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Case Study to Analysis GSM Network by Using 3G KPI Report

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Abstract **- In this Dissertation, The overall system consists of Base Station Subsystem (BSS), Network and Switching Subsystem (NSS), and Operation Support System (OSS). The BSS consists of Base Transceiver Stations (BTSs) and the Base Station Controllers (BSCs). The NSS consists of Mobile-services Switching Center (MSC), and several databases (e.g., HLR, VLR, EIR, and AUC). Radio network planning is perhaps the most important part of GSM system design process owing to its proximity to mobile users. This Dissertation present, a basic Approach to radio network planning that provides effective solution in terms of coverage and quality. The objective of this study, which is coverage driven is to find the minimum number of sites required providing sufficient coverage. large no. of BTS present in the network which we check their individual & mutual performance on the basis of different parameters. In this 3G KPI parameter for GSM are used on the basis of telecom software .There are few example of parameters like total Attempted Calls, Total Dropped Calls, Total Blocked Calls etc.by improving these parameters, we improve the quality of network.**

PATHLOSS: **proper linking purpose**

I. Introduction To Analysis Of GSM Network

The aim of Analysis is to maximize the quality of Services (QoS) of the GSM Network. In order to do this we need to measure the quality of quality of services (QoS), compare the measured value with the desired value, and then take steps to correct the causes of any deviations from the desired value. The goal is to reach or exceed the customers required level of performance.

Optimization is used to examine the following criteria when tuning a cell: Frequency planning (Interference related issues); topology (Neighbours list); cell dynamics (Handover timers and margins); database parameter and antenna tilts. Optimization is traditionally undertaken after the commissioning stage, or after a new frequency plan is introduced in a deployed network. Extensive drive testing around each site making a number of calls, concentrating on testing the handovers between each cell. Each cell is investigated and any identified or potential problems resolved classical fault- reasoning / resolution methods. This methodology, termed "drive testing", is used by most network operators as a tried and tested way of identifying areas of their network for improvement through optimization. This method of network performance measurement is very important for comparing the performance of network under test with competitor's network. Drive test statics represent a small sample of the total calls on the network and can provide a useful indication of the network quality. In order to provide a precise imitation of the user traffic, the statistics obtained from the whole network through the OMCR (Operations and Maintenance Centre) are a more accurate assessment of the quality of network. Quality and Level information of up-link and down-link for an individual call to determine the performance of the network and provides to improve the quality of services of the network. There will be a interactive process between the optimization process and the advanced OMC optimization tool for understanding a problem in greater details based on the information and statistics fed to the system.

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The outcome of the process is an optimization report which gives details on the changes needed to be done in the database; antenna tilts etc. to improve the quality of the network.

II. Problem Statement

RF Optimization teams used to analyze performance stats and evaluate QoS offered by the existing network. Since the deployment of GSM network, it has been observed practically that there are many phenomena and issues which have been neglected in literature/available text but they severely influence the network performance. To analyze the network performance dropped calls, especially in the midst of handover, are normal in GSM organizations in Delhi and in various other making countries. Call drops and handover hardships are by and large because of lacking radio assets. To open up the augmentation extents of BTSs with the end goal that handover and drop call probabilities are decreased to a base, the execution of cell part, sectoring, and effective handover association is required. Cell part, sectoring, and beneficial asset association, if true blue executed, could lessen unbalanced call misfortunes in light of handover. To accomplish this lessening, the augmentation extent of every cell is at initially updated (split) to oblige downsized scale cells and Pico-cells. Obviously, cell part builds the rate of handoff. In any case, coming about to the augmentation extents of the unmistakable cells now cover, the following handoff is conventionally a smooth one and does not moment the loss of an on-going call(s). Sectoring incorporates that the omnidirectional accepting wires, which are exhibited by different regulators, be supplanted with a couple zone radio wires. Sectoring utilizes directional social occasion gadgets to further control the piece and rehash reuse of channels. Division gathering contraptions convey light releases control than Omni-directional radio wires; thusly, sectoring greatly enhances system scope.

In the dissertation, we analyzed the latest drop call due to interference, handover, missing neighbouring ARFCN, Hardware fault data obtained from the MSC, and explored ways to improve the overall quality and level of signal strength of the network.

Traffic Analysis of GSM Network: We have considered a GSM Network to analyses the Network Performance. The key parameters to be considered are-

- Call Success Rate
- Call Setup Success Rate
- Handover Success Rate
- Dropped Call Rate
- TCH Blocking Rate

Call Success Rate: Call Success Rate is a network "figure of merit" which quantifies the network from a subscriber's perspective. It represents the proportion of calls that are successfully completed. For this to occur the call must be successfully setup and should not be suffer a RF Loss prior to subscriber termination or handover.

Call Setup Success Rate: The call Setup Success Rate relates to the proportion of subscribers that successfully achieve access to an allocated TCH, implying the end of a successful signaling phase in assignment procedure.

Handover Success Rate: Handover Success Rate (HSR) is a measure of successful handovers from the serving cell to its best neighbour. Handovers can be intra-cell, intra BSC or inter MSC handovers. When a handover required to the best neighbour result in a rejection due to unavailability of the resources or any other reason. It is considered as a handover failure. However it is to be noticed that a handover failure does not necessarily mean a drop Call. Thus HSR is taken as a key statistics in evaluating the network performance.

Dropped Call Rate (DCR): A dropped call occurs when the subscriber has an allocated TCH and this is abnormally released due to either RF loss or equipment problems. The drop call rate therefore is a measure of the proportion of subscribers that successfully access a TCH, but then abnormally drop the call. Thus DCR for a network is given more weightage and should be as low as possible. Drop call rate is an important parameter as far as performance is 0.5%.

III. Recommendation To Improve DCR

(a) Poor Down link level: This is the main reason for the drop calls. If calls are dropping because of this reason at the boundary cells then expansion of the network is the solution. However, if it is caused because of some blind spots present in the network then this can be avoided by putting up more sites in the area, improving the EIRP of the existing cells, installation of repeaters etc. if these options affect the network performance owing to high interference because of more reuse then deployment of Micro, Pico Cells and underlay overlay cells can be very good options.

(b) Poor Downlink Quality: If the received level in the downlink level is good and the quality goes bad, it can be inferred that the major reason for poor quality is interference. Interference is either Co – Channel or/and Adjacent Channel. If certain area is affected by interference resulting in poor quality then one of the ways to reduce interference level is by redefining your coverage boundaries, which can be achieved by increasing antenna down tilt and reducing antenna height. EIRP of a BTS can also be reduced to counteract interference. Frequency plan deployed in the network can be redefined and reuse distance can be increased while dealing with quality problem in general.

(c) Poor uplink Level: Generally in the coverage boundaries of cells covering large area, calls drop because of poor uplink level owing to high path loss. Probable solutions without reducing the coverage boundary of a cell are to important Tower Mounted Amplifiers (TMAs). TMAs improve the sensitivity of the receiving BTS antenna thus improving the uplink level and reducing the link imbalance.

(d) Poor uplink Quality: Uplink quality can be poor because of interference in the uplink. Discontinuous transmission and dynamic poor control in the uplink can be used to reduce interference in the uplink.

(e) MS Loss during handover: Unsuccessful handover attempts result in dropped call if the handovers are imperative. In other words inability of a MS to return back to the old cell after an unsuccessful attempt at the neighbour results in dropped call. This could be due to lack of TCH resources in the target cell. The obvious solution is to increase the capacity of congested target cell to cater to the handover attempts made to it.

TCH Blocking: The TCH Blocking rate is defined as the proportion of TCH requested from originating and hand in calls that fail due to there being insufficient TCH resources to carry the call.

Recommendation to improve TCH Blocking Rate: Problem of TCH blocking can be resolved by deploying additional RF carriers with in the cell. This will increase the number of TCHs.

- Congestion relief feature can be enabled
- Directed Retry Feature can be enabled.
- Call quenching feature can be enabled.

IV. Key Performance Indicator (KPI) Report

Thesis starts from performance and optimization of GSM Network with concept of Key Performance Indicator (KPI), which are analysis from all the Parameter of network such as call setup success rate (CSSR), Call drop rate (CDR), Traffic Channel (TCH) Congestion, Standard dedicated control channel (SDCH) Congestion, Handover Success Rate (HOSR). From KPI Report RF Streamlining agent give the data to the system related issue and activity stack. The call drop estimation is made through a programmed information gathering framework, in view of the system counters which enroll the genuine movement of the system.

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The counter is accessible on the switch or OMC and is recorded 24 hours a day, each day of the year. Notwithstanding, to report the execution the estimations must be taken amid the Bustling Hour of the day.

GSM Operation and Network Planning

Introduction of GSM: A GSM network is made up of three subsystems-

1. The Mobile Station (MS)
2. The Base Station Sub-system (BSS) –comprising a BSC and several BTSs
3. The Network and Switching Sub-system (NSS) – comprising an MSC and associated registers Several interfaces are defined between different parts of the system:

Abbreviations:

MSC – Mobile Switching Centre
BSS – Base Station Sub-system
BSC – Base Station Controller
HLR – Home Location Register
BTS – Base Transceiver Station
VLR – Visitor Location Register
TRX– Transceiver
AuC – Authentication Centre
MS – Mobile Station
EIR – Equipment Identity Register
OMC – Operations and Maintenance Centre
PSTN – Public Switched Telephone Network

Physical and Logical Channel:

ARFCN (200 KHz):

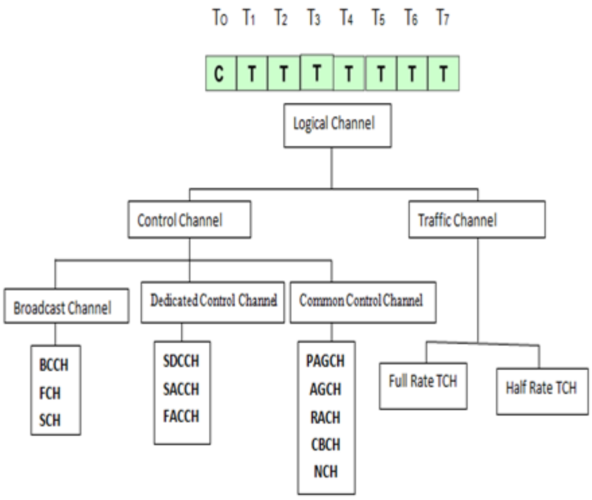

Fig. 1. Diagram Showing Logical Channels Classification

Logical Channels:

Traffic Channels: Traffic Channels carry either encoded speech or user data Two forms of Traffic Channels are defined :

Full rate Traffic Channel: Carries encoded information at gross rate of 22.8Kbps

Half rate Traffic Channel: Carries encoded information at gross rate of 11.4 Kbps

Speech Traffic Channels:

Full rate Traffic Channel for speech: Speech out of encoded information is at 13 kbps

Half rate Traffic Channel for speech: Speech out of encoded information is at 6.5 kbps

Data Traffic Channels:

Full rate Traffic Channel for 9.6 kbps user data, Full rate Traffic Channel for 4.8 kbps user data, Full rate Traffic Channel for $\leq$ 2.4 kbps user data

Traffic Channels Modes: Circuit Switching mode (transparent connection to a service like telephony), Packet Switching mode (as per recommendation X.25 or other standardized Protocols.

Frequency Correction Channels (FCCH): Carries Information for frequency correction of the mobile stations. (Downlink)

Synchronization Channels (SCH): Carries information for frame synchronization of the mobile stations and identification of BTS (Downlink). Contains two pieces of information: BSIC & Reduced Frame Number

Broadcast Control Channels (BCCH): Broadcasts various cell parameters and other information required by the mobile to access the network. (Downlink)

Dedicated Control Channels: Standalone dedicated control channel (SDCCH): Used for conveying signaling information (Downlink & Uplink).

Slow Associated Control Channel (SACCH): Used for conveying slow information associated with SDCCH and TCH (Downlink and Uplink).

Fast Associated Control Channel (FACCH): Associated with TCH for conveying fast signaling information (D & U).

Cell Broadcast Control Channel (CBCH): Subset of SDCCH used for broadcasting cell broadcast messages (Downlink).

Cell Planning Principals: The principles of cell planning which are covered in more depth in the G101 (Radio Planning Fundamentals) and G103 (Advanced GSM Cell Planning) include-

•Coverage Prediction
•Network Dimensioning
•Traffic Capacity
•Frequency Planning
•Dual Band Systems

Frequency Planning: Frequency Re-use: GSM uses concept of cells one cell covers small part of network but Network has many cells. Frequency used in one cell can be used in another cell. This is known as Frequency Re-use.

CO Channel (Re-use) Cell:

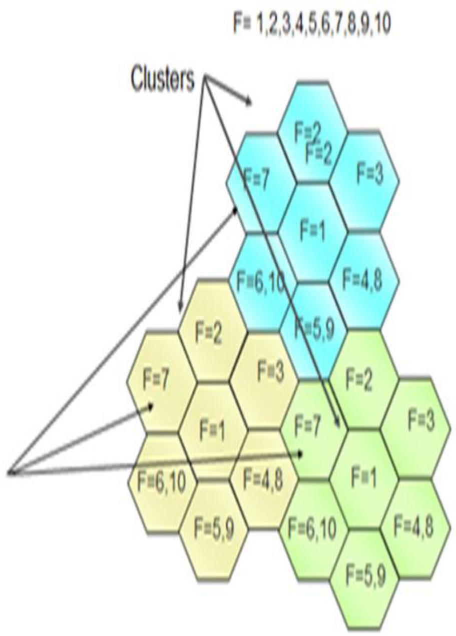

Fig.2 Diagram Showing Frequency Re-use Pattern Objective:

•Optimum uses of Resources
•Reduce Interference
•Co - Channel Re-use factor

Frequency reuse implies that in a given coverage area there is several cells that use the same set of frequencies. These cells are called co-channel cells and the interference between signals from these cells is called co-channel interference. An increase in transmit power and decrease in cell size leads to this problem. Considering each cell size to be same co-channel interference becomes the function of the radius of the cell (R), and the distance to the center of the nearest co-channel cell (D). This ratio of D/R is termed as co - channel reuse ratio (Q). By increasing Q the spatial separation between two co-channels is increased thereby reducing interference. A small value of Q provides larger capacity by more re- use; whereas a large value of Q provides improved transmission quality, due to a smaller level of co-channel interference.

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Adjacent-Channel Re-use Criteria:

Adjacent ARFCN's should not be used in the same cell it will have no problems in Downlink, but will have high risk of uplink interference (due to mandatory uplink power control). Adjacent ARFCN's can be used in adjacent cells, but as far as possible should be avoided. As such separation of 200 KHz is sufficient, but taking into consideration the propagation effects, as factor of protection 600 KHz should be used. In the worst, Adjacent ARFCN's can also be used in adjacent cells by setting appropriate handover parameters.

Re-use Patterns: Re-use Patterns ensures the optimum separation between Co-Channels. Re-use pattern is a formation of a cluster with a pattern of frequency distribution in each cell of the cluster. Same cluster pattern is then re-used. Preferred Re-use Patterns-Sector - Cells: 3/9, 4/12

3/9 Re-use Pattern:

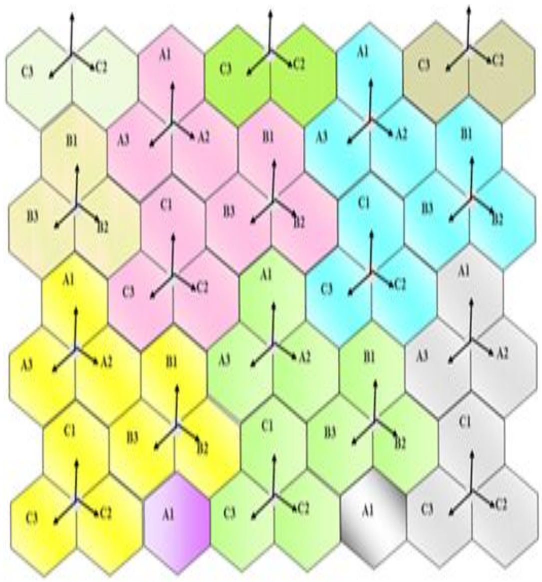

Fig. 3. Diagram Showing 3/9 Frequency Re-use Pattern

4/12 Reuse Patterns:

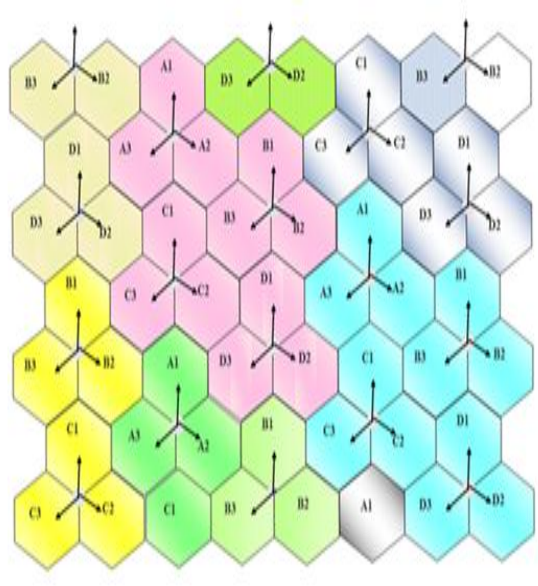

Fig. 4. Diagram Showing 4/12 Reuse Patterns

Traffic Theory: Traffic Theory based on Various Parameter-

- •Traffic Intensity
- •Busy Hour
- •Request Rate (BHCA)
- •Set-up Time
- •Holding Time
- •Blocked Call
- •Grade of Service (GoS)

Critical Network Implementation Features:

- Dynamic Power Control
- Discontinuous Transmission
- Frequency Hopping
- Intra-cell Handover

Dynamic Mobile Power Control:

- Mobile is commanded to change its Transmit Power
- Change in Power is proportionate to the Path Loss
- Change is Power is done in steps of 2 dbs

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Frequency Hopping: Multipath Fading results in variations in signal strength which is known as Rayleigh Fading. Rayleigh Fading phenomenon is dependent on path difference and hence frequency of reception. A fast moving mobile may not experience severe effect of this fading since the path difference is continuously changing. A slow moving mobile (or a halted mobile) may experience severe deterioration in quality. But, if the frequency of reception is changed when this problem occurs, could solve it. The fading phenomenon is fast and almost continuous, this means the frequency change should also be continuous. This process of continuously changing frequency is known as Frequency Hopping. Frequency Hopping is done in both Uplink and Downlink. Frequency is changed in every TDMA Frame Mobile can Hop on maximum 64 frequencies. The sequence of Hopping can be Cyclic or Non-Cyclic, There are 63 Non-Cyclic Hopping sequences possible Different Hopping sequence can be used in the same cell. BCH Timeslot can never HOP, but the remaining Timeslots can very well hop.

Troubleshooting & Optimizing GSM Networks: Troubleshooting:

- Blocked Calls
- Poor Quality and Drop calls
- Abnormal Handovers
- Interference
- Termination Failures

Blocked Call Troubleshooting: Blocked Calls can occur due to

- Access Failures
- SDCCH Congestion
- SDCCH Drop
- TCH Congestion

Blocked Call - Cause troubleshooting

- CCCH Overload at the Base Station
- Uplink Interference at the Base Station
- Low Rxlev at the Base Station
- Base Station TRX decoder malfunctioning
- Downlink Low Rxlev (Coverage Hole)
- Downlink Interference
- Excess Cell Range

Access Failure - Uplink Problem: Causes

- AGCH Overload at Base Station
- RACH Collisions
- MS out of Range
- Poor Uplink quality
- BTS Receiver Problem

RACH Non-Detection:

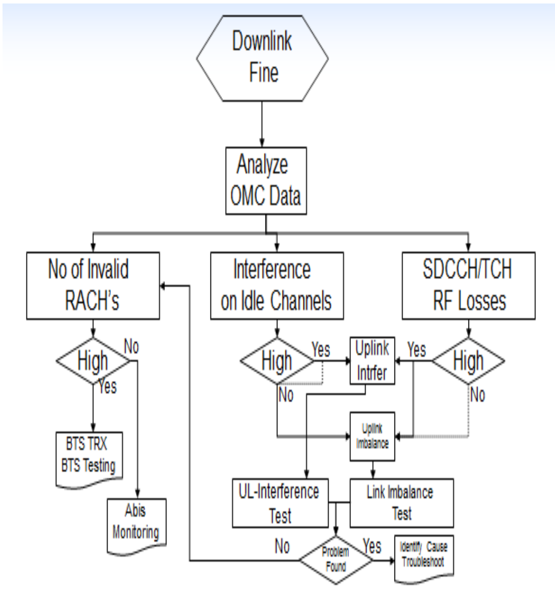

Fig.5 Block Diagram Showing RACH Non Detection

Now let us go a step further in understanding the most probable causes behind call block problems.

Access Failures: It could simply be caused by coverage holes. Interference could however play an important role. Uplink interference on a serving cell can result in RACH rejections and hence no AGCH assignments. Improper channel distribution between AGCH and PCH (paging channel) can result in RACH/AGCH overloading. Paging Failures can be impacted by BCH pollution (co-channel and adjacent channel interference).

SDCCH Blocked: Heavy Traffic and excessive Location Updates can result in congestion of SDCCH resources. Interference can block the channels, so though resources are available they may not be able to be used.

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TCH Blocked: Heavy Traffic is the main cause of TCH congestion. The TCH can also be blocked due to continuous interference in the uplink. Solutions to access failures would be to ensure continuous coverage and optimization of CCCH configuration parameters. For TCH and SDCCH congestion, the hot spots need to be identified and load sharing techniques implemented. Some techniques that have been used successfully involve adjusting cell powers to vary the coverage and therefore the location where mobiles will hand over from one cell to the next. Interference management is essential for optimum network performance. Location updates can be optimized by independent drive tests on the ALL BCH carriers. The delta is measured of each BCH with the current serving BCH and the Reselect Hysteresis parameters adjusted appropriately.

SDCCH Congestion Cause: Location Updates- To be analyzed with OMC statistics first. If high, determine the source to target cell ratio**,** Drive around the suspected area in the Idle Mode Configure "Delta LAC < > Constant 0" alarms Optimize Location Updates

Interference: Analyze OMC statistics on "Idle Channel Interference" Carry out Uplink Interference Measurements using Viper.

Heavy Traffic: Verify from OMC statistics SDCCH Congestion

Carry Call Setup Time measurements

Optimize set up time if high, else modify channel configuration

TCH Blocked – Causes Interference: Verify Idle Channel Interference reports from OMC If suspected, carry out uplink interference measurements

Heavy Traffic: Verify the TCH Holding time and no of attempts statistics from OMC during low traffic hours, Activate Cell barring in the cell Carry out Time slot testing, by setting Ignore Cell Barring.

Solutions To Blocked Calls:

- Optimize coverage
- Optimize Cell loading
- Interference management
- Channel configurations
- Optimize neighbors

Blocked Call – Interference:

- Base Station Measures Uplink Interference on Idle Timeslots
- At regular intervals, categorizes Timeslots into Interference Bands.
- There are Five Interference Bands.
- Each Interference Band has a range of interference level.

Example:

Interference Band1= -105 to -95 dbm

Interference Band2= - 95 to -85 dbm

Interference Band3= - 85 to -70 dbm

Interference Band4 =- 70 to -50 dbm

Interference Band5= -50 dbm and above

- Network will assign Timeslots starting from lower band
- Interference Band "5" Timeslots are considered as "BLOCKED"
- OMC reports Hourly average statistics for each timeslot.

Network initiated drops: Certain network features, like preemption, can kill an ordinary call to provide connection to an emergency class subscriber. A handover is the key to survival from dropping calls. But if there are problems in the Handover process itself, then this will not avoid a drop. Dropped calls can be effectively reduced by improving coverage, detecting and reducing interference, setting appropriate Handover Margins, thresholds for handovers and the correct selection of neighbors. Use of DTX and dynamic downlink power control will also reduce average interference which should lead to some improvements.

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Drop Call - Troubleshooting:

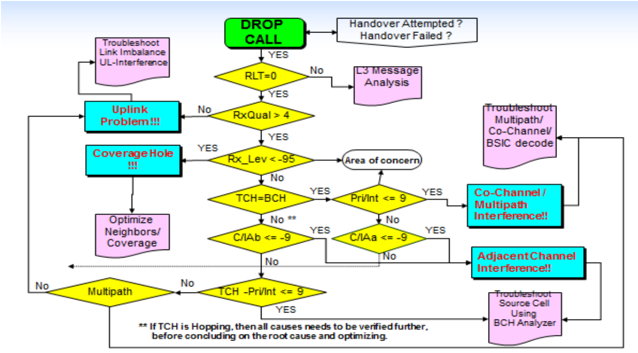

Fig. 6. Flow Chart of Dropped Call Troubleshooting Poor Quality:

Poor Speech Quality could be due to

- Patchy Coverage (holes)
- No Target cell for Handover
- Echo , Audio holes, Voice Clipping

Interference:

- Co-channel
- Adjacent channel
- External
- Multipath
- Noise

Speech Quality Parameters:

- RxQUAL: Measured on the midamble. Indicates poor speech quality due to radio interface impairments
- FER: Measured on the basis of BFI (Ping -Pong effect on speech) Preferred under Frequency Hopping situation
- Echo and distortion: Generally caused by the Transmission and switching system.
- Audio holes: Blank period of speech, due to malfunctioning of Transcoder boards or PCM circuits.
- Voice Clipping: Occurs due to improper implementation of DTX.
- Mean Opinion Score (MOS) : ITU standard for estimating speech quality.

Troubleshooting Handover Problems:

- Total Attempted Calls
- Total Dropped Calls
- Total Blocked Calls
- Rx Qual Full
- Rx Level Full
- RLT Current Value
- ARFCN
- Neighbor Cell Measurements
- RR Message
- Phone State
- Sequence Number

V. CASE STUDY TO ANALYSIS GSM NETWORK BY USING 3G KPI REPORT

Best Server BCCH:

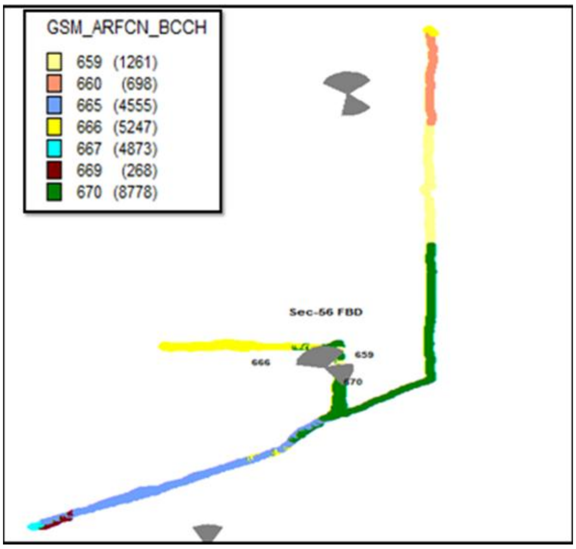

Fig. 7. Diagram Showing PLOTS OF BCCH

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Downlink Signal Level (Rx Lev, dBm):

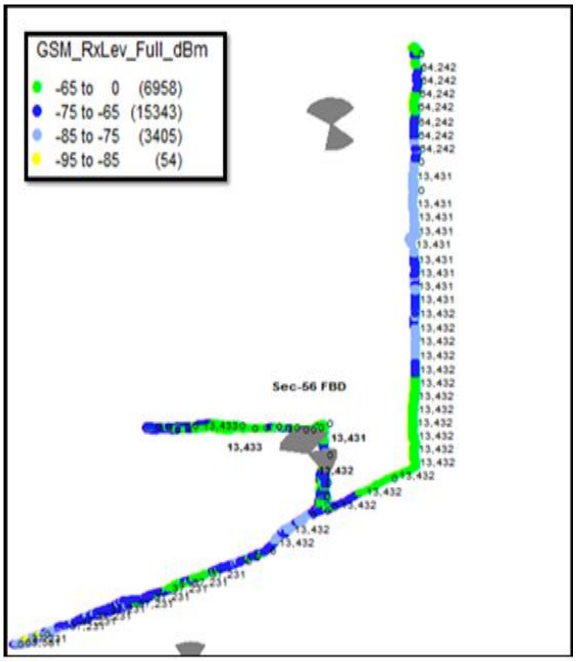

Fig. 8. Diagram Showing Plots of Downlink Signal Level (Rx Lev, dBm)

Downlink Signal Level (Rx Lev, dBm):

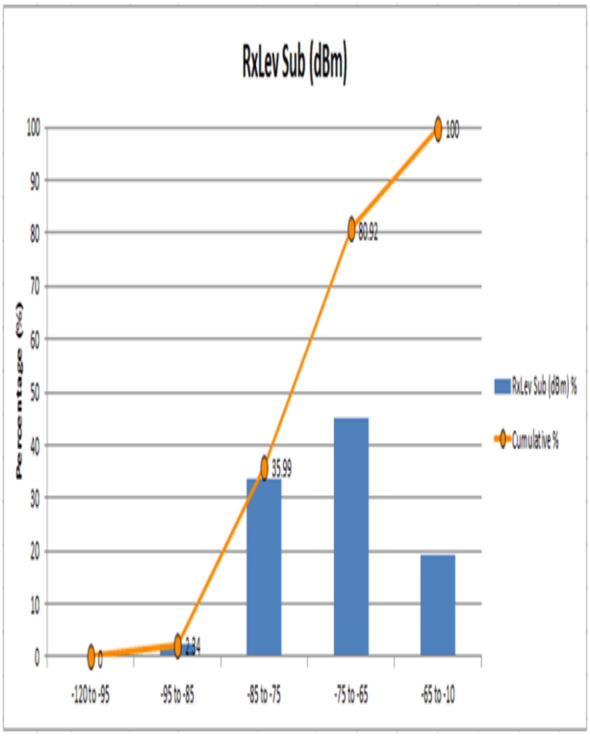

Fig. 9. Diagram Showing Graphical

Representation of Downlink Signal Level (Rx Lev, dBm)

Downlink Signal Quality (Rx Qual):

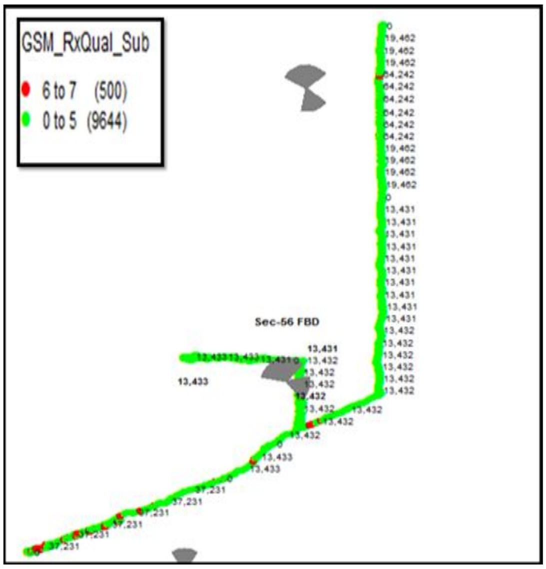

Fig.10. Diagram Showing Plots of Downlink Signal Quality (Rx Qual)

Downlink Signal Quality (Rx Qual):

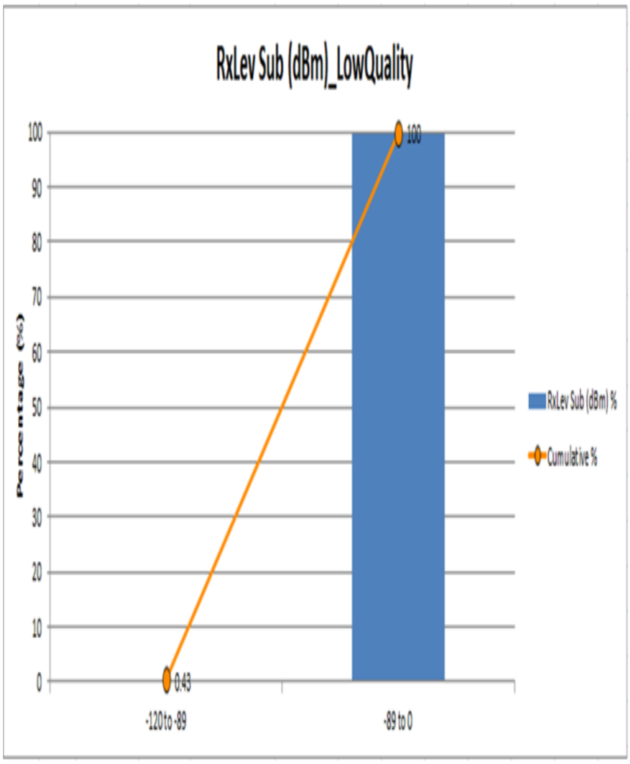

Fig. 11. Diagram Showing Graphical Representation of Downlink Signal Quality (Rx Qual)

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Downlink Signal Interference (C/I):

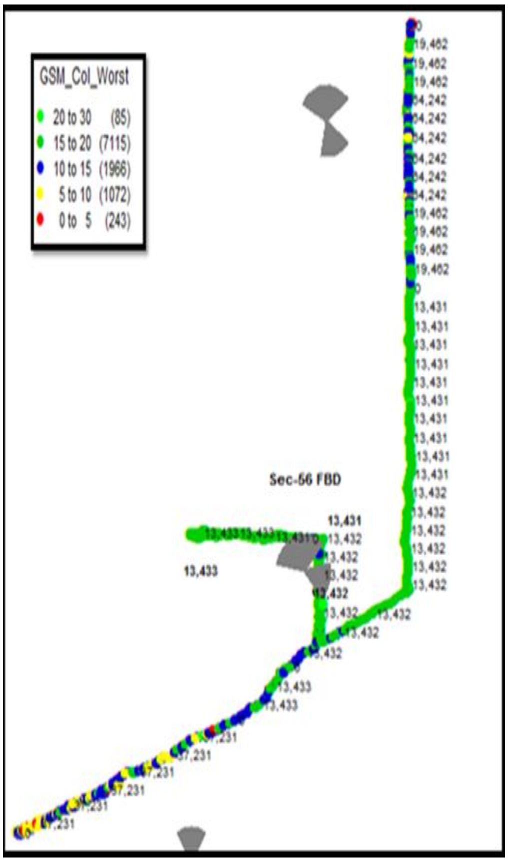

Fig. 12. Diagram Showing Plots of Downlink Signal Interference (C/I)

Downlink Signal Level:

Table.1.

Representation of Downlink Signal Level

Rx_Lev Samples distribution		
Range	Samples	% of Samples
-35 To -65 dBm	6958	27.01
-65 To -75 dBm	15343	59.56
-75 To -85 dBm	3405	13.22
-85 To -95 dBm	54	0.21
-95 dBm<	0	0.00

Downlink Signal Quality:

Table. 2.

Representation of Downlink Signal Quality

Rx_Qual Samples distribution		
Range	Samples	% of Samples
<= 5	9644	95.07
6 to 7	500	4.93
Other	0	0.00

C/I Samples distribution:

Table 3.

Representation of C/I Samples Distribution

C/I Samples distribution		
Range	Samples	% of Samples
> 20	85	0.81
20 To 15	7115	67.88
15 To 10	1966	18.76
10 To 5	1072	10.23
5<	243	2.32

VI. RESULT

Table 4.

Result of Call Event

Call events		
Event	**Value**	**Comment**
Blocked Call	**0**	**GOOD**
Call Established	**15**	
Call Attempt	**15**	
Call Attempt Retry	**0**	
Call End	**15**	
Call Setup	**15**	
CSSR	**100%**	
Dropped Call	**0**	
CDR	**0%**	
Handover	**17**	
Handover Failure	**0**	
HSR	**100%**	
Location Area	**4**	
Location Area Update Failure	**0**	

VII. CONCLUSION

In this Dissertation, analytically proved that we can optimize an existing cellular network using optimization tools likes TEM'S, MapInfo and fine parameter tuning. By giving some input for planning and optimization we get these information from traffic Report, customer complain and drive test. After analyzing all required data we can know what steps we need to do.

Each operator has their own KPI. Operator wants to fulfill their target according to their KPI Report and they must think about it within their bandwidth limitation. This study would help to plan operators to maintain coverage Level, improve quality and increase capacity. Every mobile operator should give attention towards better network dimensioning & topology, allocated bandwidth, traffic prediction & modelling. BAD Spot 1 has poor quality and Call Drop, this spot is covered by Cell 3459, Poor Coverage. Level below -85 dbm, but Call should not Drop, the other Problem is Interference, Co-Channel on BCH is very high.95.7% of the time quality will be very good.

REFERENCES

[1] Francisco, A. M. and Luis, M. C., (1999), Mobility Effects on Tele traffic in GSM, Institution de Telecommunication / Institution Superior Técnico, Technical University of Lisbon, 1999.

[2] Hugo, A., José C., and Luis M. C., (2000), Analysis of a Traffic Model for GSM/GPRS, Instituto de Telecomunicações/Instituto Superior Técnico, Technical University of Lisbon, 2000.

[3] Papaoulakis K. N., Nikitopoulos D., Gkroustiotis E., Kechagias C., Karambalis C. and Karetsos G. (2002), A Comprehensive Study and Performance Evaluation of Operational GSM and GPRS Systems under Varying Traffic Conditions, Telecommunications Laboratory National Technical University of Athens Heroon Polytechniou 9, 15773 Athens, Greece. newton.ee.auth.gr /ist2002 /papers/ SessionT4 / 2502089

[4] Allen, K., Fitzpatrick, P. and Ivanovich, M., (2003), Joint Traffic Signaling Capacity Analysis in GSM.

[5] Huei-Wen, F. and Yi-Chou T., (2003), Channel Allocation and Performance Study for the Integrated GSM/GPRS System, Department of Computer Science and Information Engineering, National Taiwan University of Science and Technology, IEEE, 2003.

[6] Fiche, G. and Hebuterne, G. (2004), Communicating systems & networks: Traffic & performance. 2004. Kogan page. ISBN: 978-1-90399-635-5.

[7] Kennedy I.,(2005), Lost Call Theory, Lecture Notes, ELEN5007 Tele- traffic Engineering, School of Electrical and Information Engineering, University of the Witwatersrand, 2005.

[8] Božidar, V., (2006), Modeling and Characterization of Traffic in a Public Safety Wireless Network, Master of Applied Science Thesis, Simon Fraser University, Fall 2006.

[9] Xiaolong, J. and Geyong, M., (2007), Modeling Priority Queuing Systems with Multi-Class Self-Similar Network Traffic, Proceedings of ICC'07, pp. 13-19.

[10] Adegoke, A., Babalola I., and Balogun, W. (2008) "Performance Evaluation of GSM Mobile System in Nigeria," Pacific Journal of Science and Technology, pp. 436-441, 2008.

[11] Haider B, Zafrullah M. and Islam M. K. (2009),Radio Frequency Optimization and QoS Evaluation in Operational GSM Network, Proceedings of the World Congress on Engineering and Computer Science 2009 Vol I WCECS 2009, October 20 -22, 2009, San Francisco, USA.

[12] Boulmalf, M., Abrache, J., Aouam, T., and Horroud, H. (2009),"Traffic Analysis of GSM Networks," IEEE Journal, pp. 498 -503, 2009.

[13] Biebuma, J.J.,Orakwe, S.I and Igbekele, O.J., (2010), Traffic Modeling for Capacity Analysis of GSM Networks in Nigeria, Continental Journal of Information Technology, 4: 78 – 79.

[14] Flood, J.E. (1998) Telecommunications Switching, Traffic and Networks, Chapter 4: Telecommunications Traffic, New York: Prentice-Hall, 1998.

[15] Madhusmita, P and Saraju, P. P., (2011), "Traffic Analysis and Optimization of GSM Network," IJCSI International Journal of Computer Science Issues, pp. 28-31, 2011.

[16] Alarape, M.A., Akinwale, A.T. and Folorunso, O. (2011), A Combined Scheme for Controlling GSM Network Calls Congestion. International Journal of Computer Application (0975 -8887), Vol.14 No. 3.

[17] Ojesanmi, O.A., Oyebisi, T.O., Oyebode, E.O. and Makinde, O.E., (2011), Performance Analysis of Congestion Control Scheme for Mobile Communication Network, International Journal of Computer Science and Telecommunications, Volume 2, Issue 8, November 2011

[18] Jabari, B.,(1996), Teletraffic Aspects of Evolving and Next-Generation Wireless Communication Networks, IEEE Personal Communications Mag., Vol. 3, No.6, Dec. 1996, pp4 -9

[19] Mughele, E. S and Wole O., (2012), Congestion Control Mechanisms and Patterns of Call Distribution in GSM Telecommunication Networks: The Case of MTN Nigeria, African Journal of Computer and ICT. December, 2012- ISSN 2006-1781, Vol. 5 No.

[20] Ohaneme, C. O., Akpado, K. A., Alumona, T. L. and Emenike, I. S.,(2012), "Performance Evaluation of Mobile Network Interconnections in Nigeria," International Journal of Scientific and Engineering Research, pp. Volume 3, Issue 4, 2012.

[21] U S Rahman, M. A. Matin, M R Rahman, (2012), A Practical Approach of Planning and Optimization for Efficient Usage of GSM Network, International Journal of Communications (IJC) Volume 1 Issue 1, December 2012.

[22] Oladeji E.O, Onwuka E.N, Aibinu M.A (2013) Determination of Voice Traffic Busy Hour and Traffic Forecasting in Global System of Mobile Communication (GSM) in Nigeria, 11th Malaysia International Conference on Communications 26th - 28th November 2013, Kuala Lumpur, Malaysia.