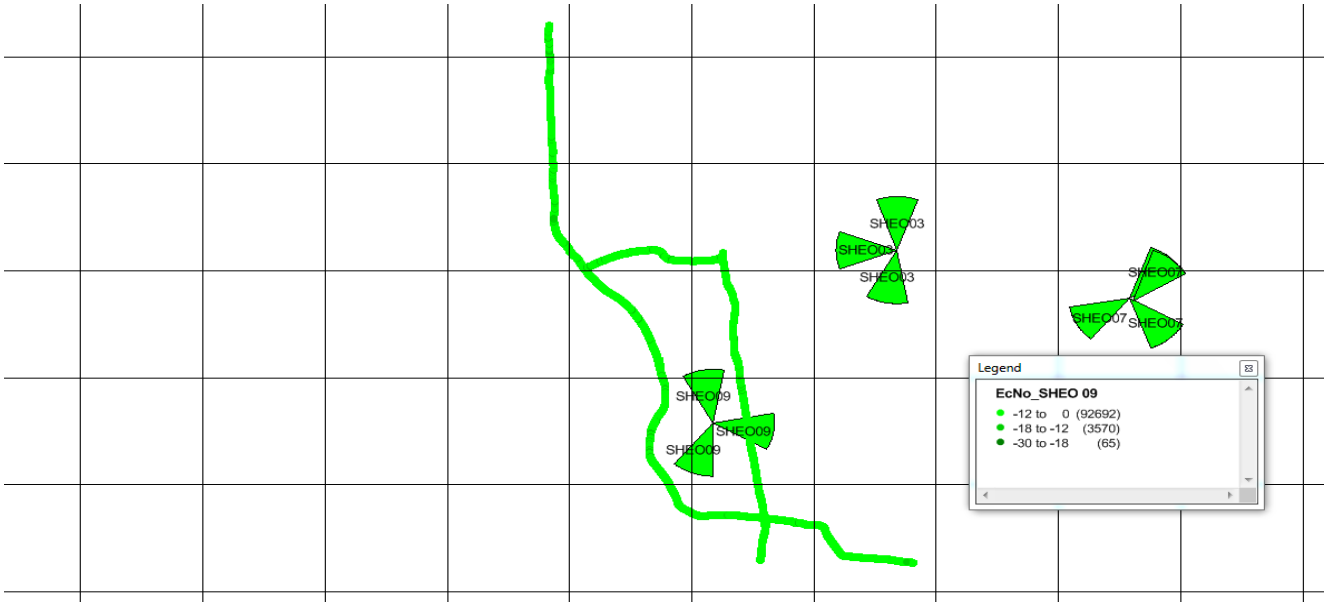
Grid View of PSC



Grid View of HSDPA



Grid View of EcNo



Grid View of RSCP

5. CONCLUSION

1. Satisfactory coverage and quality were found
2. In most of the location, additional walk test has been carried out where Operator hasn't deployed micro layer
3. Macro sites should provide coverage to mobile users located in open environment
4. Important operation considered in the wireless mobile environment is handoff in which the mobile user can move from one cell to another during an ongoing call. Resource reservation schemes are used to reserve the bandwidth required for the handoff calls. This enables the user to continue the call while moving. The time resource allocation scheme such as channel allocation strategies and effective bandwidth allocation schemes and resource reservation schemes are the most challenging areas in the wireless mobile networks. These schemes determine how the multimedia call traffic is being controlled and managed.
5. The main objective of this work is to reduce the handoff call dropping probability and the new call blocking probability of the mobile users, and to maximize the resource utilization performance of the network. Extensive simulation was used to analyze and study, and to compare the performance with other techniques. Simulation results show that the proposed techniques significantly enhance the performance of the wireless mobile system.
6. The Wireless Radio Resource Management (WRRM) is the most significant and challenging aspect in the provisioning of Quality of Service (QoS) for wireless mobile multimedia networks. Conceptually, radio resource management policies, in conjunction with the network planning and air interface design, determines QoS performance of the individual mobile user and at the network.

6. FUTURE ASPECTS

1. In HCAQ, single space queue is taken for analysis. If the number of calls in the queue is high, then the call is dropped .When the queue size increased, the dropping probability of handoff calls and blocking probability of new calls are reduced. However, this will increase the delay. Hence the optimum queue size with delay analysis may be considered as future work.
2. In PRA method, resource allocation of new calls and handoff calls are considered. If the required resource is not available for Model-3 calls, proposed PRA method reject low rate video call, postpone high rate video call and allocate bandwidth to voice part of Model-3 call. The resource allocation of postponed video call and the respective delay analysis may be considered.
3. In RER the priority queue such as Real Time(RT) and Non Real Time(NRT) service class queue may be considered so that, the real time services can get more priority and benefited.

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