OPERATION AND MAINTANANCE IN ALCATEL 3G TECHNOLOGY

(Remedial Solution for Call Blocking Probability using BTS)

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Project Report Approval for B.E

This project report entitled **(OPERATION AND MAINTANANCE ALCATEL (3G) TECHNOLOGY (Remedial Solution for Call Blocking Probability using BTS)** by (**Idrisi Tabrez, Noor Mohd, Yogesh Khanvilkar, Khan Javed**) is approved for the degree of **Electronics And Telecommunication**.

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Place: ____________

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DECLARATION

We hereby declare that the project entitled **"OPERATION MAINTAINANCE IN ALCATEL (3G) TECHNOLOGY (Remedial Solution for Call Blocking Probability using BTS)"** submitted for the B.E Degree is our original work and the project has not formed the basis for the award of any degree, associate ship, fellowship or any other similar titles.

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<u>CERTIFICATE</u>

This is to certify that the project entitled **“OPERATION MAINTAINANCE IN ALCATEL (3G) TECHNOLOGY (Remedial Solution for Call Drop using BTS)”** is the bonafide work carried out by **Idrisi Tabrez, Noor Mohd, Khanvilkar Yogesh, Khan Javed** students of B.E, KALSEKAR Technical Campus, New Panvel , during the year 2015, in partial fulfillment of the requirements for the award of the Degree of B.E EXTC and that the project has not formed the basis for the award previously of any degree, diploma, associate ship, fellowship or any other similar title.

(Prof. MUJEEB TAMBOLI)
H.O.D EXTC

(Prof. CHAYA.S)
Project Guide

(EXTERNAL)

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ABSTRACT

Operation and Maintenance System(OMS) has being an integral part of the Radio Access Network (RAN) pertaining to 3G telecommunication standard plays a vital role in managing the network. The systematic approach helps to uncover several defects related to system software release upgrade & back out, abnormal process terminations, shared memory violation and unusual process size growth. These diagnosis results have been evaluated through simulation studies and are compared with defined benchmarks of the field trial data in order to ensure overall performance stability, high quality and robustness of the OMS system.

<u>Chapter 01</u>

INTRODUCTION

INDRODUCTION

1.1 Introduction

We had decided to do our FINAL year project with real time application in telecom so , we joined MTNL to do our case study work in OMC (Operation and Maintenance Center) which is a sub-part of NSS on 3G network. OMC activities deals with performance, fault detection and also configure a new Node B.

We work on 3G network and analyzed a particular area in terms of call block, call congestion and call drop.we tried to find out reason for it. The reason was fault in the system and more users over that area in case of fault we tried to rectified it in another case we tried to virtually configured Node B in that particular area.

In order to over come call blocking, call drop and call congestion we need to configure a new Node B in that particular cellular network where there are more number of users.

1.2 OVERVIEW OF PROJECT

The Operations And Maintenance ALCATEL 3G Technology used to maintain the network for Check Fault Detection, Call Congestions, Call Drop Also Configured New Node B Successfully. Test have been classified through the License Software And Un-License Software. Hence, a comparative all test should be done.

Out-Comes of the project will be shared with Operation and Maintenance ALCATEL department who provided us the test live network. In our case, its MTNL Telecommunication.

Chapter 02

LITRETURE REVIEW

LITERATURE REVIEW

2.1 Introduction of 3G (UMTS).

The Universal Mobile Telecommunications System (UMTS) is a third generation mobile cellular system for networks based on the GSM standard. Developer national Telecommunication Union IMT-2000 standard set and compares with the CDMA(2000) standard set for networks based on the competing cdma one technology. UMTS uses wide ban coded and maintained by the 3GPP (3rd Generation Partnership Project), UMTS is a component of the Ine division multiple access (W-CDMA) radio access technology to offer greater spectral efficiency and bandwidth to mobile network operators.

UMTS specifies a complete network system, which includes the radio access(UMTS Terrestial radio access or UTRAN), the core Network (Mobile Application Part, or MAP) and the authentication of users via SIM (Subscriber Identity Module) cards.To meet the IMT-2000 standards, a system is required to provide peak data rates of at least 200 kbit/s (about 0.2 Mbit/s). However, many services advertised as 3G provide higher speed than the minimum technical requirements for a 3G service. Recent 3G releases, often denoted 3.5G and 3.75G, also provide mobile broadband access of several Mbit/s to smartphones and mobile modem in laptop computers.

3G deal with seamless global mobile and service delivery further integration of wire- line and wireless network to telecommunication transparent to the user with defining global standard.3G telecommunication networks support services that provide an information transfer rate of at least 200 kbit/s. Later 3G releases, often denoted 3.5G and 3.75G, also provide mobile broadband access of several Mbit/s to smartphone and mobile modem in laptop computers. This ensures it can be applied to wireless voice telephony, mobile Internet access, fixed wireless Internet access, video calls and mobile TV technologies.

2.2 GSM Network Evaluation of UMTS (3G)

designed to support basic voice and data services, the original GSM system consists of a circuit switched Core Network that provides the routing of calls to mobile subscribers, the Base Station Subsystem for radio access and the Mobile Station. One of the most important factors in GSM success is the standard open interfaces that have enabled any vendor to supply any elements of the network, and have let operators worldwide deployed.

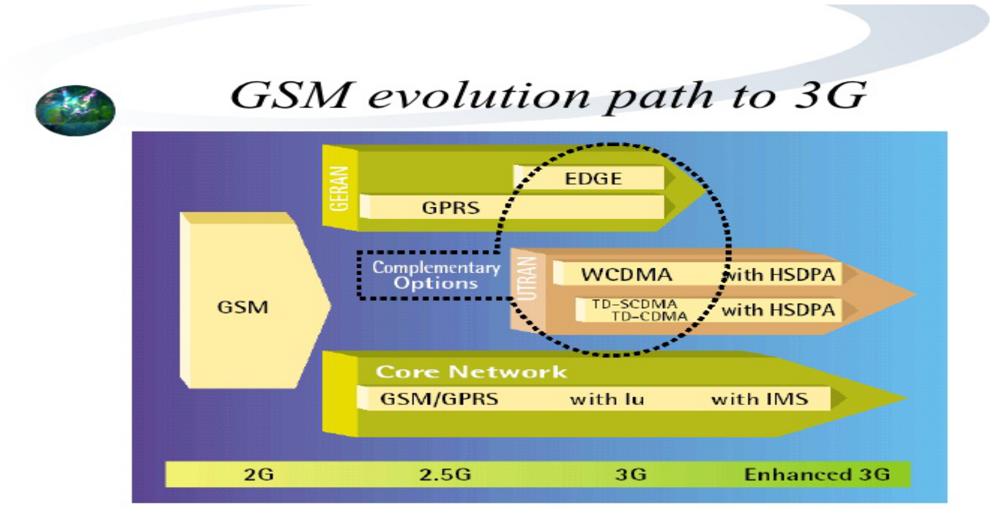


Figure 2.2 Evolution of 3G

The possibility of evolving either through upgrades to EDGE or by introducing UMTS, or both, gives operators an exceptional set of gradual deployment strategies to suit their situation precisely with regard to their legacy networks, capacity needs, spectrum availability and speed of take-up of the new services in the market.

The Importance of Standardization to 3G Evolution UMTS - consisting of WCDMA for FDD and TD-CDMA for TDD - is being standardized in 3GPP by manufacturers and operators from around the world working together to achieve consensus. This process ensures that the system is universally acceptable and that operators can offer new services to their customers while maintaining existing services and manufacturers can supply equipment competitively on an equal basis. Open interfaces ensure that terminals, radio equipment and network platforms from different suppliers all work together. The Open Mobile Alliance (OMA) is ensuring that services can be developed and will all work seamlessly on any network. The Internet Engineering Task Force (IETF) is extending its SIP (Session Initiation Protocol) so that it supports mobility and security, enabling it to become the cornerstone of the new IP Multimedia Subsystem (IMS). The Internet Protocol itself forms the basis of the Internet, and allows hosts to communicate over diverse networks, fixed and mobile. The current version, known as IPv4, provides basic mobility support and support for QoS management that is essential for IP Multimedia, as well as security. A new Internet Protocol, IPv6, will be introduced providing operators with vastly increased addressing space.

2.3 Cellular Network and Concept

2.3.1Cellular Network:

A **cellular network** or **mobile network** is a communication network where the last link is wireless. The network is distributed over land areas called cells, each served by at least one fixed-location trance-reciver known as a cell site or base station. This base station provides the cell with the network coverage which can be used for transmission of voice, data and others. In a cellular network, each cell uses a different set of frequencies from neighboring cells, to avoid interference and provide guaranteed bandwidth within each cell.

When joined together these cells provide radio coverage over a wide geographic area. This enables a large number of portable transceivers (e.g mobile phone , pagers, etc.) to communicate with each other and with fixed transceivers and telephones anywhere in the network, via base stations, even if some of the transceivers are moving through more than one cell during transmission.

2.3.2. Cellular concept:

In a cellular radio system, a land area to be supplied with radio service is divided into regular shaped cells, which can be hexagonal, square, circular or some other regular shapes, although hexagonal cells are conventional. Each of these cells is assigned with multiple frequencies (*f*1–f6) which have corresponding radio base station.Theation group of frequencies can be reused in other cells, provided that the same frequencies are not reused in adjacent neighboring cells as that would cause co channel interface.

The increased capacity in a cellular network, compared with a network with a single transmitter, comes from the mobile communication switching system developed by amos johnof Bell Labs that permitted multiple callers in the same area to use the same frequency by switching calls made using the same frequency to the nearest available cellular tower having that frequency available and from the fact that the same radio frequency can be reused in a different area for a completely different transmission. If there is a single plain transmitter, only one transmission can ne used on any given frequency. Unfortunately, there is inevitably some level of interface from the signal from the other cells which use the same frequency. This means that, in a standard FDMA system, there must be at least a one cell gap between cells which reuse the same frequency.

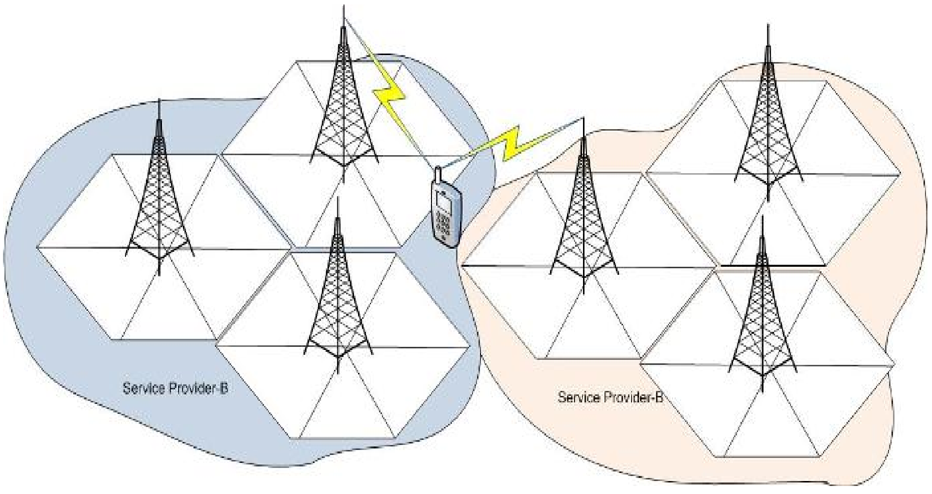


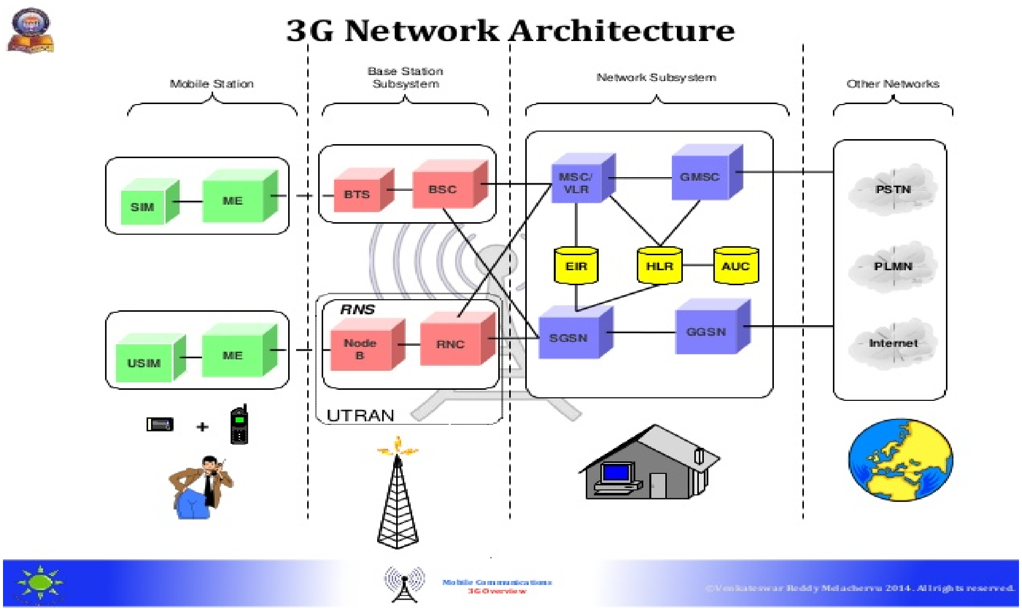
Figure 2.3.2 cellular concept

2.4. Network Architecture

The GSM technical specifications define the different elements within the GSM network architecture. It defines the different elements and the ways in which they interact to enable the overall system operation to be maintained.

The GSM network architecture is now well established and with the other later cellular systems now established and other new ones being deployed, the basic GSM network architecture has been updated to interface to the network elements required by these systems Despite the developments of the newer systems, the basic GSM system architecture has been maintained the GSM network architecture as defined in the GSM specifications can be grouped into four main areas:

- Mobile station (MS)
- Base-Station Subsystem (BSS)
- Network and Switching Subsystem (NSS)
- Operation and Support Subsystem (OSS)



2.5 3G Network architecture

Chapter 03

METHODOLOGY

Hardware:

3.1 User Equipment

In the Universal Mobile Telecommunications System (UMTS), **user equipment** (**UE**) is any device used directly by an end-user to communicate. It can be a hand-held telephone, a laptop computer equipped with a mobile broadband adapter, or any other device. It connects to the base station Node B/eNodeB as specified in the ETSI 125/136-series and 3GPP 25/36-series of specifications. It roughly corresponds to the mobile station (MS) in GSM systems.

The radio interface between the UE and the Node B is called *Uu*. The radio interface between the UE and the eNodeB is called *LTE-Uu.*

Functionality

UE handles the following tasks towards the core network:

- Mobility management
- Call control
- Session management
- Identity management

The corresponding protocols are transmitted transparently via a Node B, that is, Node B does not change, use or understand the information. These protocols are also referred to as Non Access Stratum protocols.

The UE is a device which initiates all the calls and it is the terminal device in a network.

3.2 Node B

This is the hardware that is connected to the mobile phone network that communicates directly with mobile handsets. In contrast with GSM base stations, Node B uses WCDMA/ SCDMA as the air interface technology. As in all cellular systems, such as UMTS and GSM, the Node B contains radio frequency transmitter(s) and the receiver(s) used to communicate directly with mobile devices, which move freely around it. In this type of cellular network, the mobile devices cannot communicate directly with each other but have to communicate with the Node B.

Traditionally the Node B have minimum functionality, and are controlled by an RNC (Radio Network Controller). However, this is changing with the emergence of High Speed Downlink Packet Access (HSDPA), where some logic (e.g., retransmission) is handled on the Node B for lower response times The utilization of WCDMA technology allows cells belonging to the same or different Node Bs and even controlled by different RNC to overlap and still use the same frequency (in fact, the whole network can be implemented with just one frequency pair). The effect is utilized in soft handovers.

Node B Setup: A full cell site has a cabinet, an antenna mast and actual antenna. An equipment cabinet contains e.g. power amplifiers digital signal processor and backup batteries. What you can see by the side of a road or in a city center is just an antenna. However, the tendency nowadays is to camouflage the antenna (paint it the color of the building or put it into an RF-transparent enclosure). Smaller indoor nodes may have an antenna built into the cabinet door.

A Node B can serve several cells, also called sectors, depending on the configuration and type of antenna. Common configuration include omni cell (360°), 3 sectors (3×120°) or 6 sectors (3 sectors 120° wide overlapping with 3 sectors of different frequency).

Specification of antenna:

Band	2100 MHz full band
RF output power @RRH port	40W nominal
RF power accuracy	± 0.75 dB
Number of transmit carriers	Up to 3 carriers in 15MHz RF power shared across operational carriers
Number of Rx channels	2-way RX diversity Up to 6 RX with flexible allocation: 2x 15MHz same frequencies (Main + Div) 2x 10MHz different frequencies (for 2+2 daisy chain config); distance up to 40MHz
VSWR meter	Supported on TX path
Noise figure	< 3 dB, typ 2,5 dB
RSSI accuracy	± 3dB over T° for Rx signal -70dbm to -110dBm

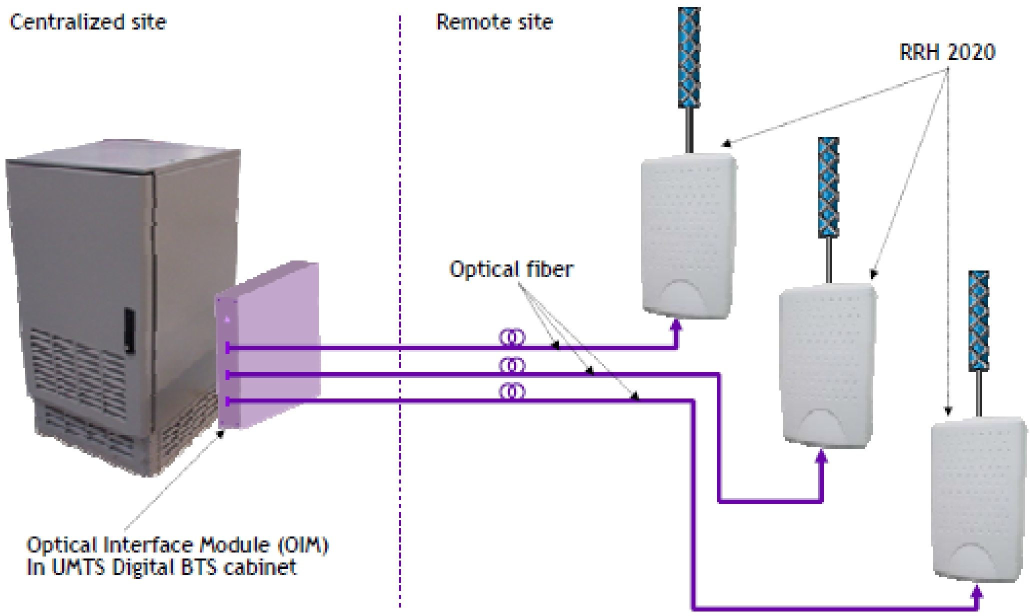


Figure 3.3 Node B Setup

3.3. RNC (Radio Network Controller)

The **Radio Network Controller** (or **RNC**) is a governing element in the UMTS radio access network (UTRAN) and is responsible for controlling the Node B that are connected to it. The RNC carries out radio resource management, some of the Mobility management functions and is the point where encryption is done before user data is sent to and from the mobile. The RNC connects to the Circuit Switched Core Network through Media Gateway (MGW) .

Interfaces of RNC: The logical connections between the network elements are known as interfaces. The interface between the RNC and the Circuit Switched Core Network (CS-CN) is called Iu-CS and between the RNC and the Packet Switched Core Network is called Iu-PS. Other interfaces include Iub (between the RNC and the Node B) and Iur (between RNCs in the same network).

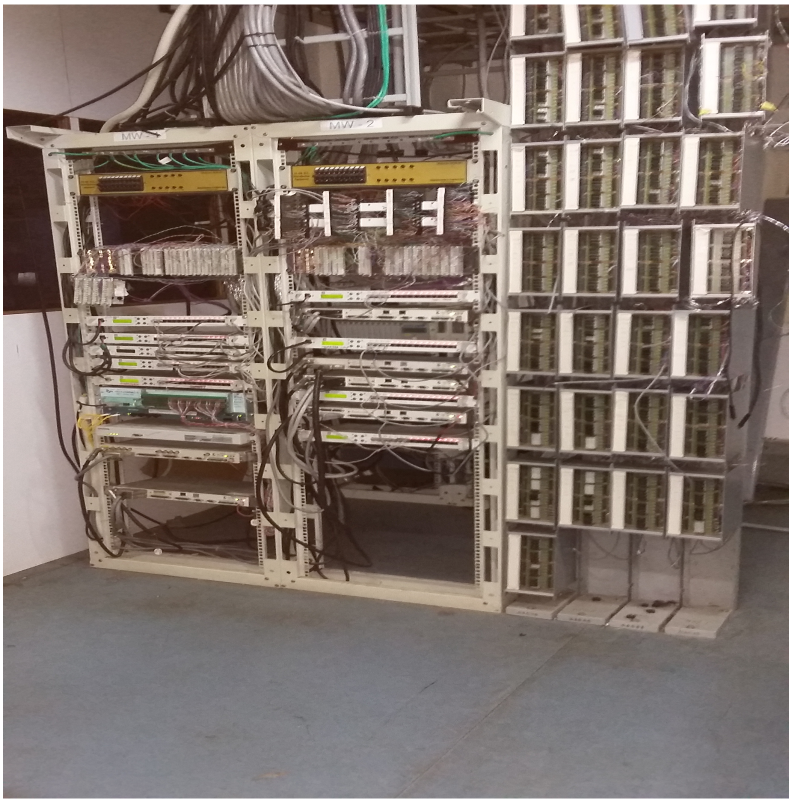


Figure 3.4 RNC

Iu interfaces carry user traffic (such as voice or data) as well as control information (see **Protocols**), and Iur interface is mainly needed for soft Handover involving 2 RNCs though not required as the absence of Iur will cause these handovers to become hard handovers.

Until 3gpp R4, all the interfaces in the UTRAN are implemented using ATM only, except the Uu (air) interface which uses WCDMA technology. Starting R5,IP bearers can be used over Ethernet instead. Physically, these interfaces can be carried over SDA over optical fiber, E1(sometimes referred to as PDH) - over a copper wire or microwave radio. Several E1s can be bundled to form an IMA Group. Since the interfaces are *logical*, many interfaces can be multiplexed onto the same transmission line. The actual implementation depends on the network topology; examples are chain, distant star,mesh and loop configurations.

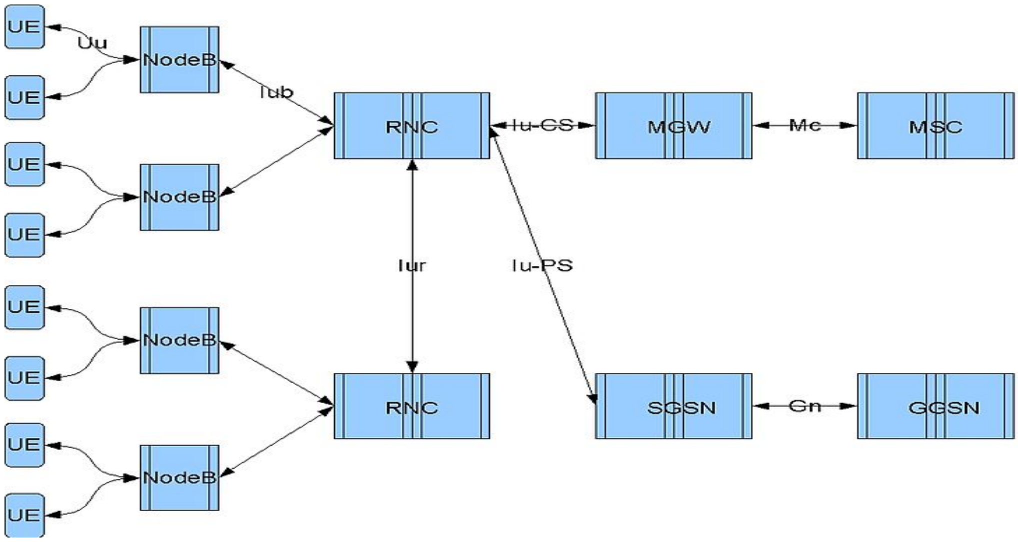


Figure 3.4.1 Interfacing of RNC

3.4. OMC (Operation Maintenance Center)

Operation Maintenance Center (OMC) is used to monitor and maintain the performance of each Mobile Station (MS), Base Station (BS), Base Station Controller (BSC) and Mobile Switching Center (MSC) within a GSM system. The OMC has three main functions which are:

1. To maintain all telecommunications hardware and network operations with a particular market.
2. Manage all charging and billing procedures.
3. Manage all mobile equipment in the system.

   The OMC is dedicated to each of these tasks and has provisions for adjusting all base station parameters and billing procedures, as well as for providing system operators with the ability to determine the performance and integrity of each piece of subscriber equipment in the system.

3.4.1. Performance

The Performance management enables the operator to monitor the traffic load on his network and to detect any degradation before it impacts the Quality of Service. Indeed, the performance management functions allow to optimize UMTS network operations, to maximize the QoS delivered, to manage the network growth and also to pinpoint and to resolve, as soon as possible, network performance issues.

Call Drop:

In telecommunications, the **dropped-call** rate (DCR) is the fraction of thea telephone**calls**wh ich, due to technical reasons, were cut off before the speaking parties had finished their conversation and before one of them had hung up (**dropped calls**) This fraction is usually measured as a percentage of all **calls**.

- When we go far away from BTS signal level should be decrease resulting in call drop.
- Hand over – when we travel from one cell to another cell.

Error! Bookmark not defined.

$$Call\,Drop = \frac{Drop\,Call}{Total\,Call} \square 100$$

Formula:

Call drop avoid:

- Establishment of more tower in a area where call drop occur.
- If we experiencing call while we are inside our home or office and we have good cell phone signal outside the building then our problem is related to the material used to construct building to avoid this problem we can cell phone booster. A cell phone boost is a system which takes a good cell phone signal which is usually fount outside the building amplifies it and transmit it to an area which is receving little or no signal.

Call Setup:

The call setup success rate in conventional (so-called land-line) networks is extremely high and is significantly above 99.9%. In mobile communication systems using radio channels the call setup success rate is lower and may range for commercial networks between 90% and 98% or higher. The main reasons for unsuccessful call setups in mobile networks are lack of radio coverage (either in the downlink or the uplink), radio interference between different subscribers, imperfections in the functioning of the network (such as failed call setup redirect procedures), overload of the different elements of the network (such as cells), etc.

Formula:

$$Call\,Setup\,Success\,Rate = \frac{Call\,Setup\,success}{Total\,Call\,Atempt}$$

Call blocking:

Call blocking, also known as **call block**, **call screening**, or **call rejection**, allows a telephone subscriber to block incoming calls from specific telephone numbers. This feature may require an additional payment to the subscriber's telephone company or a third-party.

Call blocking is desired by individuals who wish to block unwanted phone calls. These generally include types of unsolicited calls from telemarketers and robocalls.

Formula:

$$1 - \frac{1 - RRC\,Congestion}{1 - RAB\,Congestion}$$

3.4.2. Fault Management

The fault management tasks are monitoring tasks which enable to detect and to analyze hardware, software and network problems in order to execute corrective maintenance procedures according to the type of alarm.

W-NMS provides several fault management functions for the UMTS Access Network. Indeed, W-NMS receives and stores notifications from network elements in the Access Network. It also converts these notifications into alarms and ensures alarm correlation. Lastly, W-NMS transmits the alarms to the graphical user interface.

Process of Fault Management: In network management, **fault management** is the set of functions that detect, isolate, and correct malfunctions in a telecommunications network, compensate for environmental changes, and include maintaining and examining error logs, accepting and acting on error detection notifications, tracing and identifying faults, carrying out sequences of diagnostics tests, correcting faults, reporting

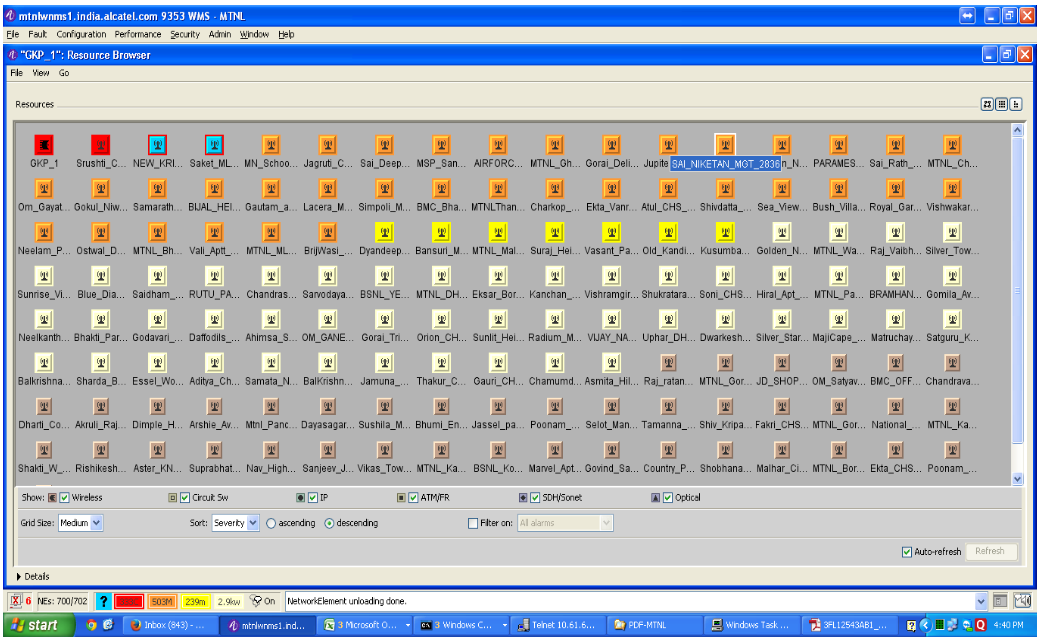


Figure 3.3.2 Alarm shown on Node B

A fault management console allows a network administrator or system operator to monitor events from multiple systems and perform actions based on this information. Ideally, a fault management system should be able to correctly identify events and automatically take action, either launching a program or script to take corrective action, or activating notification software that allows a human to take proper intervention (i.e. send e-mail or SMS text. Some notification systems also have escalation rules that will notify a chain of individuals based on availability and severity of alarm.

3.4.3. Configuration

Base Transceiver station is an important element of any wireless or wireline network. A base transceiver station (BTS/NODE B / Node B) is a piece of equipment that facilitates (helps) wireless communication between user equipment (UE) and a network. BTS/NODE B is also referred to as the radio base station (RBS), node B (in 3G Networks). The BTS/NODE B / Node B is the networking component of a mobile communications system from which all signals are sent and received. It is responsible for defining a range of radio frequency for the terminals,

known as cell. In this way overall functionality of a network depends on properly configuration of each element and this procedure by which this configuration takes place is known as commissioning. There are different techniques possible that allow ‘commissioning of BTS/NODE B’ but these vary according to the constraints of workload and time.

NODE B OVERVIEW

Purpose: This topic provides a brief description of logical entity Node B of the RAN model. Node B general description

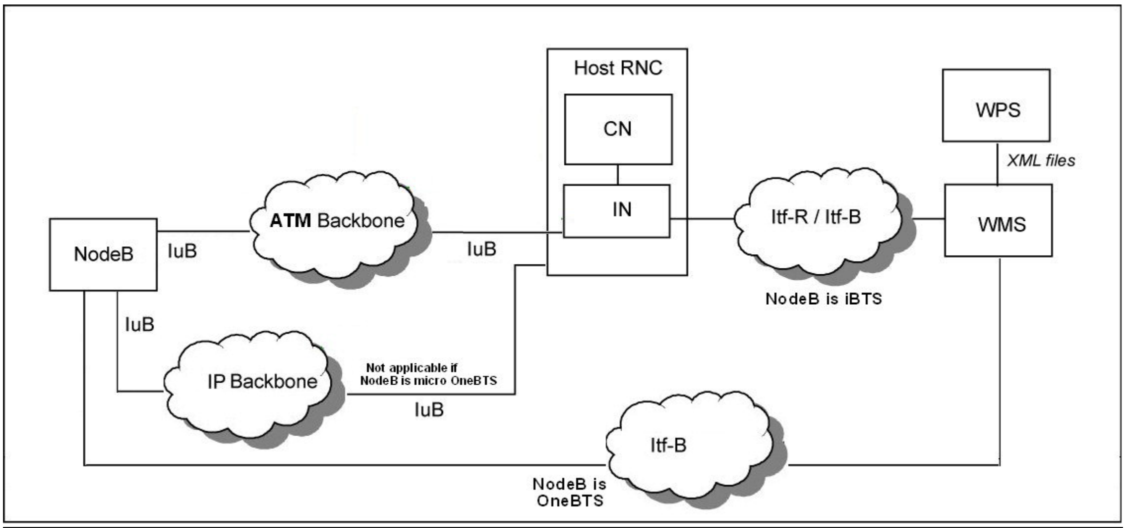


Figure 3.5.3 over view

Itf-B	Interface between the Node B and its Element Manager
Itf-R	Interface between the RNC and its Element Manager

The following NE s are involved in this procedure:

• The new Node Bs

• The Host RNC I-Node and RNC C-Node

The others Nodes that might be involved are out of scope of this procedure (POC, NAM, NAM, ATM switch, Routers, Firewalls, and so on).One BTS either supports ATM IuB or IP IuB, but not Hybrid Iu B. In case of micro One BTS, the Iu B over IP configuration is not supported. If the Node B is a One BTS, ensure that a DHCP Relay Agent must be added between the One BTS and the Iu B ATM/IP Backbone. For more information on DHCP configuration or activation, see documents.

Node B addition preparation under WPS: This chapter defines the data provisioning required before introducing a new Node B in a live network. The resulting data consists of a set of CM XML files that contain:

• The initial configuration to be activated on the new Node B(s)

• The modifications to be applied on the following objects:

– The RNC C-Node and RNC I-Node

• Check that the capacity licensing is well configured for the new Node B:

– If you did not buy the capacity licensing feature, you have the maximum rights and all capacity licensing parameter values are set to 'Infinite'.

– Otherwise, you must define a value to the 9 parameters of the *Capacity* object in the BTS Equipment.

– One BTS Equipment does not bear Capacity Licensing feature.

The following figure presents an overview of the algorithm to be applied in order to provide the OMC team with the relevant data set required to add N Node B(s).

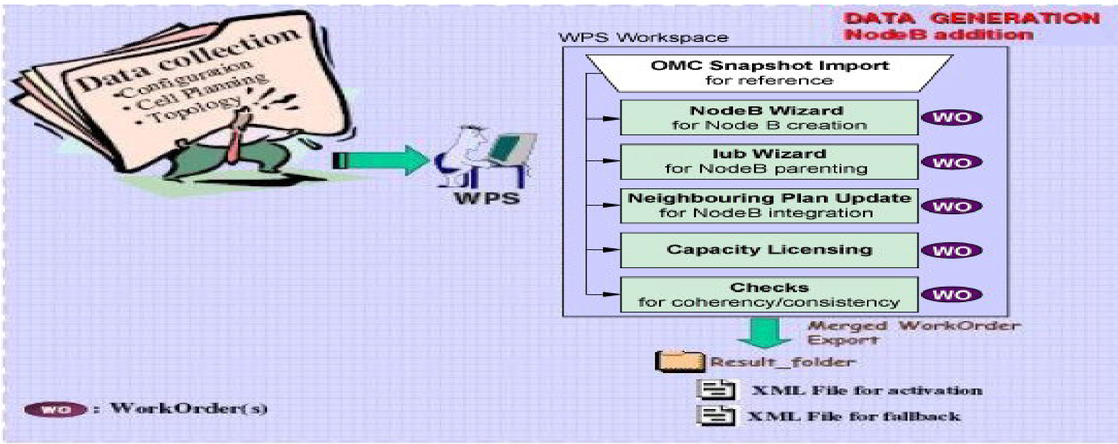


Figure 3.5.3 Advance Node B (s)

The procedure that follows is derived from the preceding figure, and gathers all the steps and notes, which need to be followed to add Node B(s).

The steps to complete the Node B Addition preparation under WPS are:

Step	**Sheet**
1 (Optional)	Sheet 1 - Reverse Engineering

2 (for each Node B)	Sheet 2a - Creation of a new Node B Sheet 2b - Creation of a new One BTS Sheet 3a - Parenting of a new Node B Sheet 3b - Parenting of a new One BTS
3	Sheet 4 - Neighboring plan update
4	Sheet 5 - Capacity Licensing
5	Sheet 6- Consistency checks
6	Sheet 7 - Export work orders

Configuration of new Node B: This provides an overview of the network reconfiguration procedure to be performed, when a new BTS is added in the UMTS network.

The following figure shows the various steps involved for introducing a new BTS in W-CDMA access network.

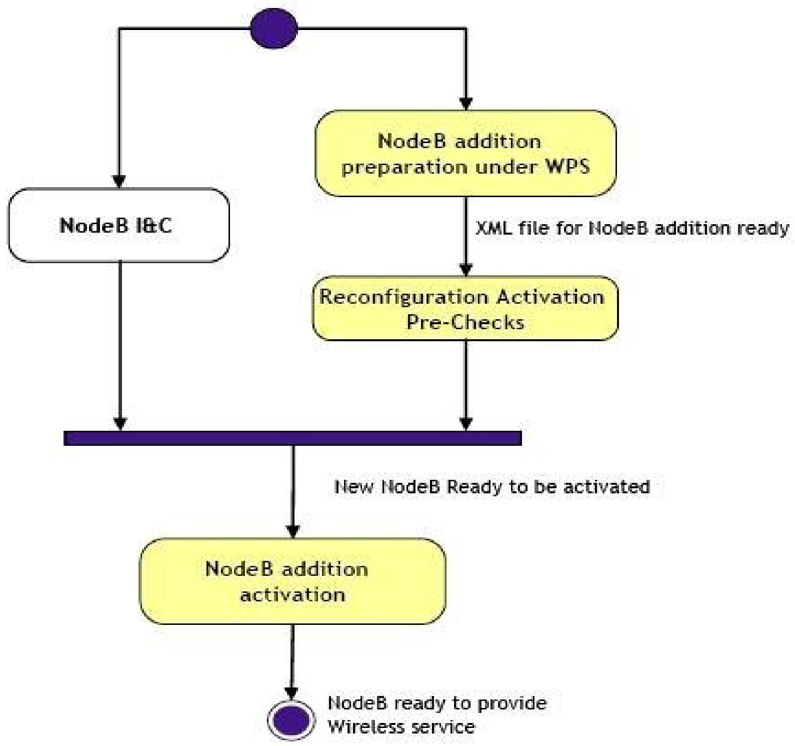


Figure 3.5.3 flow diagram of configuration

STEPS FOR CREATING A NEW NOBE B IN CASE OF CALL DROP AND CALL CONGESTION

Step 1: In case of Call Drop and Call Congestion we are creating a new Node B by WPS (Wireless Provision System) software in an RNC

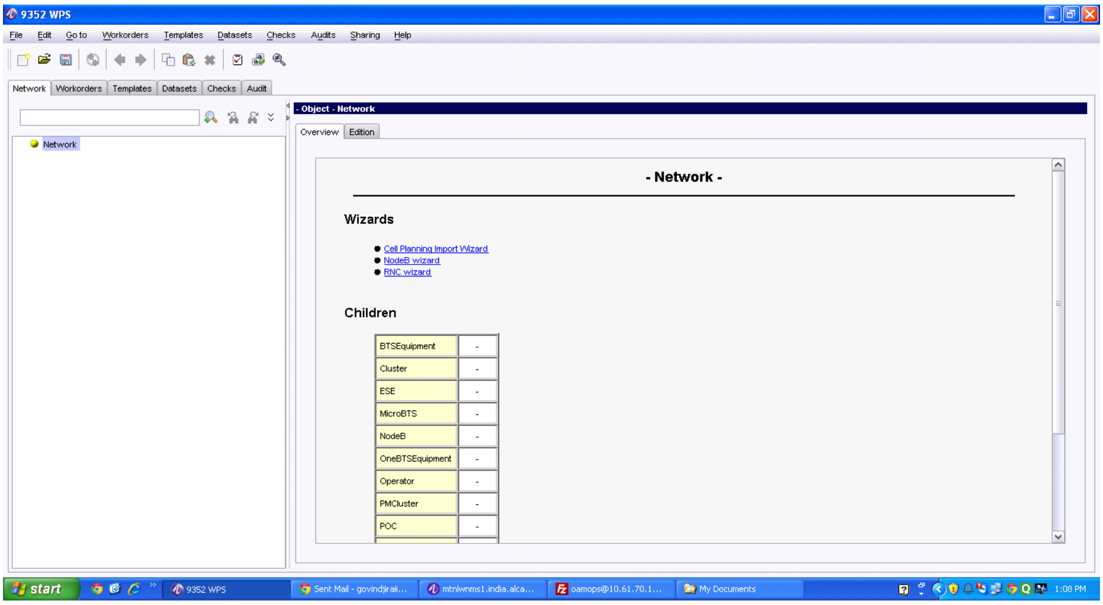


Figure: WPS window for configuration

Step2: We have to import all the Node B's in that particular RNC for the interfacing with each other

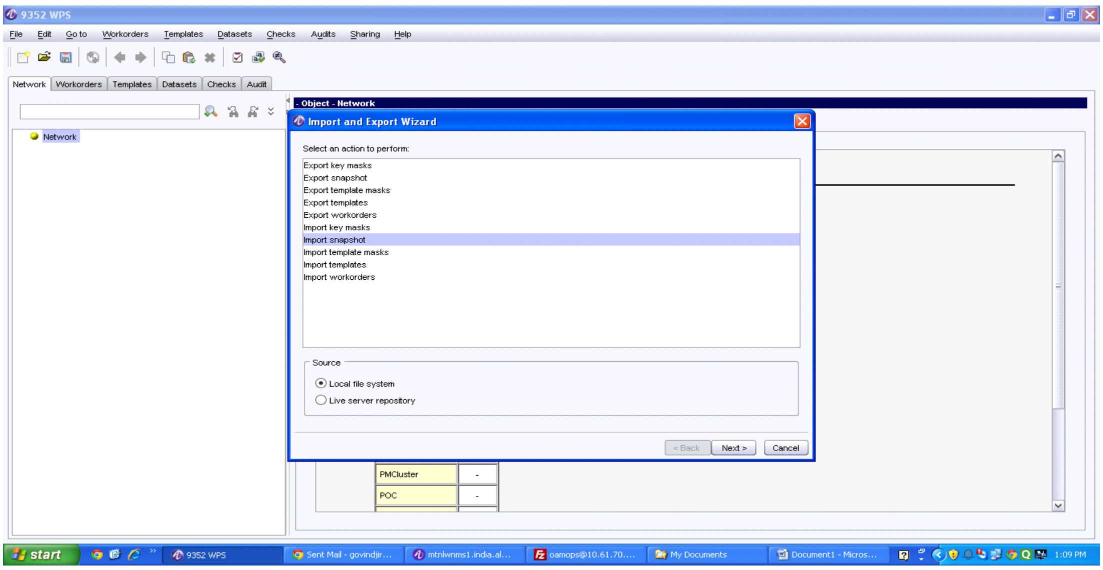


Figure: shows the import snapshot of all the Node B's in the RNC

Step3: We have to create a Node B wizard in which we have configured BTS Equipment, one BTS Equipment and Channel configuration

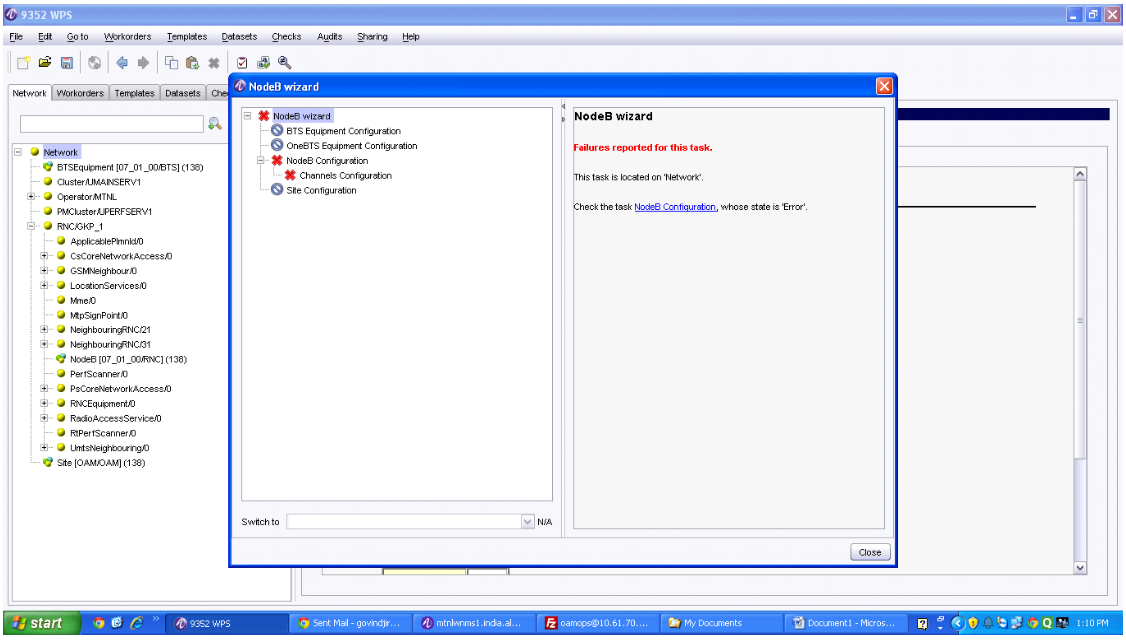


Figure: Node B wizard configuration

Step4: Here we are configuring a BTS cell by assigning local cell id, type of card that can be use and uplink and downlink frequency.

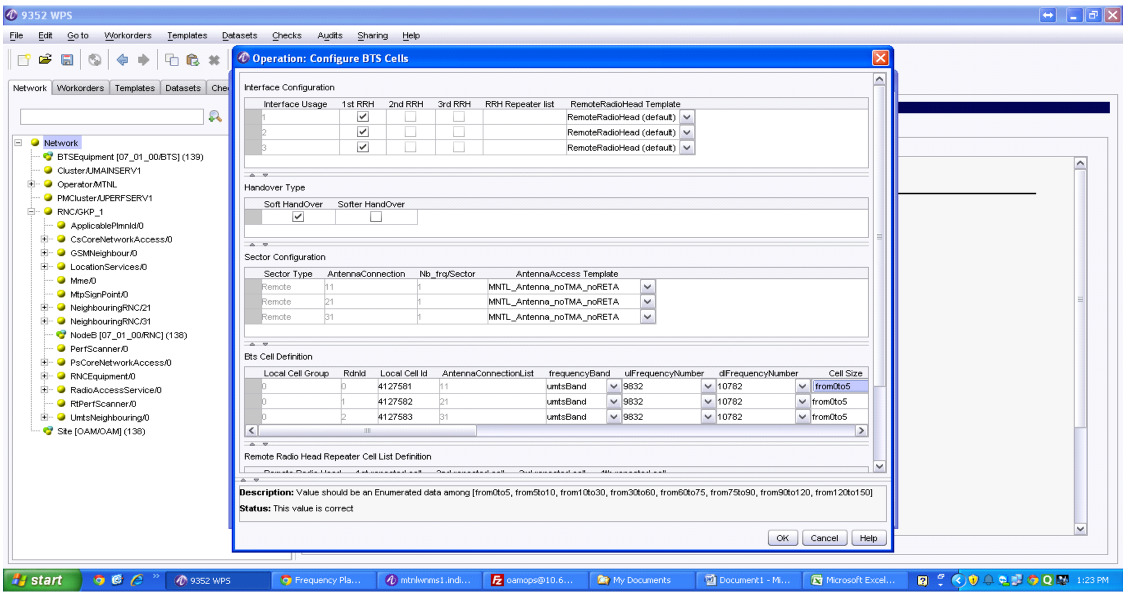


Figure: Configure BTS cell

Step5: We are setting FDD (Frequency Division Duplexing) for uplink and downlink frequency.

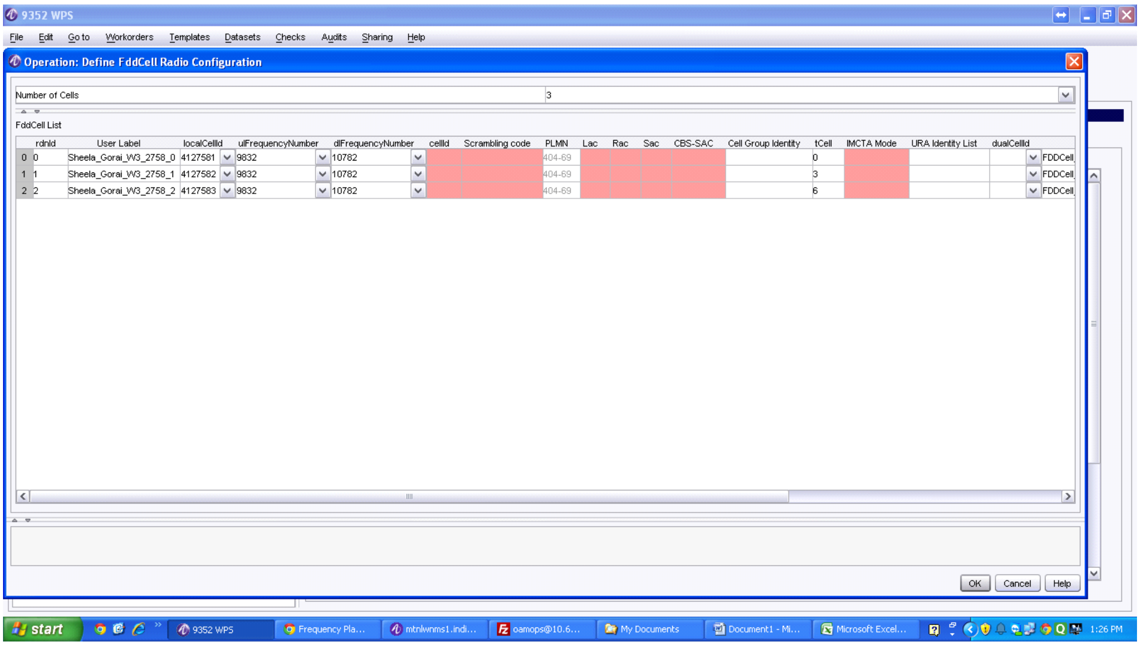


Figure: FDD configuration

Step6: Here we decide the azimuth angle of an Antenna

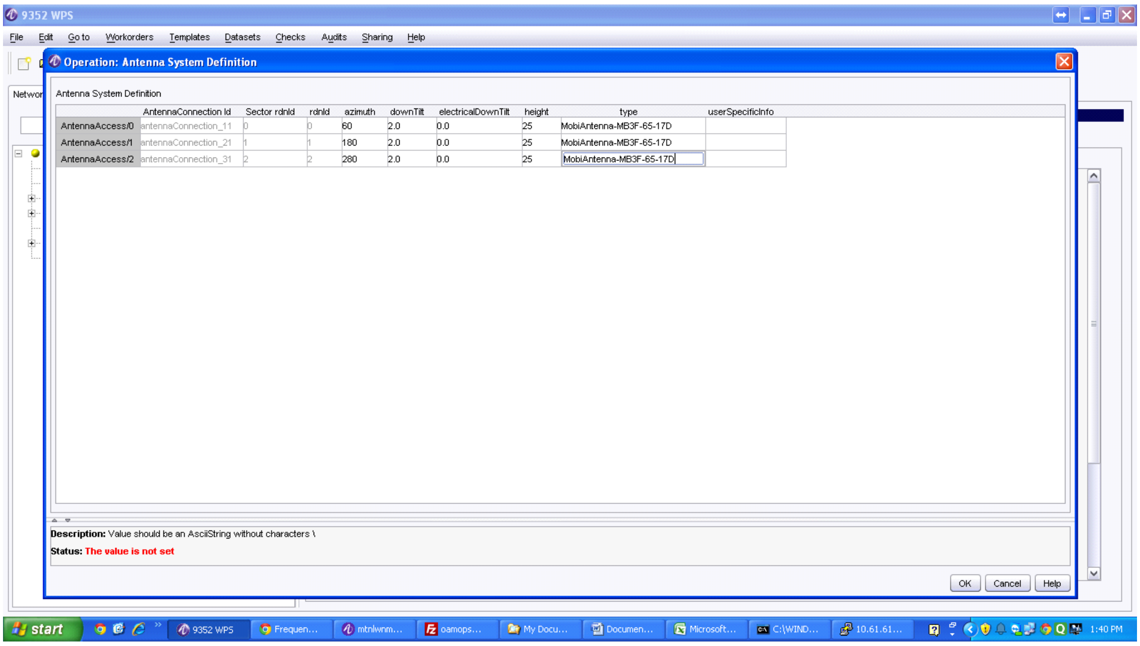


Figure: Antenna System Definition

Step7: We have configure Iub interfacing configuration in which BTS configure, interface Node configure and IP subnet management.

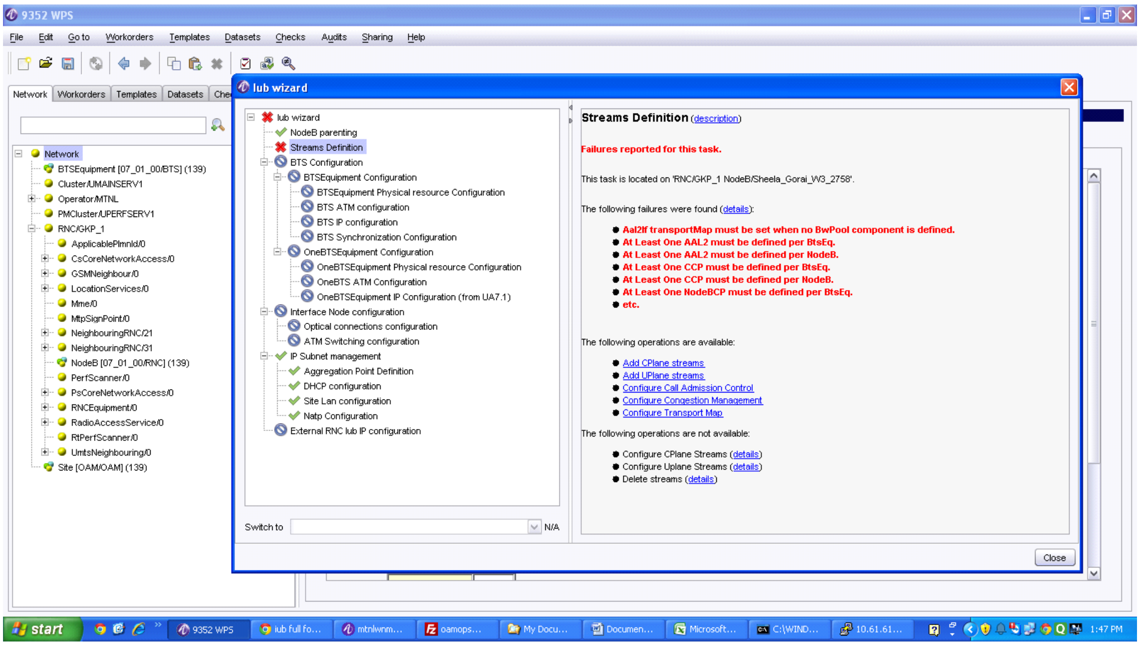


Figure: Iub wizard

Step8: Finally we have configure a new Node B in an Ghatkopar RNC

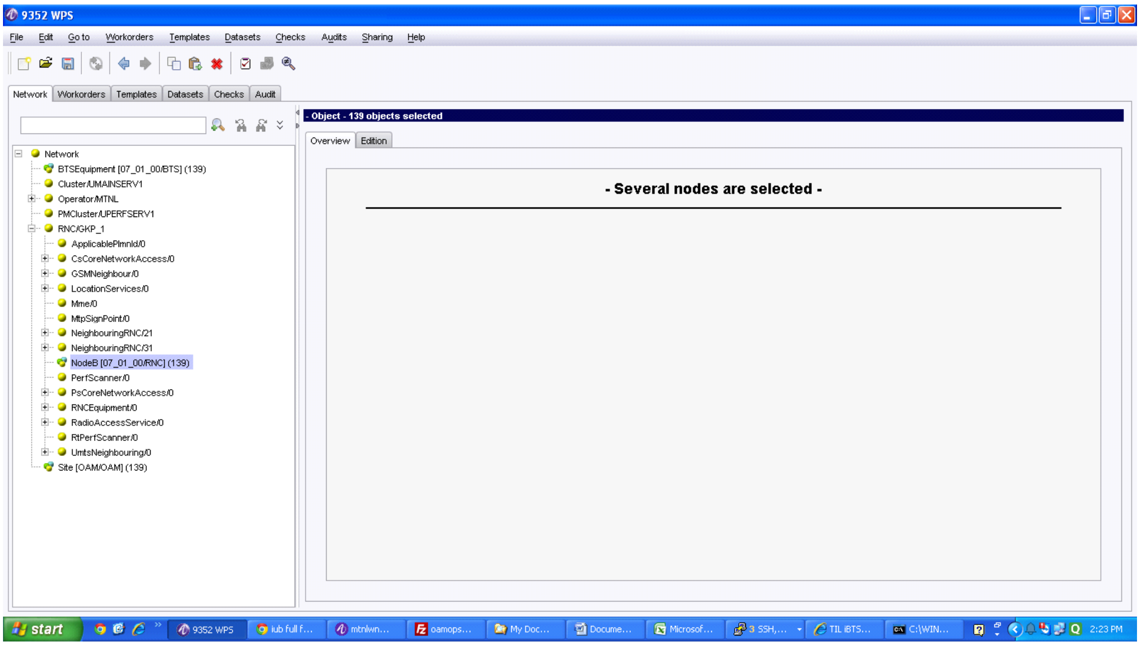


Figure: Create a Node B

Software:

3.5. Net Sim

NetSim is a popular network simulation and network emulation tool used for network design & planning, defense applications and network R & D. Various technologies such as Cognitive Radio, Wireless Sensor Networks, Wireless LAN, Wi-max, TCP, IP, etc. are covered in Net Sim.

Net Sim	
Developer(s)	TETCOS
Stable release	v9 / March 1, 2016
Written in	C
Operating system	Windows
Type	Simulation
License	Proprietary
Website	NETSIM product page

Model Library in NetSim:

Modeling and simulation are supported for the below mentioned technologies. Protocol libraries are available with C source code

- Aloha, Slotted Aloha
- Token Ring, Token Bus

- Ethernet - 10 Mbit/s through 40Gbit/s
- WLAN - IEEE 802.11 a/ b / g / n / ac and e[2]
- TCP, UDP
- IPv4 and IPv6[3]
- Routing - RIP, OSPF, BGP
- Wi-Max
- MANET covering DSR, AODV, ZRP, OLSR etc. with sinkhole / black hole attacks and intrusion detection
- GSM and CDMA
- Internet of Things (IOT)
- Wireless Sensor Network with LEACH etc.
- Zigbee
- Cognitive radio
- LTE
- Military Radios - HF, VHF, UHF bands. Tactical data link - Link 16

The Network Emulator Add on allows users to link NetSim to live applications running on real devices. This allows for real traffic to flow via the emulator and experience network effects.

In addition modules are available for sink hole attack, intrusion detection, packet encryption, packet capture using Wireshark etc.

Application:

- Network R & D including custom protocol development
- Defense applications
- Railway communication networks
- Sensor network deployment
- SCADA Communication Networks [4]
- Wireless / Satellite link emulation
- Enterprise network / Data-centre network analyses

3.5.1 Call Blocking Probability

<u>Example 1:</u>

Objective:

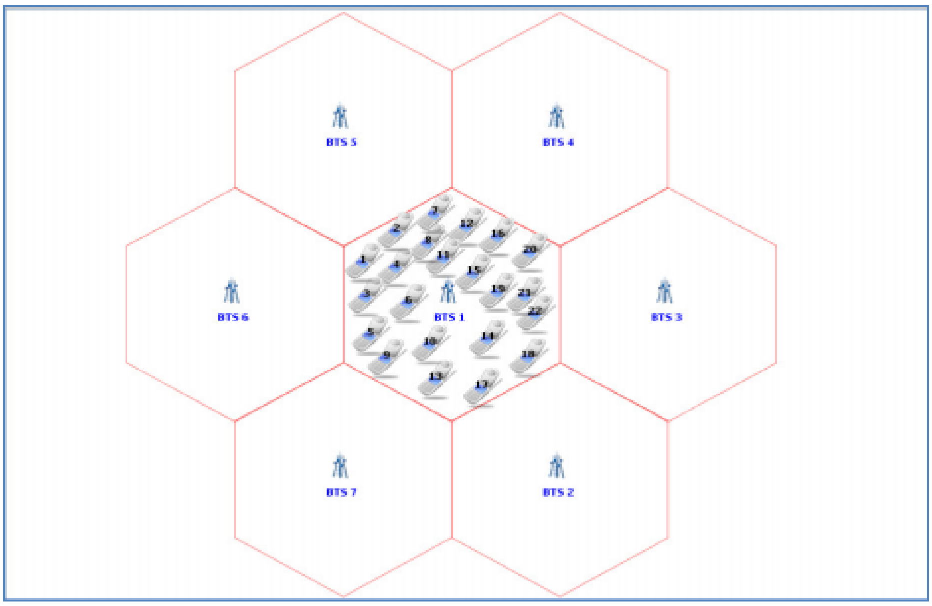
Study how call blocking probability varies as the load on a GSM network is continuously increased.

Procedure:

- Create Scenario: "Help   NetSim Help   Running Simulation via GUI   Cellular Networks   Create Scenario".
- Select the BTS.
- Select the Mobile node in which particular BTS cell.
- Set the properties of mobile node file voice, CBR, Destination.
- Select properties of BTS.

Inputs:.

- Total no of BTS used: 7
- Total no of MS used: Vary from 4 to 22 in steps of 2. The devices are inter connected as given below,
- All the MS is placed in the range of BTS1



BTS Properties	BTS1
Maximum Uplink bandwidth	891.0 MHz
Minimum Uplink bandwidth	890.0 MHz
Maximum Downlink bandwidth	936.0 MHz
Minimum Downlink bandwidth	935.0 MHz
Channel bandwidth	200 kHz
Number of time slot	8

Input for sample 1

No of MS=4

MS Properties	MS 1	MS 3
Destination	MS 2	MS 4
Transmission Type	Point to Point	Point to Point
Traffic Type	Voice	Voice
Call Details		
Distribution	Exponential	Exponential
Mean Call Interval Time (sec)	300	300
Distribution	Exponential	Exponential
Call Duration	60	60
Codec		
Codec	GSM-FR	GSM-FR
Packet Size	33	33
Inter Arrival Time (µs)	20000	20000
Service Type	CBR	CBR
Generation rate	0.0132	0.0132
Mobility Model	No Mobility	No Mobility

Input for sample 23

No of MS=6

MS Properties	**MS 1**	**MS 3**	**MS 5**
Destination	MS 2	MS 4	MS 6
Transmission Type	Point to Point	Point to Point	Point to Point
Traffic Type	Voice	Voice	Voice
Call Details			
Distribution	Exponential	Exponential	Exponential
Mean Call Interval Time (sec)	300	300	300
Distribution	Exponential	Exponential	Exponential
Call Duration	60	60	60
Codec			
Codec	GSM-FR	GSM-FR	GSM-FR
Packet Size	33	33	33
Inter Arrival Time (µs)	20000	20000	20000
Service Type	CBR	CBR	CBR
Generation rate	0.0132	0.0132	0.0132
Mobility Model	No Mobility	No Mobility	No Mobility

Likewise, increase the number of MS by 2 and set properties up to 22 MS.

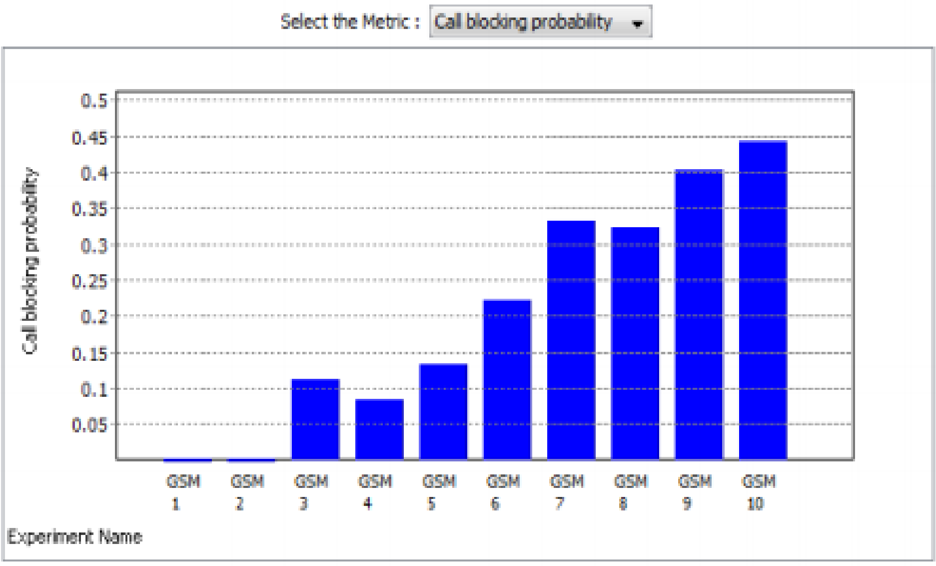
Simulation Time – 1000 sec

Output To view the output by using NetSim Sample experiments need to be added onto the Analytics interface. Given below is the navigation for analytics –"Simulation Analytics"

Select the experiments by selecting

- Cellular Networks
- Select the Experiments (Note: Click one experiment after another to compare the experiments in the Analytics interface).
- Select the Metric: Call Blocking probability

Out Put:



All the above plots highly depend upon the placement of Mobile station in the simulation environment. So, note that even if the placement is slightly different the same set of values will not be got but one would notice a similar trend.

When the number of MS is increased from 4 to 22 the call blocking probability increases from 0 to 0.48. This is because; as we increase the number of mobile stations more calls are generated. This increases the traffic load on the system & more calls generated implies more channel requests arrive at the base station but the number of channels in each base station is fixed (In this experiment it is 40).

Total number of channels in system = 40

Number of channels per BTS = 40/7 = 5

Number of traffic channels in each BTS = 4 (Here 1 channel is RACH)

So when the base station does not find any free channel the call is blocked.

An additional observation is that the call blocking is zero until 8 MS. This is because the number of channels is sufficient to handle all call that 8 MS may generate. Only after this does the base station not finds free channels and block calls.

Example 2:

Objective:

To study call block probability reduces has we increase BTS.

Procedure:

- Select the BTS drag and drop.
- Select the mobile nodes drag and drop in that particular cell.
- Set the properties of mobile node like voice , destination ,CBR.
- Set the properties of BTS.

Stage 1:

Setting the mobile nodes in a particular cell due to more user there is load over BTS so, call block probability was high.

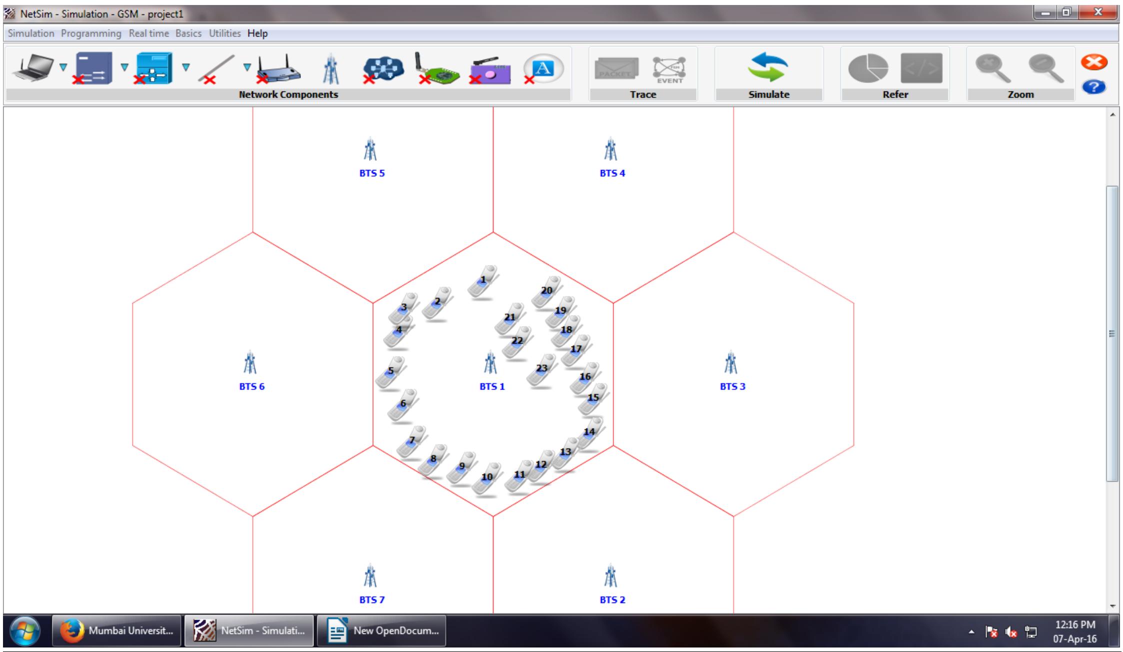


Figure shows the congestion of BTS in a particular area where the no of users are more in that particular cellular network.

Stage 2:

By configuring new BTS in that particular region the load over the BTS reduces so, call block rate is reduces.

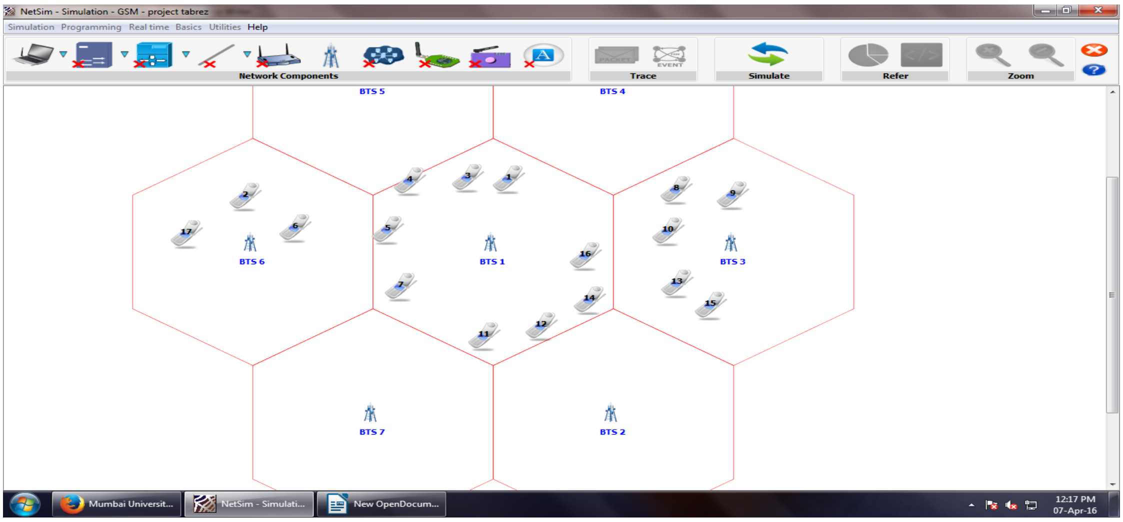
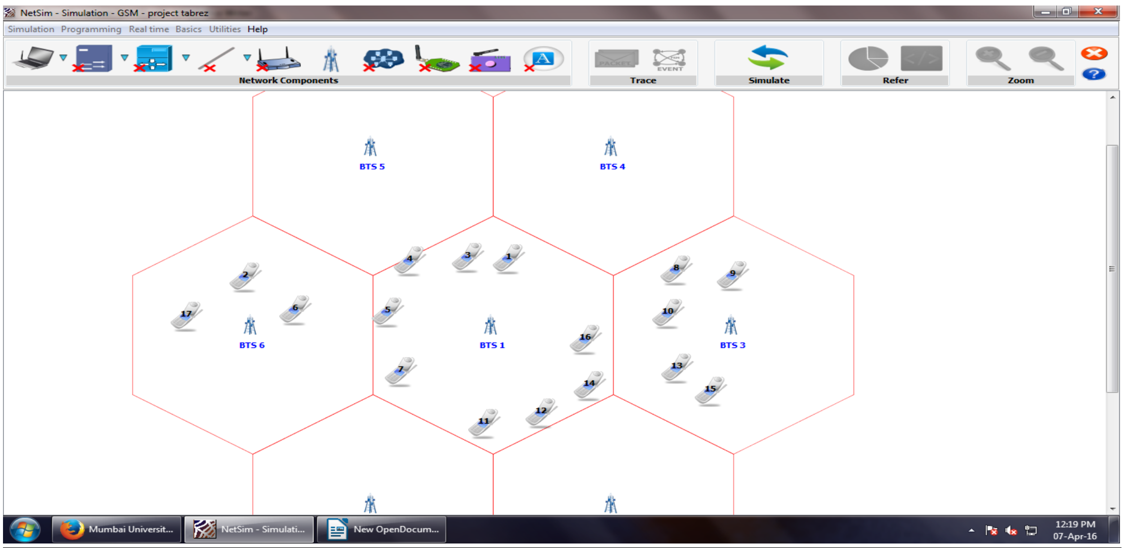


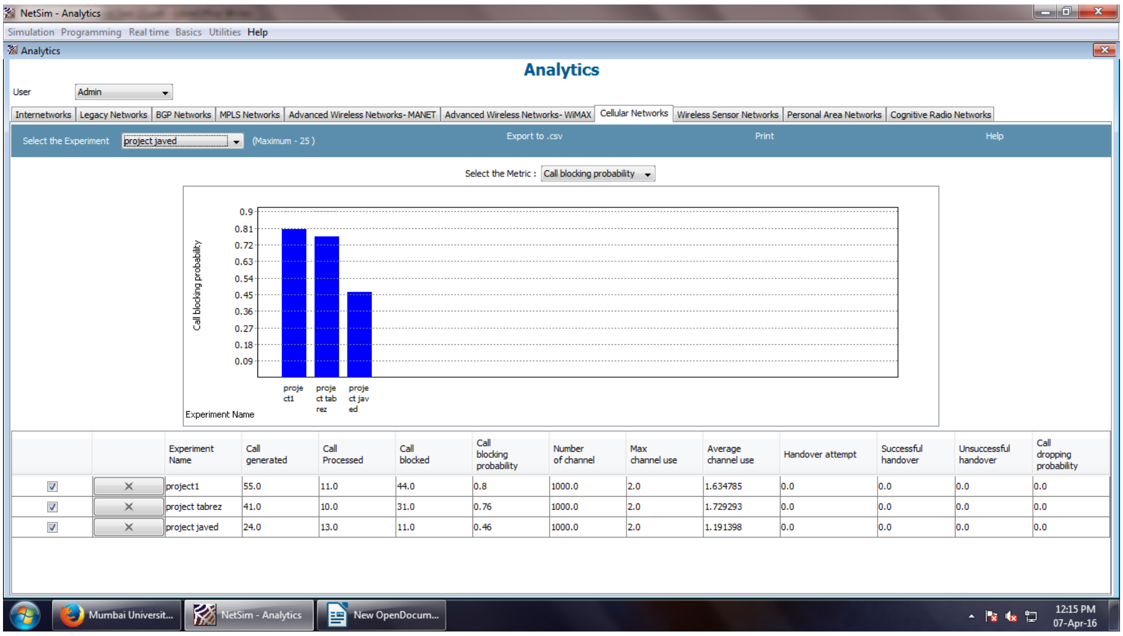
Figure shows As the no of BTS is install in the near by area the call blocking probability is going to reduce in that particular area.

Stage 3:

by reducing the number of users the load over BTS was reduced so, call block rate is reduced.



<u>Out put:</u>



NetSim - Analytics
Simulation Programming Real time Basics Utilities Help
Analytics
Analytics
User
Admin
Internetworks Legacy Networks BGP Networks MPLS Networks Advanced Wireless Networks- MANET Advanced Wireless Networks- WiMAX Cellular Networks Wireless Sensor Networks Personal Area Networks Cognitive Radio Networks
Select the Experiment
project javed
(Maximum - 25)
Export to .csv
Print
Help
Select the Metric :
Call blocking probability
Call blocking probability
0.9
0.81
0.72
0.63
0.54
0.45
0.36
0.27
0.18
0.09
project1
project tabrez
project javed
Experiment Name
Experiment Name
Call generated
Call Processed
Call blocked
Call blocking probability
Number of channel
Max channel use
Average channel use
Handover attempt
Successful handover
Unsuccessful handover
Call dropping probability
project1 55.0 11.0 44.0 0.8 1000.0 2.0 1.634785 0.0 0.0 0.0 0.0
project tabrez 41.0 10.0 31.0 0.76 1000.0 2.0 1.729293 0.0 0.0 0.0 0.0
project javed 24.0 13.0 11.0 0.46 1000.0 2.0 1.191398 0.0 0.0 0.0 0.0
Mumbai Universit...
NetSim - Analytics
New OpenDocum...
12:15 PM
07-Apr-16

CHAPTER 04

RESULT AND CONCLUSION

RESULT AND CONCLUSION

We have successfully tried to avoid Call Block , Call Congestion in the particular area by rectify fault in a system and Configuring Node B in that area.

Simulation part we have tried to reduce Call Block by diverting the call to another BTS and reducing the Call Block probability in that Cell.

The Call block probability can not be totally nullified due to insufficient infrastructure or barrier in path.

By proper maintainance of network system and sufficient infrastructure Call Block and Call Drop can be reduced.

The performance of software designed under test is fount to be satisfactory as compare to the reference software (in our case the reference software is Alcatel 3G, Net Sim).

CHAPTER 05

FUTURE SCOPE

FUTURE SCOPE

We have done the test of Call Blocking probability in the small region if we will do this test in all over Mumbai the result of analysis will be more accurate.

We have done this test on 3G system an we can also do this analysis on 4G.netwoek we have 4G system.

India has different network like Alcatel, Ericsson, Huawei, Nortel we had done this test only on Alcatel network of Mumbai region.

In simulation part we had tried to avoid Call Blocking but we were unable to achieve 100% and also we were unable to find Call Blocking.

CHAPTER 06

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REFERENCES

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Node B Description
UMTS radio principal

APPENDIX

APPENDIX

MSC	Mobile Switching Center
BSC	Base station switching center
BTS	Base trans recives station
RNC	Router node controller
VMSC	Visitor mobile switching center
GMSC	Gateway mobile switching center
NLD	National long distance
Auc	Authentication
MNP	Mobile network probability
OMC	Operation maintained center
IN	Internet network
HLR/VLR	Home/Visitor location register

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