VIGNANA BHARATHI
Institute of Technology
(Sponsored by Swamy Vivekananda Educational Trust, Hyd.)
(Approved by AICTE, Accredited by NBA & NACC, Affiliated to JNTUH)

CERTIFICATE

FILE AND LINK No: MRP-6944/16 (SERO/UGC)

NAME OF THE PRINCIPAL INVESTIGATOR: S.Bhagya Rekha

Vignana Bharathi Institute of Technology,

Aushapur, Hyderabad, Pin: 501301

TITLE OF THE PROJECT: "Study on Smart Call Forwarding in DUOS",

Certified that the project has been successfully completed and Executive summary of the report, Research documents, monograph, academic papers published under Minor research project has been posted on the website of the college

Signature of the Principal Investigator

Signature of the Principal
With seal and stamp
PRINCIPAL
Vignana Bharathi Institute of Technology
Aushapur(V), Ghatkesar(M), Medchal Dist. - 501 301

ACCESSION CERTIFICATE

This is to certified that S.Bhagya Rekha, Department of Information Technology, Hyderabad has handed over the following books and journals purchased under the scheme of Minor Research Project to the Library of Vignana Bharathi Institute of Engineering & Technology, Hyderabad. The following are books and journals handed over by S.Bhagya Rekha (MRP-6944/16 (UGC/SERO).

S. No	Item	Qty.
1	Kotlin Programming Cook Book	1
2	Intelligent Mobile Project with TensorFlow	1
3	Android Sensor Programming	1
4	Android in Action	1
5	Creating Dynamic UI with android fragments	1
6	Building Android UI with custom view	1
7	Mastering fire base for android development	1
8	Practical mobile forensics	1
9	Android 6 for programmers: An app driven approach	1
10	Dynamic cell sizing in mobile cellular networks	1
11	Wireless networks and mobile computing	1
12	Java how to programming	1
13	Introduction to wireless & Mobile	1
14	The complete reference J2ME	1
15	Mobile Computing Principles	1
16	Internet and World wide web	1
17	Mobile communications (Schiller)	1
18	Mobile communications (Raj Kamal)	1
19	Android 4 application development	1
20	Mobile cellular Tele communications	1
21	Android Head First	1
22	Learning pretesting for android devices	1
23	GSM CDMA 1 and 3G systems	1
24	Mobile Application Development with Android Technologies and algorithms	1
25	Pro Android 5	1

Signature of the Principal Investigator

7/1/2020

Signature of the Librarian

SRINIVASA RAO GANTA
Asst. Professor in LIS
& Librarian VBIT

Signature of the Principal

PRINCIPAL
Vignana Bharathi Institute of Technology
Aushapur(V), Ghatkesar(M) Medchal Dist-501 301

ASSETS CERTIFICATE

This is to certified that S.Bhagya Rekha, Department of Information Technology, Hyderabad has handed over the following equipment purchased under the scheme of Minor Research Project to the Department of Information Technology, Vignana Bharathi Institute of Engineering & Technology, Hyderabad. The following are equipments handed over by S.Bhagya Rekha (MRP-6944/16 (UGC/SERO).

S. No	Particulars	Company	Qty.
1	HP 15G LAPTOP	HP	1
2	HP Printer 1020 LaserJet	HP	1
3	Samsung Mobile(A6)	Samsung	1

Signature of the

Principal Investigator

Signature of the

Head of Department.

Signature of the

Principal

Dept. of IT
Vignana Bharathi Institute of Technology
Aushapur Vill; Ghatkesar Mdl; R R Dist -501 301

PRINCIPAL
Vignana Bharathi Institute of Technology
Aushapur(V), Ghatkesar(M) Medchal Dist-501 301

Settlement proforma

UTILISATION CERTIFICATE

FILE AND LINK No: MRP-6944/16 (SERO/UGC)

NAME OF THE PRINCIPAL INVESTIGATOR: S.Bhagya Rekha

Vignana Bharathi Institute of Technology,

Aushapur, Hyderabad, Pin: 501301

TITLE OF THE PROJECT: "Study on smart call forwarding in DUOS Mobile",

Certified that the grant of Rs. 2,10,000/ (Rupees Two Lakhs ten thousand only) approved by UGC and the grant received Rs2,02,000/(Rupees Two lakhs two thousand only) from the University Grants Commission under the scheme of support for Minor Research Project entitled "Study on smart call forwarding in DUOS Mobile", vide UGC letter No. F. MRP-6944/16 (SERO/UGC) dated 28/7/2017 **has been fully utilized for the purpose for which it was sanctioned and that the balance of Rs. 8000 has been spent by institute which has to be released from UGC in accordance with the terms and conditions laid down by the University Grants Commission. If as a result of check or audit objection, some irregularity is noticed at a later stage, action will be taken to refund or regularize the objected amount.**

Rekha

SIGNATURE OF THE PRINCIPAL INVESTIGATOR

PRINCIPAL with Seal and Stamp

PRINCIPAL
Vignana Bharathi Institute of Technology
Aushapur(V), Ghatkesar(M) Medchal Dist-501 301

9-1-2020

STATUTORY AUDITOR with Seal and Stamp

CA. L. JANARDHAN RAO
Chartered Accountant
M.No: 18474

UDIN 20018474AAAAAD8317

Annexure - III

UNIVERSITY GRANTS COMMISSION
BAHADUR SHAH ZAFAR MARG
NEW DELHI – 110 002

STATEMENT OF EXPENDITURE IN RESPECT OF MINOR RESEARCH PROJECT(II Year)

1. Name of Principal Investigator : Sangisetti Bhagya Rekha
2. Deptt. of PI :Information Technology
   Name of College : Vignana Bharathi Institute of Technology
3. UGC approval Letter No. and Date : 28-7-2017 MRP-6944/16 (SERO/UGC)
4. Title of the Research Project :Study on smart call forwarding in duos mobile
5. Effective date of starting the project:15-Aug-2017
6. a. Period of Expenditure: From :29-jan-2019 to 08-Aug-2019
   b. Details of Expenditure _____

S.No.	Item	Amount Approved (Rs.)	Amount Received (Rs.)	Expenditure Incurred (Rs.)	Amount to be released by UGC
i.	Books & Journals	00	00	00	00
ii.	Equipment	00	00	00	00
iii.	Contingency including special needs	15000	12000	15000	3000
iv.	Field Work/Travel (Give details in the Proform) a .	15000	12000	15000	3000
v.	Hiring Services	10000	8000	10000	2000
GRAND TOTAL		**40,000**	**32,000**	**40,000**	**8,000**

7. if as a result of check or audit objection some irregularly is noticed at later date, action will be taken to refund, adjust or regularize the objected amounts.

8. .It is certified that the grant of Rs. **40,000/** (Rupees Forty thousand only) approved by UGC and the grant received Rs **32,000** (Rupees thirty two thousand only) from the University Grants Commission under the scheme of support for Minor Research Project entitled "Study on Smart call Forwarding in DUOS Mobile", vide UGC letter No. F. MRP-6944/16 (SERO/UGC) dated 28/7/2017 has been fully utilized for the purpose for which it was sanctioned and that the balance of Rs.**8,000** has been spent by institute which has to be released from UGC in accordance with the terms and conditions laid down by the University Grants Commission.

.

SIGNATURE OF PRINCIPAL INVESTIGATOR

PRINCIPAL

PRINCIPAL
Vignana Bharathi Institute of Technology
Aushapur(V), Ghatkesar(M) Medchal Dist-501 301

(Seal)

Annexure - III

UNIVERSITY GRANTS COMMISSION
BAHADUR SHAH ZAFAR MARG
NEW DELHI – 110 002

STATEMENT OF EXPENDITURE IN RESPECT OF MINOR RESEARCH PROJECT(I&II Year)

1. Name of Principal Investigator : Sangisetti Bhagya Rekha
2. Deptt. of PI :Information Technology
   Name of College : Vignana Bharathi Institute of Technology
3. UGC approval Letter No. and Date : 28-7-2017 MRP-6944/16 (SERO/UGC)
4. Title of the Research Project :Study on smart call forwarding in duos mobile
5. Effective date of starting the project:15-Aug-2017
6. a. Period of Expenditure: From :07-Aug-2017 to 07-Aug-2019
7. b. Details of Expenditure _____

S.No.	Item	Amount Approved (Rs.)	Amount Received (Rs.)	Expenditure Incurred (Rs.)	Amount to be released by UGC
i.	Books & Journals	30,000	30,000	30000	00
ii.	Equipment	1,00,000	1,00,000	1,00,000	00
iii.	Contingency including special needs	30,000	27000	30000	3000
iv.	Field Work/Travel (Give details in the Proform) a .	30000	27000	30000	3000
v.	Hiring Services	20000	18000	20000	2000
GRAND TOTAL		**2,10,000**	**2,02,000**	**2,10,000**	**8,000**

8. if as a result of check or audit objection some irregularly is noticed at later date, action will be taken to refund, adjust or regularize the objected amounts.

8. It is certified that the grant of Rs. **2,10,000/** (Rupees Two Lacks ten thousand only) approved by UGC and the grant received Rs **2,02,000** (Rupees Two Lacks Two thousand only) from the University Grants Commission under the scheme of support for Minor Research Project entitled "Study on Smart call Forwarding in DUOS Mobile", vide UGC letter No. F. MRP-6944/16 (SERO/UGC) dated 28/7/2017 has been fully utilized for the purpose for which it was sanctioned and that the balance of Rs.**8,000** has been spent by institute which has to be released from UGC in accordance with the terms and conditions laid down by the University Grants Commission.

SIGNATURE OF PRINCIPAL INVESTIGATOR

PRINCIPAL

PRINCIPAL
Vignana Bharathi Institute of Technology
Aushapur(V), Ghatkesar(M) Medchal Dist-501 301

(Seal)

Annexure - IV

UNIVERSITY GRANTS COMMISSION
BAHADUR SHAH ZAFAR MARG
NEW DELHI – 110 002

STATEMENT OF EXPENDITURE INCURRED ON FIELD (II year) WORK

Name of the Principal Investigator: S.Bhagya Rekha

Name of the Place visited	Duration of the Visit		Mode of Journey	Expenditure Incurred (Rs.)
	From	To		
Sree Nidhi Institute of Technology	29th Jan 2019	2-Feb -2019	Hired Cab	15000

Certified that the above expenditure is in accordance with the UGC norms for Major Research Projects.

SIGNATURE OF PRINCIPAL INVESTIGATOR

PRINCIPAL
(Seal)

PRINCIPAL
Vignana Bharathi Institute of Technology
Aushapur(V), Ghatkesar(M) Medchal Dist-501 301

Annexure – V

UNIVERSITY GRANTS COMMISSION
BAHADUR SHAH ZAFAR MARG
NEW DELHI – 110 002

Utilization certificate (II YEAR)

Certified that the grant of Rs. 40,000/ (Rupees Forty thousand only) approved by UGC and the grant received RS 32,000(Rupees Thirty Two thousand only) from the University Grants Commission under the scheme of support for Minor Research Project entitled "Study on smart call forwarding in duos mobile", vide UGC letter No. F. MRP-6944/16 (SERO/UGC) dated 28/7/2017 has been fully utilized for the purpose for which it was sanctioned and that the balance of Rs.8000 has been spent by institute which has to be released from UGC in accordance with the terms and conditions laid down by the University Grants Commission.

SIGNATURE OF THE
PRINCIPAL INVESTIGATOR

PRINCIPAL
(Seal)

PRINCIPAL
Vignans Bharathi Institute of Technology
Aushapur(V), Ghatkesar(M), Medchal Dist-501 301

STATUTORY AUDITOR
(Seal)

HYDERABAD
CHARTERED ACCOUNTANT

CA. L. JANARDHAN RAO
Chartered Accountant
M.No: 18474

UDIN: 20018474AAAAAD8317

Annexure – V

UNIVERSITY GRANTS COMMISSION
BAHADUR SHAH ZAFAR MARG
NEW DELHI – 110 002

Utilization certificate (Consolidated, I & II Year)

Certified that the grant of Rs. 2,10,000/ (Rupees one lakh sixty thousand only) approved by UGC and the grant received Rs2.0,2000/(Rupees Two lakhs ten thousand only) from the University Grants Commission under the scheme of support for Minor Research Project entitled "Study on smart call forwarding in duos mobile", vide UGC letter No. F. MRP-6944/16 (SERO/UGC) dated 28/7/2017 has been fully utilized for the purpose for which it was sanctioned and that the balance of Rs.8000 has been spent by institute which has to be released from UGC in accordance with the terms and conditions laid down by the University Grants Commission.

SIGNATURE OF THE
PRINCIPAL INVESTIGATOR

PRINCIPAL

STATUTORY AUDITOR

HYDERABAD
CHARTERED ACCOUNTANT

(Seal)(Seal)

PRINCIPAL
Vignana Bharathi Institute of Technology
Aushapur(V), Ghatkesar(M) Medchal Dist-501 301

CA. L. JANARDHAN RAO
Chartered Accountant
M.No: 18474

UDIN: 20018474AAAAAD8317

Annexure -VI

UNIVERSITY GRANTS COMMISSION
BAHADUR SHAH ZAFAR MARG
NEW DELHI – 110 002.

Annual/Final Report of the work done on the Minor Research Project.
(Report to be submitted within 6 weeks after completion of eachyear)

dated: 25/09/2019

1. Project report No. 1st /Final : 2/Final (After two years)
2. UGC Reference No.F. : MRP 6944/16 (SERO/UGC)
3. Period of report: from : 15-Aug-2018 to 7-Aug-2019
4. Title of research project : Study on smart call forwarding in duos mobile
5. (a) Name of the Principal Investigator : Sangisetti Bhagya Rekha
   (b) Deptt. : Information Technology
   (c) College where work has progressed: Vignana Bharathi Institute of Technology
6. Effective date of starting of the project: 15-Aug-2017
7. Grant approved and expenditure incurred during the period of the report:
   a. Total amount approved : Rs. 2.10,000
   b. Total expenditure : Rs. 2.10,000
   c. Report of the work done: (Please attach a separate sheet)
   i. Brief objective of the project : (Attached)

   ii. Work done so far and results achieved and publications, if any, resulting from the work (Give details of the papers and names of the journals in which it has been published or accepted for publication

1."An examination of Switchover of calls of missive conveyance in a dual operating Android mobile device" in International Journal of Management, Technology And Engineering Volume 8, Issue VIII, AUGUST/2018

2."A STUDY ON VARIOUS TECHNIQUES OF MOBILE CALL DIVERSION AND CALL FORWARDING TECHNIQUES IN DUAL SIM MOBILES" in Journal of Emerging Technologies and Innovative Research March 2019, Volume 6, Issue 3.

3.Published a paper "Smart call Forwarding and conditional Network monitoring in ACM ICPS (SJR-Scopus Indexed journal) Shimla, India — June 15 - 16, 2019 ACM New York, NY, USA ©2019
ISBN : 978-1-4503-6652-6 doi:10.1145/3339311.3339312

4. Published a paper "Implementation of Network Monitoring and Automatic Smart Call Forwarding In Duos Mobile" International Journal of Innovative Technology and Exploring Engineering (IJITEE) ISSN: 2278-3075, Volume-8 Issue-9, July 2019 897 SCOPUS Indexed journal

iii. Has the progress been according to original plan of work and towards achieving the objective. **YES**

iv. please enclose a summary of the findings of the study. One bound copy of the final report of work done may also be sent to the concerned Regional Office of the UGC.

v. Any other information

SIGNATURE OF THE PRINCIPAL INVESTIGATOR

PRINCIPAL

(Seal)

PRINCIPAL
Vignana Bharathi Institute of Technology
Aushapur(V), Ghatkesar(M) Medchal Dist-501 301

Annexure – VII

UNIVERSITY GRANTS COMMISSION BAHADUR SHAH ZAFAR MARG NEW DELHI – 110 002

PROFORMA FOR SUBMISSION OF INFORMATION AT THE TIME OF SENDING THE FINAL REPORT OF THE WORK DONE ON THE PROJECT

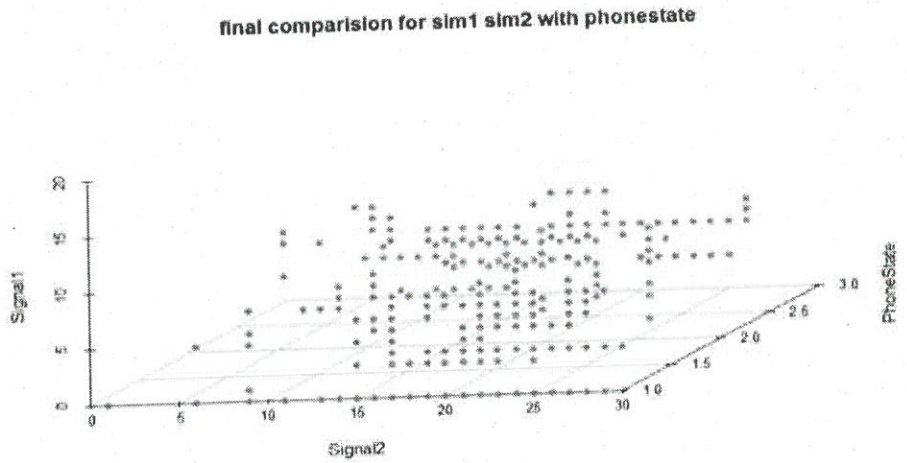
1. Title of the Project: "Study on smart call forwarding in duos mobile"
2. NAME AND ADDRESS OF THE PRINCIPAL INVESTIGATOR: S.Bhagya Rekha, VBIT, Hyderabad.
3. NAME AND ADDRESS OF THE INSTITUTION: Vignana Bharathi Institute of Technology, Aushapur, Hyderabad
4. UGC APPROVAL LETTER NO. AND DATE: MRP-6944/16 (SERO/UGC), 28/7/2017
5. DATE OF IMPLEMENTATION: 15/08/2017
6. TENURE OF THE PROJECT : Two years
7. TOTAL GRANT ALLOCATED: 2,10,000/-
8. TOTAL GRANT RECEIVED: 20,2,000/-
9. FINAL EXPENDITURE: 2,10,000/-
10. TITLE OF THE PROJECT: "Study on smart call forwarding in duos mobile"
11. OBJECTIVES OF THE PROJECT:

1.The main objective of smart call forwarding mechanisms in duos mobile is call forwarding from one SIM to other SIM in the same device.

2. To study and implement the call forwarding mechanisms when cell coverage area is poor or unexpectedly call is disconnected this proposed mechanism automatically detect and connect the call to another SIM that already present in the DUOS Mobile.

12. WHETHER OBJECTIVES WERE ACHIEVED: YES

SUMMARY OF THE FINDINGS



After switchover the call continues this application is useful whenever there is more signal fluctuations happened when there is an important conversation call will not be terminated rather it smart call forwarded with another sim from present handset.

CONTRIBUTION TO THE SOCIETY: The study monitoring Call Forwarding takes place within the single handset. Due to difference in bandwidths, the telecommunication companies may provide stronger network at some regions and time, whereas bit weaker at other. This can be taken advantage of, and when one network is unable, the call can be advanced by forwarding to another.

WHETHER ANY PH.D. ENROLLED/PRODUCED OUT OF THE PROJECT: YES

NO. OF PUBLICATIONS OUT OF THE PROJECT: Four (paper is attached)

(PRINCIPAL INVESTIGATOR)

(PRINCIPAL)

(Seal)

PRINCIPAL
Vignana Bharathi Institute of Technology
Aushapur(V), Ghatkesar(M) Medchal Dist-501 301

DETAILED STATEMENT OF EXPENDITURE FOR CONTINGENCY (incl. Special needs)(II Year)
UGC Reference No. F: MRP-6944/16 (SERO/UGC)

Name of the Principal Investigator: S.Bhagya Rekha

Title of research project: "Study on smart call forwarding in DUOS Mobile"

S.No	Item	Bill.No.	Date	Amount
1	ICAICR-2019	Order No: E6BGGBJBXXX5997D5056CB17	15-06-2019&16-06-2019	7500
4	SRRS Stationary items	993	25-6-2019	210
3	External Hard Disc Drive	CIN NO: U01100MH1999PLC120563	31/07/2019	3899
4	Secretarial charges		5-8-2018	500
5	HDMI to VGA	CCPL10743	19-7-2019	300
6	Stationary	860	3/11/18	52
7	Mobile Recharge for implementation of Application	FCVM181128787677006	28/11/2018	245
		FCVA191002858332252	12/1/2019	399
		FCVA191002858332252	2/10/2019	1699
		FCVA190407821141789	7/4/2019	169
		FCVA190220809218322	20/2/2019	26
8			**Grand Total**	**15,000**

Signature of the Principal Investigator

Signature of the Principal

Signature of the Statutory Auditor

9-1-2020

CA. L. JANARDHAN RAO
Chartered Accountant
M.No: 18474

DETAILED STATEMENT OF EXPENDITURE FOR FIELDWORK & TRAVEL(II year)

UGC Reference No. F: MRP-6944/16 (SERO/UGC)

Name of the Principal Investigator: S.Bhagya Rekha

Title of research project: "Study on smart call forwarding in DUOS Mobile"

Name of the Place visited	Duration of the Visit		Bill No	Mode of Journey	Expenditure Incurred (Rs.)
	From	To			
Sree Nidhi Institute of Technology	29th Jan 2019	2-Feb -2019	092	Hired Cab	15,000
				Grand Total	15,000

Signature of the Principal Investigator

Signature of the Principal

Signature of the Statutory Auditor

CA. L. JANARDHAN RAO
Chartered Accountant
M.No: 18474

DETAILED STATEMENT OF EXPENDITURE FOR HIRING SERVICES (II year)

UGC Reference No. F: MRP-6944/16 (SERO/UGC)

Name of the Principal Investigator: S.Bhagya Rekha

Title of research project: "Study on smart call forwarding in DUOS Mobile "

S.No	Item	Qty.	Bill.No.	Date	Amount
1	LTE Base Station (SDR Integrated with i7 Processor)+Two Antennas	1	Inv/ 24-07-2019	24-7-2019	8000
2	LTE Huawei dongle+one sim card	1	Inv/ 26-08-2019	24-7-2019	2000
				Grand total	10000

Signature of the Principal Investigator

Signature of the Principal

Signature of the Statutory Auditor

9.1.2020

HYDERABAD

CA. L. JANARDHAN RAO
Chartered Accountant
M.No: 18474

DETAILED STATEMENT OF EXPENDITURE FOR CONTINGENCY (incl. Special needs) I &II YEAR

UGC Reference No. F: MRP-6944/16 (SERO/UGC)

Name of the Principal Investigator: S.Bhagya Rekha

Title of research project: " Study on smart call forwarding in DUOS Mobile "

I YEAR

S.No	Item	Bill.No.	Date	Amount
1	ICPCSI-2017	Order No: E6BGGBJBXXX5997D5056CB17	21-09-2017&22-09-2017	7000
2	Fdp on avenues for technology and research in IOT	MGIT College	11-12-2017 to 16-dec-2017	900
3	GEETHANJALI COLLEGE	2639	26-6-2018	1000
4	SRRS Stationary items	671	30-7-2018	3690
5	SRRS Stationary items XEROX	671	31-7-2018	166
6	Tirumala xerox	893	4-8-2018	844
7	Tirumala xerox	938	4-8-2018	900
8	Secretarial charges		5-8-2018	500
9			**Grand Total**	**15000**

II YEAR

S.No	Item	Bill.No.	Date	Amount
1	ICAICR-2019	E6BGGBJBXXX5997D5056CB17	15/6/2019-16/6/2019	7500
4	SRRS Stationary items	993	25-6-2019	210
3	External Hard Disc Drive	U01100MH1999PLC120563	31/07/2019	3899
4	Secretarial charges		5-8-2018	500
5	HDMI to VGA	CCPL10743	19-7-2019	300
6	Stationary	860	3/11/18	52
7	Recharge for implementation of Application	FCVM181128787677006	28/11/2018	245
		FCVA191002858332252	12/1/2019	399
		FCVA191002858332252	2/10/2019	1699
		FCVA190407821141789	7/4/2019	169
		FCVA190220809218322	20/2/2019	26
8			**Grand Total**	**15,000**

GRAND TOTAL (I & II YEAR) = 30,000/-

Signature of the Principal Investigator

Signature of the Principal

9-7-2020

Signature of the Statutory Auditor

CA. L. JANARDHAN RAO
Chartered Accountant
M.No: 18474

DETAILED STATEMENT OF EXPENDITURE FOR HIRING (incl. Special needs) I &II YEAR

UGC Reference No. F: MRP-6944/16 (SERO/UGC)

Name of the Principal Investigator: S.Bhagya Rekha

Title of research project: " Study on smart call forwarding in DUOS Mobile "

I YEAR

S.No	Item	Qty.	Bill.No.	Date	Amount
1	LTE SET UP WITH TWO ANTENNAS	1	Inv/1/02-08-2018	2-8-2018	7,000
2	LTE Huawei dongle+one sim card	1	Inv/1/02-08-2018	2-8-2018	3,000
				Grand total	**10,000**

II YEAR

S.No	Item	Qty.	Bill.No.	Date	Amount
1	LTE Base Station (SDR Integrated with i7 Processor)+Two Antennas	1	Inv/ 24-07-2019	24-7-2019	8000
2	LTE Huawei dongle+one sim card	1	Inv/ 26-08-2019	24-7-2019	2000
				Grand total	**10000**

GRAND TOTAL (I & II YEAR) = 20,000/-

Signature of the Principal Investigator

Signature of the Principal

Signature of the Statutory Auditor

CA. L. JANARDHAN RAO
Chartered Accountant
M.No: 18474

DETAILED STATEMENT OF EXPENDITURE FOR CONTINGENCY (incl. Special needs) I &II YEAR

UGC Reference No. F: MRP-6944/16 (SERO/UGC)

Name of the Principal Investigator: S.Bhagya Rekha

Title of research project: " Study on smart call forwarding in DUOS Mobile "

I YEAR

Name of the Place visited	Duration of the Visit		Bill No	Mode of Journey	Expenditure Incurred (Rs.)
	From	To			
Saveetha Engineering College	21-09-2017	22-09-2017	PNR :4648187440 Bus Ticket no:TKAJ10198510	Train & Bus	3,111
Cell One Malakpet	25-05-2018	-	486	Hired Cab	2,000
BSNL Malakpet	13-06-2018	-	484	Hired Cab	2,000
CellOneMalakpet	16-06-2018	-	492	Hired Cab	2,000
5g Solutions pvt ltd	18-07-2018	-	488	Hired Cab	2,000
5g Solutions pvt ltd	19-07-2018	-	488	Hired Cab	1,889
5g Slutionspvt ltd	5-08-2018	-	490	Hired Cab	2,000
				Grand Total	**15,000**

II YEAR

Name of the Place visited	Duration of the Visit		Bill No	Mode of Journey	Expenditure Incurred (Rs.)
	From	To			
Sree Nidhi Institute of Technology	29th Jan 2019	2-Feb -2019	092	Hired Cab	15,000
				Grand Total	**15,000**

GRAND TOTAL (I & II YEAR) = 30,000/-

Signature of the Principal Investigator

Signature of the Principal

Signature of the Statutory Auditor

CA. L. JANARDHAN
Chartered Accountant
M.No: 18474

THESIS

Title of Minor Research Project: Study on Smart Call Forwarding in DUOS Mobile

Principal Investigator: S.Bhagya Rekha Assistant Professor ,Department of IT, Vignana Bharathi Institute of Technology, Aushapur, Hyderabad.

UGC Reference No. F: MRP-6944/16 (SERO/UGC)

ABSTRACT

Call forwarding is a traditional telecom service that allows a user to forward incoming calls to another mobile number in the same mobile device or to the other device. In present scenario in mobile phone technology, call divert is a phone feature that enables the user to forward or redirect their incoming calls to an alternate number, which can be a landline. Users can also choose to divert incoming calls directly to voicemail.

When call divert is enabled, the phone does not ring at the original number of the incoming call, but rather only at the locations the call had been diverted to This service requires the user to manually activate and deactivate the feature.

This approach needs more manual intervention even in dual operating SIM mobiles also. To overcome this problem a smart call, divert mechanism in dual operating mobile is proposed as an automatic *call-forwarding mechanism* (CFM).

In this mechanism if one SIM is under poor signal strength call is automatically forwarded to another SIM which is present in the same Mobile device. By installing software in a smart phone, call forwarding is automatically triggered.

INDEX

LIST OF FIGURES

LIST OF TABLES

1.INTRODUCTION

Call Forwarding takes place within the present handset. Due to difference in bandwidths, the telecommunication companies may provide stronger network at some regions and time, whereas bit weaker at other. This can be taken advantage of, and when one network is unable, the call can be advanced by forwarding to another.

i. Smart call forwarding mechanisms in duos mobile is call forwarding from one SIM to other SIM in the same device while conversation is going on with another Phone.

ii. To study and implement the Paper when cell coverage area is poor or unexpectedly call is disconnected this proposed mechanism automatically detect and connect the call to another SIM that already present in the DUOS Mobile. The method of working features of Smart call forwarding mechanism. It must be a smart device with android operating system which supports dual SIMs. This has to detect the signal strength always when the signal strength is becoming poor before the call is disconnected This Paper has to auto forward the call to another SIM that should be high signal strength. Smart call divert mechanism in duos mobile that phone must be dual SIM application based, configuring the phone by selecting a dual standby mode with a specific master configuration of the first SIM application registering the second SIM application

on a suitable cell of a wireless network activating a call forwarding function from the second SIM application to the first SIM application registering the firstSIM application on a suitable cell of the wireless network operating the phone by processing standby functions of the first SIM application receiving and incoming call via the first SIM application and handling requests for outgoing calls from the first SIM application.

Call forwarding, or call diversion,couldbe a telecommunication featureof some cellular exchange systems that redirects a telephone toa different destination, which can be, as an example, a subscriber mobile cellular phone, or another mobile number wherever the specified referred to as party is accessible. Telephony call was forwarded line sometimes ring once cue the client victimization devicethat the call is beingredirected. Additional systematically, the forwarded call and receiver device indicates that its condition by call diversion. Telephony usually will send incoming calls to the other domestic number; however, the owner of the forwarded line should pay some toll free or paid charges for diverted calls.

Telephony is commonly enabled by dialling some code followed by the phone range to that calls ought to be forwarded. Telephony is disabled by dialling. This feature needs a subscription from the network suppliers. Collectively obtainable in some areas is Remote Access

to cellular mobile telephony, which enables the management over telephony from phones aside from the sender and receiver subscriber's telephone.

VOIP and cable phone systems collectively usually enable mobile telephony to be started and directed via their internet portals. Diverting calls can increase receiver's availability to a caller.

The main alternative is a receiving mobile phone or voicemail, but some mobile callers do not wish to leave a recorded message, suspecting that the caller mobile will delay returning their messages. Call diversion to a specified mobile number of one or more of the following situations:

1.All calls once all-Call call forwarding is activated by a phone user; all incoming calls are diverted. The target mobile for diverted calls can be laid out in the router configuration or by the phone user with a soft key or feature access number.

2.No answer Incoming calls are diverted once the extension doesn't answer before the threshold timeout expires. The target destination for diverted calls is laid out in the network router configuration.

3. Busy Incoming calls are diverted once the extension is engaged and call waiting isn't active. The target mobile for diverted calls is selected within the network router configuration.

4.Night service —all incoming Night service and all incoming calls are mechanically diverted throughout night- service hours. The target destination for diverted calls is laid out in the network router configuration. **5**.In progress call —perpetual call on hold or transfer it as per demand. The incoming calls is additionally forwarded. Directory range will have all four style of conditional call forwarding outlined at an equivalent time with a distinct forwarding destination outlined for every variety of call forwarding. If quite one variety of call forwarding is active at only once, the order for evaluating the Various sorts are as follows:

1. Call forward night-service

2. Call forward all

3. Call forward busy and call forward no-answer

4. Ongoing call forward

Objective of Project

The main objective of ***SCF*** is to provide the user with a liability to automatically switch between duple SIMs of a phone when there transpires an issue in call connectivity. The only requirement is availability of information about both the registered numbers. In case of double SIM handsets, when the call drops and fails to connect to the First network (which was initially dialed by the caller), SCF switches and redirects the incoming call to the second SIM on the receiver's handset. In addition to this, the advantage of knowing participants in a conference call is another feature. The requisite for applying this, is just availability of both the contacts in database of the caller.

Scope of Project

- Diverting calls can increase one's availability to a caller. The main alternative is an answering machine, but some callers do not wish to leave a recorded message, suspecting that the party will delay returning their messages.

- Some businesses find that the human touch can improve contact, thus sales, but traditional wired answering services are expensive, so they have their SCF to a call centre, so the client can reach an operator instead of an answering a call. Before the availability of call forwarding, commercial answering services needed to physically connect to every line for which they provided after-hours response; this required their offices be located near the local central exchange and be fed by a huge multi-pair trunk in which a separate pair of wires existed for each client subscriber. With call forwarding, there is no physical connection to the client's main telephone service, which is merely call-forwarded to the answering service (usually on a directinward dial number) at the end of the business day.

- Often, a suburb of a large city is a toll call from many suburban exchanges on the opposite side of the same city, even though all of these suburbs are a local call to the city Centre. A business located in such a suburb may therefore benefit from obtaining a downtown number as an "extender", to be permanently forwarded to their geographic suburban number.

- Where unlimited local calls are flat-rated and long-distance incurs high per-minute

  charges, the downtown number's wider local calling area represents a commercial

  advantage. Markham (directly north of Toronto) is long-distance to Mississauga (directly west of Toronto). A Markham business with a

  forwarded 416 number could receive calls from Toronto's entire local calling area without incurring long-distance tolls (as both legs, Mississauga → Toronto and Toronto → Markham, are each a local call).

2. SIGNAL STRENGTH

The quality of the call depends on the strength of the cellular signal of the area. The mobile phone displays current signal strength as a series of vertical or horizontal bars on the left-hand side of its display screen - the more number of bars, the better the signal in the cellular area. If the signal strength is poor, we can try moving the mobile phone slightly to improve reception. If we are using the mobile phone in a building, you may find that reception of signal is better near a window. Signal strength-based call forwarding for wireless phones: A mobile station monitors received signal strength from a base transceiver station, either directly or by monitoring or some other measure of received signal quality, such as the ratio Ec/Io in a CDMA network. When the signal strength drops below a threshold, the mobile station is programmed to automatically send a feature code to the wireless network to activate unconditional call forwarding to a previously programmed directory number. When the mobile station renters the service network, i.e., the signal strength improves to an acceptable level or goes above the threshold, the mobile station automatically sends a feature code to turn off the unconditional call forwarding. Thereafter, incoming phone calls are directed to the mobile station. signal strength from a base transceiver station in a cellular system, for instance, a subscriber's profile may indicate how the service provider should handle or respond to attempts to connect cellular calls to or from a given subscriber.

For example, the subscriber's profile may indicate that the subscriber is not allowed to place calls to certain mobile phones, and so the service provider may block any attempt by the subscriber to place calls to those mobile areas. As another example, the subscriber's profile may indicate that some or all calls to the subscriber should be forwarded to another number or to voice mail under certain conditions, and so the service provider may accordingly forward an incoming call under those conditions First, confirm that you have the correct template for your paper size. Maintaining the Integrity of the Specifications

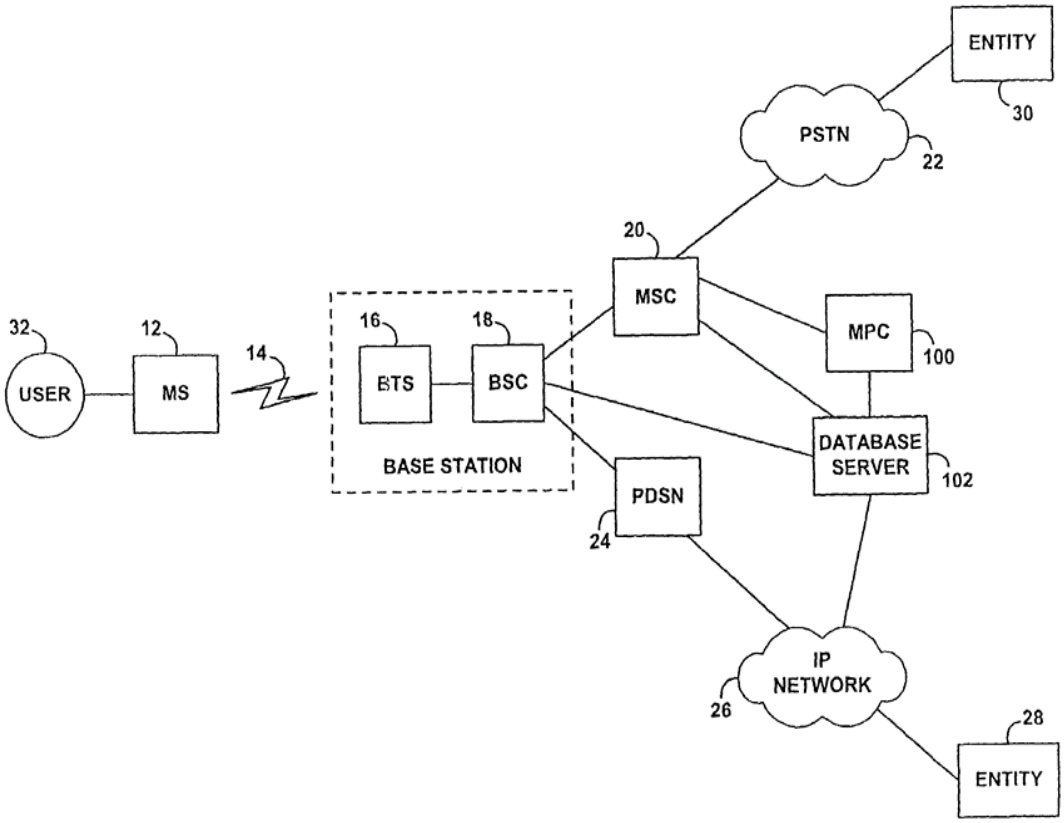


Fig 1. Flow of Mobile Call Establishment

Fig 1: Explains the flow of call establishment mentioned long term Evolution (LTE) exhaustive in the view of technological design,use, specifications, speed, etc., however we'd like to recollect its forerunner. New technologies, LTE enclosed, wouldn't be the speedy large it's nowadays while not learning from those technologies United Nations agency lived before it. GSM[13] is one in all them. To with success perceive our future, we tend to should perceive our past. So, GSM (Global System for Mobile Communications, originally Groupe Special Mobile), could be a customary set developed by the ecu Telecommunications Standards Institute (ETSI) to explain protocols for second generation (2G) digital cellular networks employed by wireless phones. originally, the GSM customary was developed to switch the primary generation (1G) analogue cellular networks, and was represented a digital, circuit switched network optimized for full duplex voice telecommunication. Over time, GSM's capabilities dilated to the cellularmobile knowledge communications, initial by circuit switched transport, then packet knowledge transport via GPRS (General Packet Radio Services) and EDGE (Enhanced knowledge rates for GSM Evolution or EGPRS).

Further enhancements to GSM were created once the 3GPP developed third generation (3G) UMTS standards followed by fourth generation (4G) LTE Advanced and the radio network consists of an outsized variety of BTSs. every BTS is given associate identity.These BTSs are classified consistent with location space, conjointly given associate identity. every MS C/VLR (Mobile Services change Centre/Visitor Location Register) serves the BTSs in associate variety of location areas. The GSM phones reports to the network (VLR) once it moves from a BTS in one location space to a BTS in another device location space. GSM network apprehend wherever the subscribers are , The VLR continually is aware of during which location space the GSM subscriber is found in at any given moment. consequently, the HLR continually is aware of that MSC/VLR the GSM subscriber is at additionally. Then, theGSM subscriber's signalling tells the network that HLR the particular GSM subscriber belongs to. GSM transportable. The call is routed through mobile network to the highest master's degree to the known as GSM subscriber. Next, entranceway master's degree checks with HLR, asking "Where is that the GSM subscriber?" at that time, the decision is established to the particular MSC/VLR (Visiting MSC) either directly or through the fastened or international phone network. Finally, the request for a mobile decision is transmitted over all BTSs within the actual location space of the known as GSM subscriber.

Mobile acknowledges its own identity, and also the decision begins. Call from a GSM Phone to a GSM Phone How will it work for GSM, business from mobile device to mobile device? Well, All India Radio the radio path and also the base station network a decision request for a GSM subscriber is shipped from a transportable to MSC/VLR).

3. LITERATURE SURVEY

Call Forwarding uses:

Diverting calls can increase one's availability to a caller. The main alternative is an answering machine or voicemail, but some callers do not wish to leave a recorded message, suspecting that the party will delay returning their messages. Some businesses find that the human touch can improve contact, thus sales, but traditional wired answering services are expensive, so they have their calls forwarded to a call center, so the client can reach an operator instead of an answering machine or voice mail. Before the availability of call forwarding, commercial answering services needed to physically connect to every line for which they provided after-hours response; this required their offices be located near the local central exchange and be fed by a huge multi-pair trunk in which a separate pair of wires existed for each client subscriber. With call forwarding, there is no physical connection to the client's main telephone service, which is merely call-forwarded to the answering service (usually on a direct inward dial number) at the end of the business day Often, a suburb of a large city is a toll call from many suburban exchanges on the opposite side of the same city, even though all of these suburbs are a local call to the city centre. A business located in such a suburb may therefore benefit from obtaining a downtown number as an "extender", to be permanently forwarded to their geographic suburban number. Where unlimited local calls are flat-rated and long-distance incurs high per-minute charges, the downtown number's wider local calling area represents a commercial advantage. Markham (directly north of Toronto) is long-distance to Mississauga (directly west of Toronto). A Markham business with a forwarded 416 number could receive calls from Toronto's entire local calling area without incurring long-distance tolls (as both legs, Mississauga → Toronto and Toronto → Markham, are each a local call).Some services offer international call forwarding by allocating for the customer a local virtual phone number which is forwarded to any other international destination. The number was permanently forwarded and had no associated telephone line. As a means to obtain an inbound number from another town or region for business use, "remote call forwarding" schemes tend to be far less expensive than foreign exchange lines but more costly than using voice over IP to obtain a local number in the chosen city.

Dual SIM Dual Standby (DSDS):

DSDS devices work with one or two SIM cards inserted. You can receive calls and messages to both SIM cards. Before you can use the SIM cards, you have to enable them in the Dual SIM

settings menu. Data traffic can only be handled on one SIM card at a time and you can select which SIM card you want to use.

At any given time, you can select which SIM card to use for making a call or sending a text message (SMS). However, when one SIM card is engaged in a call, the other SIM card is temporarily disabled. This means, that, during a call, only the SIM card that you have selected to use (the active SIM card) is available for communications. It is not possible to handle two calls simultaneously on two different SIM cards. When you use one SIM card to handle calls, the other SIM card is disabled automatically. You can still receive calls to the disabled SIM card by using the Dual SIM reach ability feature. If the Dual SIM reach ability feature is activated and you use, for example, SIM 1 to handle an ongoing call, any calls to SIM 2 get forwarded to SIM 1. This means that you can put the ongoing call on hold and answer the call forwarded to SIM 1 from SIM 2 (which remains disabled).

Dual SIM reachability uses the Call forwarding feature. Check with your network operator to see if call forwarding is available in the networks that your SIM cards use. Call forwarding may not be available if you use SIM cards from two different countries/regions

3.1 Automatic event triggered call forwarding mechanism for mobile phone [1] Call forwarding is a traditional cellular telecom service that allows a user to forward or divert incoming calls to another number it may be cellular mobile device or landline. This service requires the customer to manually on and off the feature and therefore may not be very convenient. There is a sophisticated automatic call- forwarding algorithm (CFA) for mobile phones. The application software must be installed in a Smartphone, call forwarding is automatically on (e.g., when the phone is under a charging condition or is turned off) or disabled (e.g., when the phone is low battery level or is turned on). The performance of the CFA was investigated by analysis, simulation, and performance measurement. This study indicates that CFA is very feasible for commercial or business use

3.2 Routing for diverting calls [2] Integrated cellular and ad hoc relaying systems (ICAR)[2] There a new wireless cellular system architecture based on the combination of traditional cellular and modern ad hoc relaying technologies. The ICAR system can balance traffic loads of the cellular mobile phones, increase the device capability capacity cost effectively, reduce transmission power for mobile hosts and extend system coverage by using adhoc relaying stations (ARS) to relay traffic from one cellular network to another dynamically.

Thus, the adhoc relaying stations are imported to forwarding a call from a congested cellular cluster (hot spot) to a non-congested cellular cluster, a fast-efficient relaying routing protocol that can reflect the cell's status is needed in ICAR networks. The advantage is time delay of the call establishment is within acceptable range that can basically meet the performance and accuracy of ICAR application.

3.3 Handover between fixed and mobile networks for dual mode [3]. A modern telecommunications system and method for performing a call forwarding between the fine-tuned land lines wired networks and mobile networks during a call placed called and caller a dual mode device, without any noise or interruption in the voice or data connection. Ergo, for calls initiated in the fine-tuned network, once the calling subscriber leaves the network coverage area for the fine- tuned mode of the dual mode device, the call preserves as normal by transferring the call to the receiver mobile network. Similarly, for calls initiated in the mobile network, once the subscriber moves back into the fixed or land line mode coverage area, the call can be transferred to the secure network in order to provide a lower signal rate to the subscriber, without any service intervention.

3.4 A novel smart forwarding scheme in LTE-advanced networks [4,14] Long Term Evolution (LTE) and IEEE 802.16 WiMAX. LTE complies with 3GPP standards whereas 802.16 WiMAX is regulated by the Institute of Electrical and Electronics Engineers (IEEE). Albeit WiMAX is, the system is an independent incipient system that is incompatible with the current 3G system. On the other hand, LTE conforms to 3GPP that is fortified by telecommunication manufacturers and other operators and is, moreover, rearward compatible with 3G/UMTS mobile radio cellular systems. The LTE designations define how to utilize infrastructure (UI) connects and communicates with evolved Node B (eNB) base stations. The enhanced version, LTE-Advanced, integrates a developing entity called the relay node (RN) to widen accommodation coverage, albeit this change has resulted in a more intricate architecture. Mobility management and call forwarding are important components in wireless mobile networks. This method is efficient and handover architecture in LTE-Advanced networks and proposes a creative forwarding to handover performance. Simulation studies show that the Astute call Forwarding scheme employs a better operational transmission path that efficaciously reduces handover latency and signals overhead.

3.5 A new technique of call forwarding using remote mobile [5] in ancient call forwarding, a caller can forward their calls to another mobile subscriber in another device by configuring their mobile. An incipient approach in which a both mobile subscribers can forward their calls to another mobile subscriber by configuring their mobile utilizing the available mobile handset.

Concept of multiple sim cards in single use [6] now a days every person wants to carry more than one SIM card to relish different accommodations provided by a telecom operator. So, the user has to carry multiple SIM cell phones. But in general, there are lots of quandaries to these kinds of cell phones.

To overcome this issue there is a proposal. This single USIM has the capability of handling multiple network access. Has been proposed, here they are providing single SIM in lieu of multiple where a different operator can store different network keys to access their respective network at different situations. An advantage to utilizing these USIM is that use of multiple SIM can be evaded. For this, they have to make transmutations in mobile software as well as the internal architecture of SIM card had been used. The concept proves itself worth mentioning contribution towards wireless, Cellular and tele communication.

3.6 Context aware relinquishing algorithms for mobile positioning systems [7] Context-aware computing will play a major role to improve the services of mobile networking systems. To fixate on optimizing relinquishing choices in differentenvironments and different scenarios, wherever the user includes a selection among different mobile networks and different access points. In our approach, the choice isn't only supported the signal quality, however to boot on the data regarding the context of mobile devices and accesspoints. Since context data and context process evolves quickly, we tend to propose a versatile, integrated approach for context management[12], which might adapt in many ways that. The design encompasses programmable platforms and distributed context management parts in network nodes and mobile devices, in addition as a service preparation theme for network services.

This important design is in a position to activelydeploy in different relinquishing networks. It manages dynamic context data and sanctions mobile devices to be forever connected to the access network. This design is valid during a paradigm implementation and performance results are mentioned.

3.7 Distributed call admission management in mobile/wireless networks [8] Call Admission Management(CAM) is a main component within the provision of bonded quality of service in wireless networks. The actual planning of call admission management (CAM) algorithmsfor mobile cellular networks is particularly difficult given thecircumscribed with extremely variable

resources, and therefore the quality of users encountered in such networks this (CAM) paper concludes on the state of current analysis and points out a number of key problems that require to be addressed within the context of call admission management for future extended cellular networks.

3.8 Configuring call Transfer and Forwarding [9] Call forwarding diverts calls to a nominative range of 1 or a lot of of the subsequent conditions• All calls— when all-call telephone is activated by a phone user, all incoming calls are diverted.

The target destination for diverted calls will be laid out in the router configuration or by the phone user with a soft key or feature access code. The foremost recently entered destination is recognized by Cisco Unified CME, notwithstanding however it had been entered and placed the call with signalling and calling region. No answer—Incoming calls are diverted once the extension doesn't answer before the timeout expires. The target destination mobile device for diverted calls is laid out in the router configuration. Busy—Incoming calls are diverted once the extension is busy and telephony isn't active. The target destination for diverted and forwarded calls are established and calls are laid out in the router configuration. Night serviceAll incoming calls are mechanically diverted throughout night-service hours. The target destination for diverted calls is laid out in the router configuration. A directory range will have all four forms of telephony outlined at an equivalent time with aspecial forwarding destination outlined for every variety of call forwarding.

3.9 One Number Service Using Mobile Assisted Call Forwarding Facilities [10] call diversion is an automation feature in a mobile phone provides automated on and off of conventional carrier system calls forwarding. The mobile phone provides for storing multiple call forwarding mobile phone numbers, selecting a call forwarding telephone number based upon location information, automatically activating call forwarding to the selected telephone number during a wireless telephone power down sequence, and automatically deactivating the call forwarding during a mobile phone power up sequence. Programming is also provided for configuring and enabling the conditional call forwarding feature. In another embodiment, the mobile phone automatically prompts the user for on of call forwarding each time the user powers down the mobile phone. The process also provides the user with an ability to select from a list of stored call forwarding telephone numbers to use, as well as providing the user with an ability to manually input a new mobile number. In this embodiment, the location information is used only to provide a suggested forwarding mobile number, rather than automatically activating call forwarding without user input during the power down sequence. If user input is not received

during a defined time period in response to the prompt, the mobile phone automatically ON the call forwarding only if an automatic call forwarding timeout default option is enabled. The user is also automatically prompted each time the user powers up the wireless telephone to deactivate call forwarding if call forwarding is activated, and real-time idle mode automated call forwarding activation and deactivation service are also provided.

3.10 Using Two Sim Cards with Same Missed Number [11] A method and equipment for using multiple SIM cards with the same MSISDN number in a mobile communication system. To at least one subscriber identifier are allocated at least two identity modules (SIM), of which the only one at a time can be registered as active. In connection with location updating, it is checked whether the location updating relates to a subscriber identifier to which at least two identity modules (SIM) have been allocated. If yes, it is checked whether the identity module (SIM) concerned is at that particular moment registered as passive and if yes, it is activated 3and the identity module (SIM) earlier registered as active is deactivated. If the identity module (SIM) earlier registered as active is involved in an ongoing call while location updating is being performed using an identity module (SIM) earlier registered as passive, the location updating is rejected or delayed until the ongoing call has been ended Table 1 Explains the different methods of call forwarding and comparison of CFA, ICAR, Handover between fixed and mobile networks for dual mode and LTE advanced systems. Each and every technique is having its own pros cons also used in various conditions. in bandwidths of tele come networks for more effectual phone call, the telecommunication companies may provide noticeably stronger network at some domain and time interval, whereas bit more impuissant at other. Such that, while the current call in going on and the network drops, it shall be forwarded to the next sim, making the connection untroubled – advancing the call further. The main objective of smart call forwarding is to provide the user with a liability to automatically switch between duple SIMs of a phone when there transpires an issue in call connectivity. The only requirement is the availability of information about both the registered numbers. In the case of double SIM handsets, when the call drops and fails to connect to the first network (which was initially dialed by the caller) Smart Call Forwarding switches and redirects the incoming call to the second SIM on the receiver's handset. The requisite for applying this is just availability of both the contacts in the database of the caller.

S.No	METHODS	ANALYSIS
1	Automatic event triggered call forwarding mechanism for mobile phone(CFA)	CFA is very feasible for commercial use
2	Routing for diverting calls(ICAR)	fast-efficient relaying routing protocol that can reflect the cell's status is needed in ICAR networks
3	Handover between fixed and mobile networks for dual mode	secure network in order to provide a lower rate to the subscriber, without any service intervention.
4	A novel smart forwarding scheme in LTE-advanced networks	This scheme employs a better operational transmission path that efficaciously reduces handover latency and signals overhead.

Table1:Analysis on different methods for call forwarding

4.CONDITIONAL SIGNAL MONITORING & SIGNAL STRENGTH ANALYSIS

Architecture Flow

Below architecture diagram represents main flow of request from the users to database through servers. In this scenario overall system is designed in three tiers separately using three layers called presentation layer, business layer, data link layer. This project was developed using 3-tier architecture.

Architecture Diagram

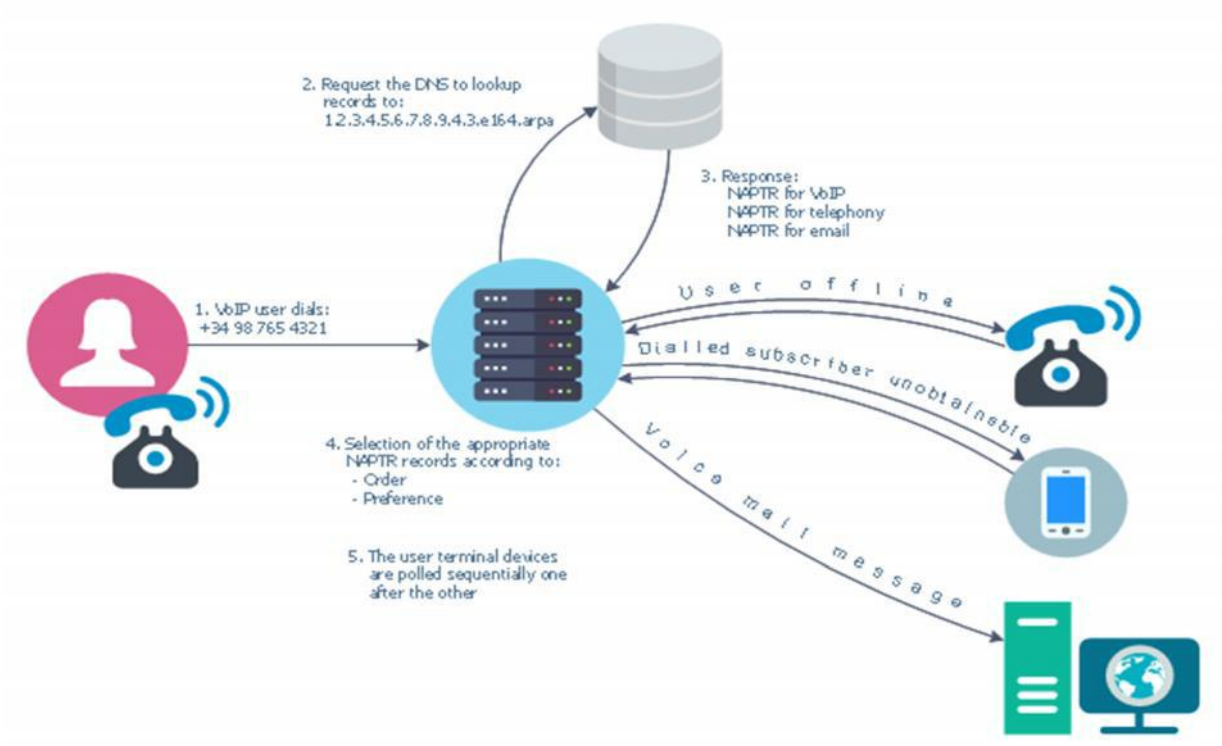


Fig: 4.1. System Architecture

The quality of the call depends on the strength of the cellular signal in our area. The mobile displays current signal strength as a series of bars on the left-hand side of its display screen - the more number of bars, the better the signal in the cellular area. If the signal strength is poor, we can try moving the mobile phone slightly to improve reception. If we are using the mobile phone in a building, you may find that reception is better near a window. Signal strength-based call forwarding for wireless phones: A mobile station monitors received signal strength from a base transceiver station, either directly or by monitoring or some other measure of received signal quality, such as the ratio Ec/Io in a CDMA network. When the signal strength drops below a threshold, the mobile station is programmed to automatically send a feature code to the wireless network to activate unconditional call forwarding to a previously programmed directory number. When the mobile station re-enters the service network, i.e., the signal strength improves to an acceptable level or goes above the threshold, the mobile station automatically sends a feature code to turn off the unconditional call forwarding. Thereafter, incoming phone calls are directed to the mobile station. signal strength from a base transceiver station in a cellular system, for instance, a subscriber's profile may indicate how the service provider should handle or respond to attempts to connect cellular calls to or from a given subscriber. For example, the subscriber's profile may indicate that the subscriber is not allowed to place calls to certain mobile phones, and so the service provider may block any attempt by the subscriber to place calls to those mobile areas.

As another example, the subscriber's profile may indicate that some or all calls to the subscriber should be forwarded to another number or to voice mail under certain conditions, and so the service provider may accordingly forward an incoming call under those conditions.

STATE	TIME STAMP	SIM – 1	SIM - 2
	11:19:41	17	16
IDLE	11:19:41	17	17
IDLE	11:19:45	16	17
IDLE	11:19:46	16	16
IDLE	11:19:50	17	16

IDLE	11:19:51	18	16
IDLE	11:20:18	19	16
IDLE	11:20:20	21	16
IDLE	11:20:22	22	16
IDLE	11:20:28	23	16
IDLE	11:20:29	25	16
IDLE	11:20:31	26	16
IDLE	11:20:33	25	16
STATE	TIME STAMP	SIM – 1	SIM - 2
IDLE	11:20:35	24	16
IDLE	11:20:38	23	16
IDLE	11:20:40	22	16
IDLE	11:20:43	23	16
IDLE	11:20:44	24	16
IDLE	11:20:47	23	16
IDLE	11:20:48	21	16
RINGING	11:20:53	0	22
RINGING	11:20:53	21	22
IDLE	11:21:03	23	16
IDLE	11:21:03	23	22
IDLE	11:21:05	24	16
IDLE	11:21:05	24	22
IDLE	11:21:07	23	16
IDLE	11:21:07	23	22
IDLE	11:21:09	22	16
STATE	TIME STAMP	SIM – 1	SIM - 2
IDLE	11:21:09	22	22
IDLE	11:21:10	21	22
IDLE	11:21:10	21	16
IDLE	11:21:12	20	16
IDLE	11:21:12	20	22
RINGING	11:21:14	0	20

RINGING	11:21:14	20	20
IDLE	11:21:15	20	19
IDLE	11:21:16	19	22
IDLE	11:21:16	19	19
IDLE	11:21:17	19	18
IDLE	11:21:18	18	18
IDLE	11:21:18	18	22
RINGING	11:23:00	0	19
RINGING	11:23:00	18	19
IDLE	11:23:03	18	22
STATE	TIME STAMP	SIM – 1	SIM - 2
IDLE	11:23:04	20	22
IDLE	11:23:05	21	22
IDLE	11:23:07	23	22
IDLE	11:23:07	23	23
IDLE	11:23:08	23	24
IDLE	11:23:13	23	22
RINGING	11:23:14	0	22
RINGING	11:23:14	22	22
IDLE	11:23:15	23	22
IDLE	11:23:16	23	25

Table 2 : Signal Strength Monitoring

5. IMPLEMENTATION OF SMART CALL FORWARDING

DEVELOPMENT PROCESS:

The process of development mainly divided according to the module that are included in our rekobling application. There are mainly 2 modules in our project and each has a development process and all these are again combined into a single application. Now we will discuss briefly about each and every module included in our application.

SERVICE 1: Register to be a Member Module.

The first module is the register to be a member module which will alert a person about his register first. In this the module comprises of the mobile app which will serve as the display of information and as the input component for the details of user's. The next component is the server which will process the inputs and stores them in the database. It also obtains the data from the database and alerts according to the time at which the call is to be forwarded. Finally, the last component in this service is the follow, if the number is unregistered so the user have to make changes in his phone by going to phone settings. Here the client or user have to go to Sim Management and make the changes ,for some devices it's a by default numbers are unknown ,but whereas in other phones it's a editable were the user can change his or edit his sim number's .So for the this service it's both methods are supporting. After this service the rekobling mobile application will automatically get the contacts for your mobile device and its run's as a background process. The user just have to enter his sim number thatis sim1 and sim2.If the user click's the button next ,this servicer won't go to the next page ,because for few mobile devices it maybe a default numbers are saved and for few it may not be there to edit the number.

SERVICE 2: Network Module.

In this service, we have the system components such as the mobile app, server with SQLite database. The mobile app is connected to the server and displays the application network information. The server will preprocess the data obtained from the components and stores in database. The other

components that are used in this service which network the user is using, by the sim number

of the user this rekobling application will identifies the user’s network information is gathered.

Here the client can make his usage of applications by using this service. The network monitoring provides the details of the dual Sims monitoring information and this data is send to the server for processing. If, in case the user is having a conversation with the other person and suddenly the network is down, then the call is forwarded automatically. Generally, a strong mobile phone signal is more likely in an urban area, though these areas can also have some "dead zones", where no reception can be obtained. The finally obtained application is simpler and easier to use as the implementation of the project is carried out in a perspective that it should be easily used by every person irrespective of age.

Call Forwarding [1] is an extremely handy life-saving perk used to jump inbound calls to a specified number. Due to difference in bandwidths, the telecommunication companies may provide stronger network at some regions and time, whereas bit weaker at other. when one network is unable, the call can be advanced by forwarding to another.

In smart call forwarding, It must be a smart device with android operating system which supports dual SIMs [9]. Here it has to detect the signal strength always and when the signal strength is below threshold level then the network should automatically switch to another SIM that has high signal strength before call is disconnected.

Smart call divert mechanism in duos mobile that phone must be dual SIM application basedconfiguring the phone by selecting a dual standby mode with a specific master configuration [7].

Here it automatically detects the subscriber numbers that are already present in duos mobile.

The options for call forwarding[11] on your phone can be set by using either the Android operating system itself or the controls set up by your cellular provider.

System Features:

Signal Monitoring: It monitors the signal strengths of two of the subscribers which are present in the duos mobile.

- Here it monitors the signal of subscribers.

- It also gives invoice when there is poor network

Auto end: In our application as we monitor signal strength always, when signal strength of the incoming sim is poor then it auto ends the call automatically by our application.

- When there is a poor network, ongoing call is ended automatically.

Auto switch: After automatically ending the call, the network will switch to another Subscriber in the same duos mobile that has high signal.

- After call termination, the network is switched to another subscriber that has high signal.

Then it makes an outgoing call from the subscriber that has high signal

Auto connect: Here we automatically make a call to the incoming number from the Subscriber that has high signal in the present duos mobile.

The main objective of ***Smart Call Forwarding***is to provide the user with a liability to automatically switch between duple SIMs of a phone when there transpires an issue in network. In case of dual SIM handsets, due to difference in bandwidths, the telecommunication companies may provide stronger network at some regions and time, whereas bit weaker at other. when one network is unable, the call can be advanced by forwarding to another.

CALL FORWARDING

Call forwarding [1] is an extremely handy life-saving perk used to jump inbound calls to a specified number. Due to difference in channel frequency, the telecommunication companies may provide stronger network at some regions and time, whereas bit weaker at other. when one of the networks are not available, the call can be advanced by forwarding to another. In smart call forwarding, it must be a smart device with android operating system which supports dual SIMs [9]. Here it has to detect the signal strength always and when the signal strength is below threshold level then the network should automatically switch to another SIM that has high signal strength before call is disconnected.

Smart call forwarding mechanism in duos mobile that phone must be dual SIM application based configuring the phone by selecting a dual standby mode with a specific network configuration [7]. Here it automatically identifies the subscriber mobile numbers that are

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SYSTEM FEATURES

Signal Monitoring: It monitors the signal strengths of two of the subscribers which are present in the duos mobile. • Here it monitors the signal of subscribers. • It also gives invoice when there is poor network Auto end: In our application as we monitor signal strength always, when signal strength of the incoming sim is poor then it auto ends the call automatically by our application. When there is a poor network, ongoing call is ended automatically. Auto switch: After automatically ending the call, the network will switch to another Subscriber in the same duos mobile that has high signal. After call termination, the network is switched to another subscriber that has high signal. Then it makes an outgoing call from the subscriber that has high signal Auto connect: Here we automatically make a call to the incoming number from the Subscriber that has high signal in the present duos mobile

The main objective of Smart Call Forwarding is to provide the user with a liability to automatically switch between duple SIMs of a phone when there transpires an issue in network. In case of dual SIM handsets, due to difference in bandwidths, the telecommunication companies may provide stronger network at some regions and time, whereas bit weaker at other. when one network is unable, the call can be advanced by forwarding to another. Forwarding calls can increase one's availability to a caller. Here it enhances the regular communication through phone calls by providing a conveyance of call between the subscribers Forwarding calls can increase one's availability to a caller. Here it enhances the regular communication through phone calls by providing a conveyance of call between the subscribers

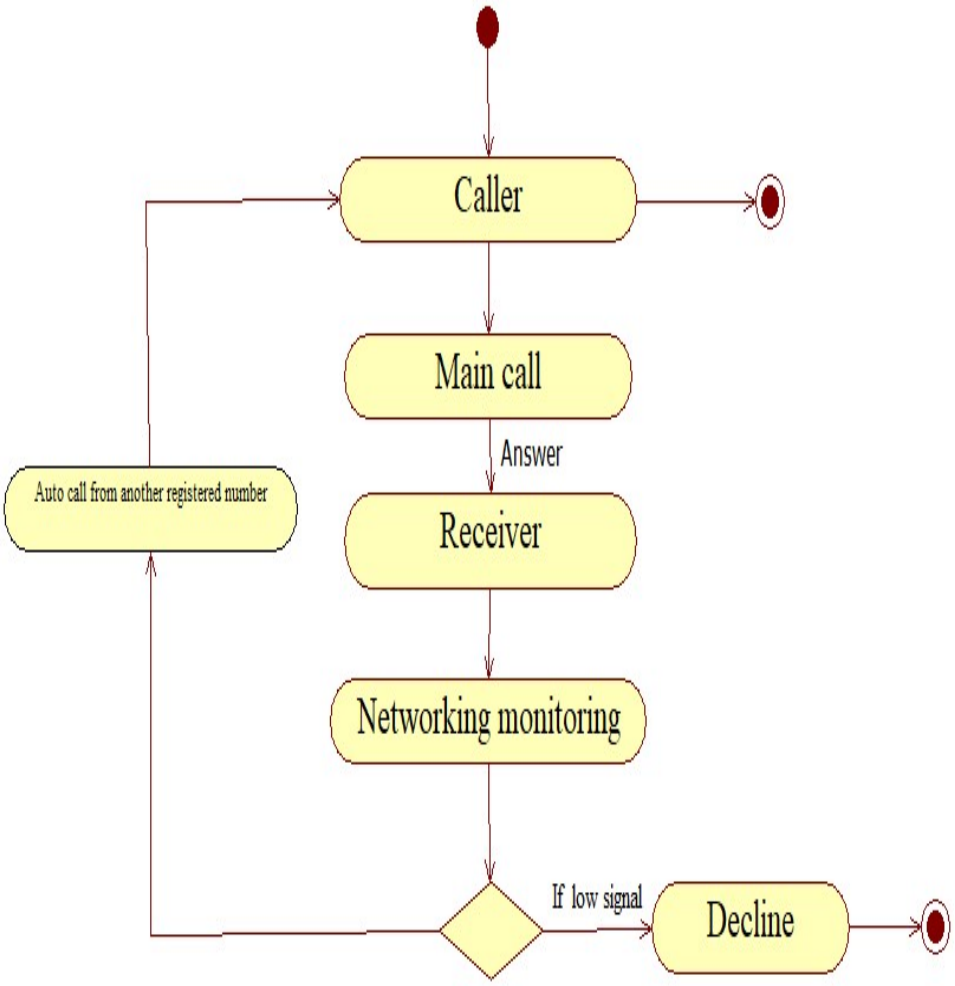


Fig 5.1: Establishment of smart call forwarding when active call process

Figure 5.1. explains about the establishment of smart call forwarding mechanism when the ongoing call which is suffering with poor signal strength then another subscriber automatically takes the action of calling to the incoming number without any intervention in the call process.

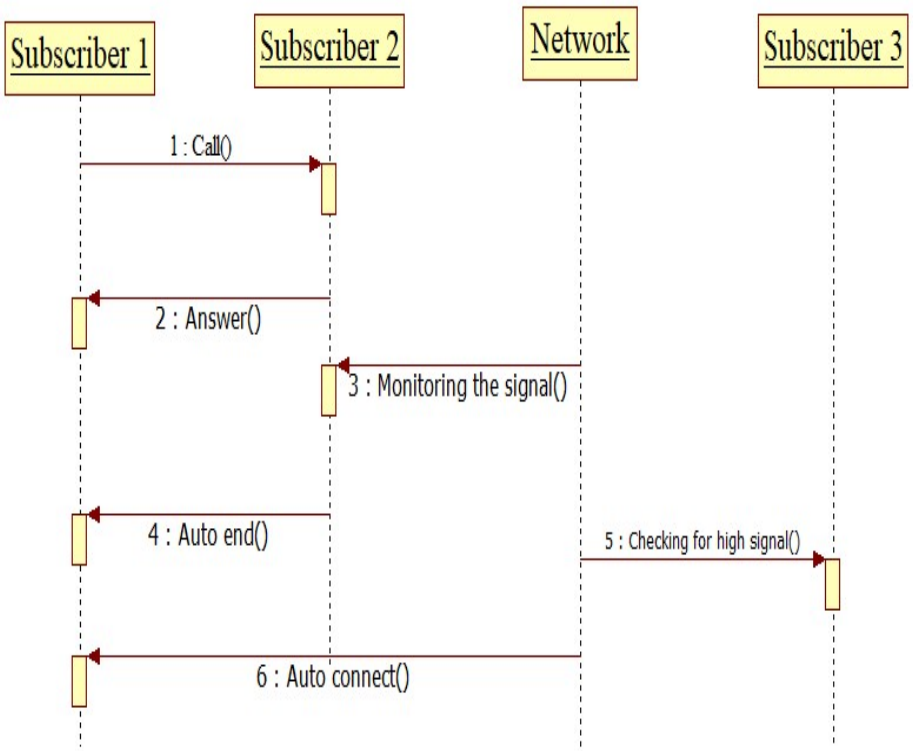


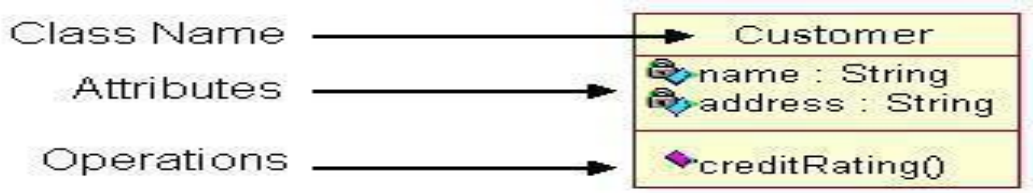
Fig 5.2: Sequential flow of SCF in call process

Figure 5.2 Explains the flow how subscriber 1, subscriber 2 are interchanging their call process after the application works. subscriber 3 in in the same handset if it has higher signal rate it handed over the call without delay.

CLASS DIAGRAM

Class diagrams are widely used to describe the types of objects in a system and their relationships. Class diagrams model class structure and contents using design elements such as classes, packages and objects. Class diagrams describe three different perspectives when designing a system, conceptual, specification, and implementation. These perspectives become evident as the diagram is created and help solidify the design.

Classes are composed of three things: a name, attributes, and operations.



Class diagrams also display relationships such as containment, inheritance, associations and others. The association relationship is the most common relationship in a class diagram. The association shows the relationship between instances of classes. Another common relationship in class diagrams is a generalization. A generalization is used when two classes are similar, but have some differences.

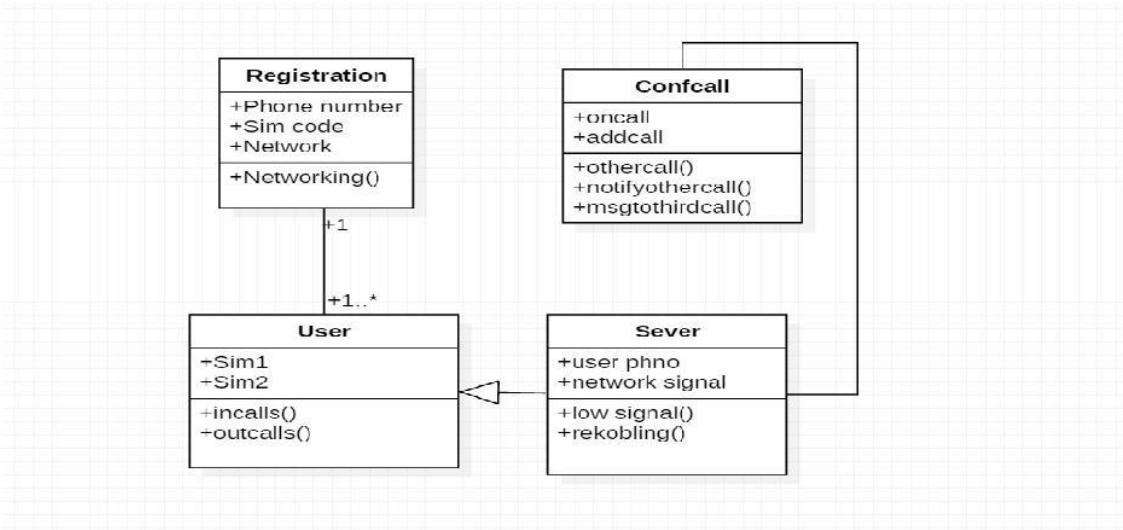


Fig 5.3: Class Diagram of SCF in call process

5.3. SMART CALL FORWARDING ALGORITHM

Smart call forwarding is technique which always monitors the signalling of duos mobile in two sims are present.

Step1: It always monitors the two sims signal rate in Decibels.

Step2: Application will always check with the signal strength of received sim with threshold value.

Step 3: Application compares the two networks signal level

```
While (oncall)
{
        If ( Sim1>=Sim2)
          Present call continues….
        If(sim1<=Sim2)
                Current call auto ends
                Sim2 makes a call to incoming number        If(sim1==sim2)
         No disturbance in current cal
   }
```

Step4: After Switchover incoimg call sim of called party will get a new call from the other sim from called mobile

```
public void finalRedial(String num,StringpS,int sig1,int si g2)
  {
     if(phoneState_final=="ONCALL")
     {
        if(sim1_final<=poor)
        {   Log.e(TAG,"sim1 signal is falling down");
           if
(eckPermission(Manifest.permission.CALL_PHONE))
```

```
            {  .setFlags(Intent.FLAG_ACTIVITY_NEW_TASK);
callIntent.setData(Uri.parse("tel:"+ num_final));
startActivity(callIntent);
callIntent.putExtra("com.android.phone.extra.slot", 1);
disconnectCall();
                        Connect_call2(num);
            }
            else {
               "Permission Call Phone denied", }
        }
        else if(sim2_final<=poor)
        {
Log.e(TAG,"sim2 signal is falling down");
            if (checkPermission(Manifest.permission.CALL_PHONE))
            {     disconnectCall();
              connect_call1(num);
            }
            else {
                        Permission denied
            }
        }
```

```
        else if (sim1_final==sim2_final)

        {

Log.e(TAG,"sim1 signal is equal to sim 2");

        }

      }

   }
```

Smart Call Forwarding FlowChart

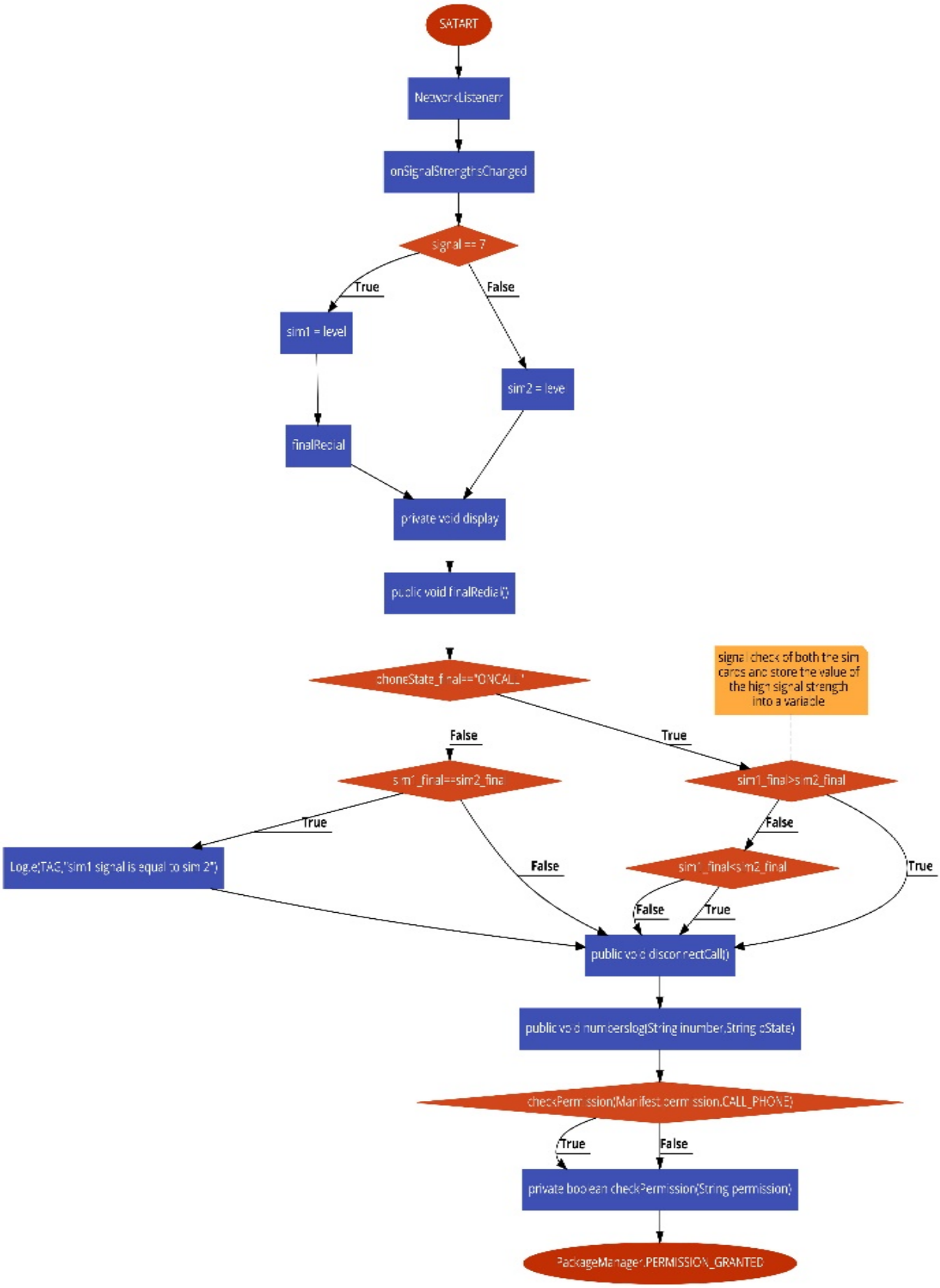


Fig 5. Smart Call Forwarding FlowChart

6. EXPERIMENTAL RESULTS

Signal strength monitoring when phone is in different states (idle, ringing, oncall) we have conducted experiments in different places in one day in different times. The two different network one is AIRTEL and Another one is Jio network. These are the experimental results with signal and time variants.

i) Sim1 signal level when phone is Idle.

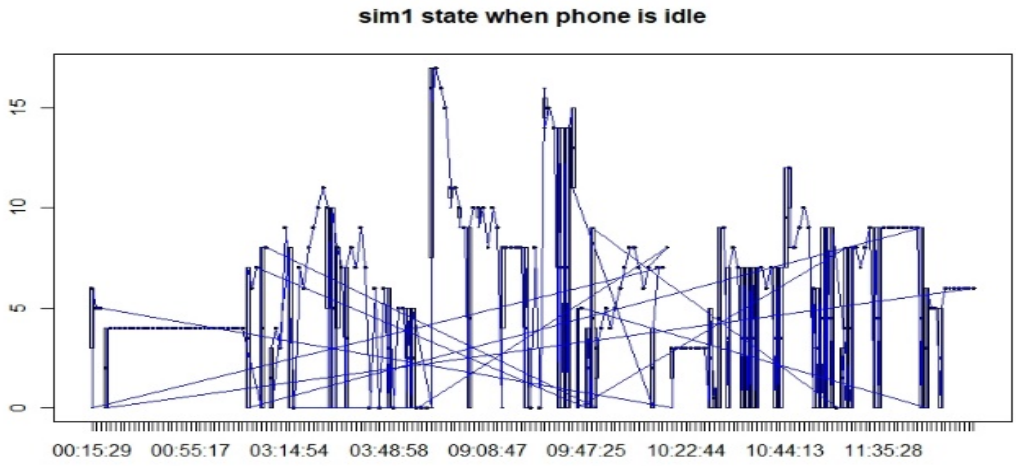


Fig 6.1 Sim1 signal level when phone is Idle

ii) Sim2 signal level when phone is in Idle.

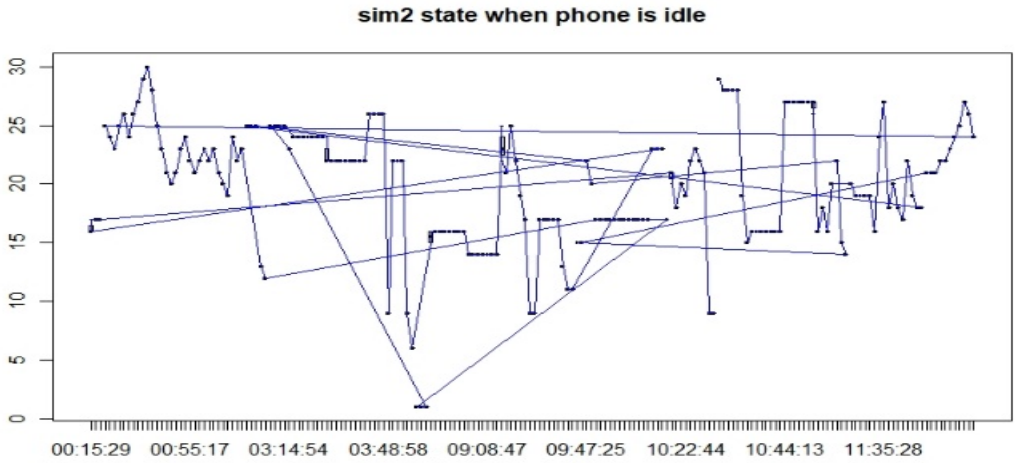


Fig 6.2 Sim2 signal level when phone is in Idle

iii) Sim1 signal level when phone is in Ringing.

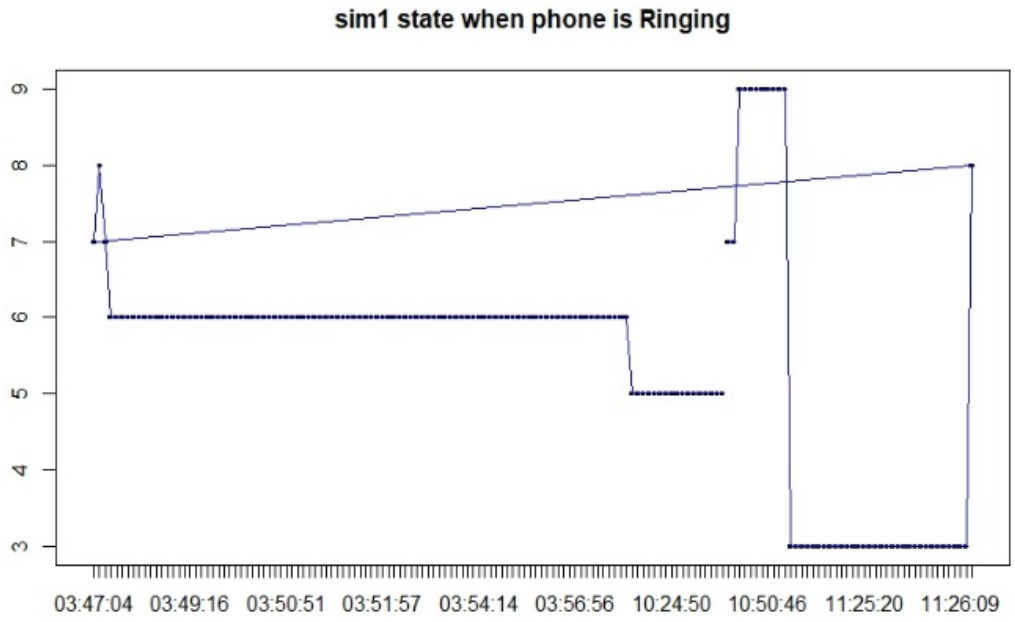


Fig 6.3 Sim1 signal level when phone is in Ringing

iv) Sim2 signal level when phone is in Ringing.

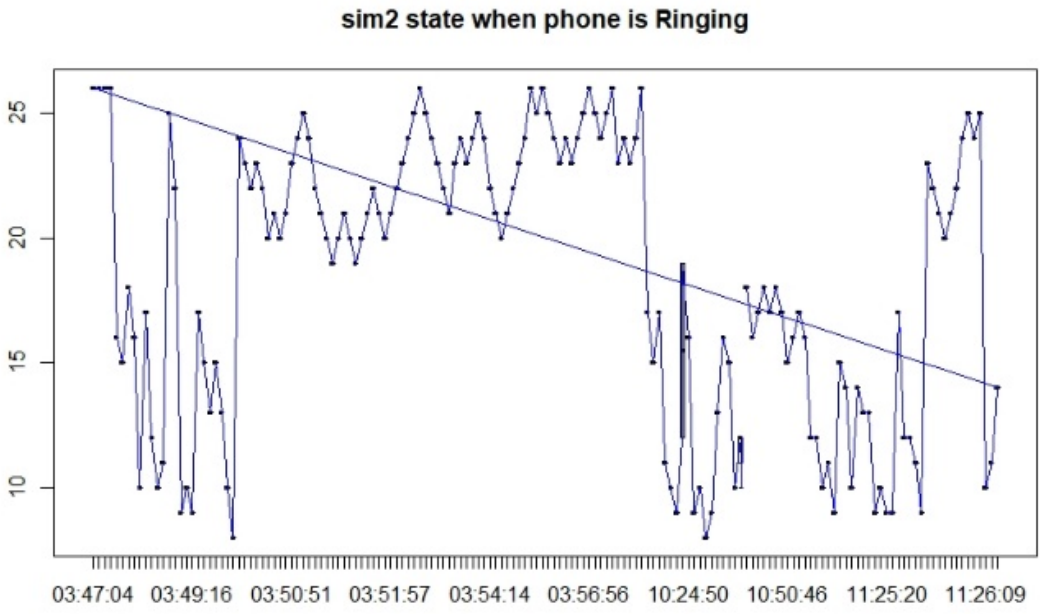


Fig 6.4Sim2 signal level when phone is in Ringing

v) Sim1 signal level when phone is in Oncall.

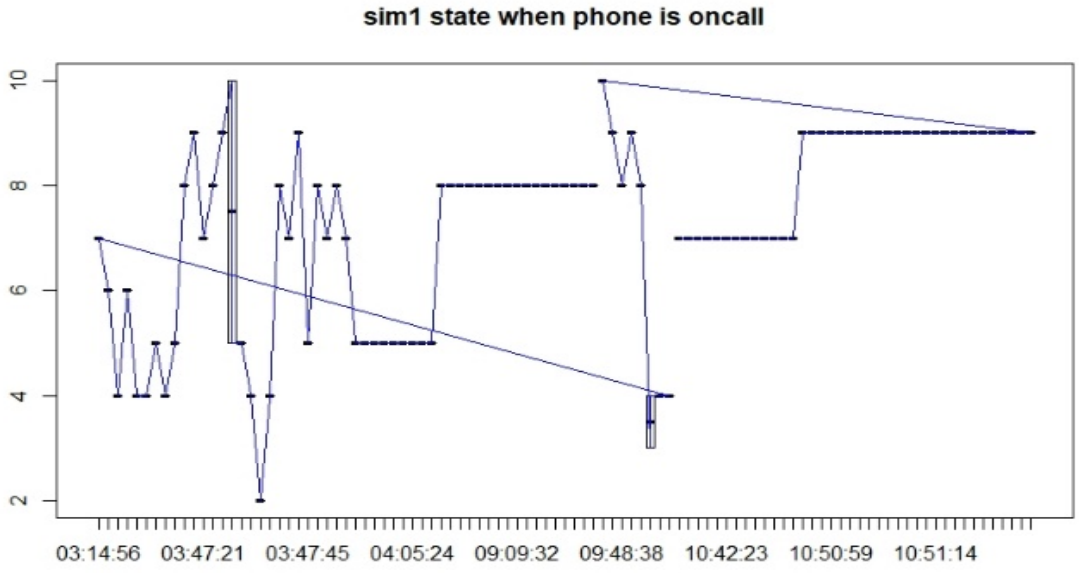


Fig 6.5 Sim1 signal level when phone is in Oncall

vi) Sim2 signal level when phone is in Oncall.

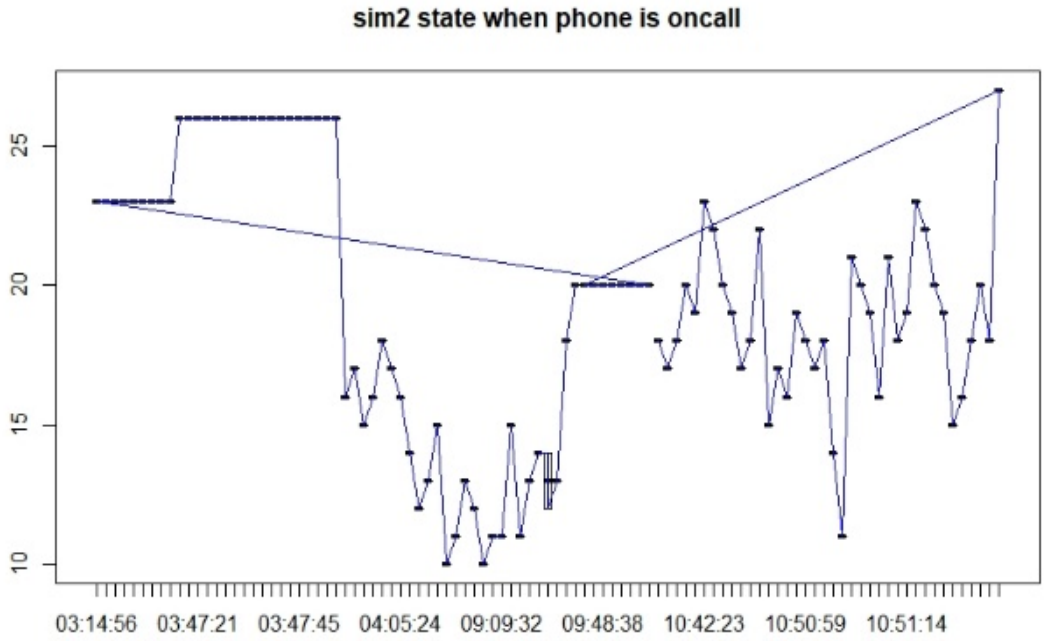


Fig 6.6 Sim2 signal level when phone is in Oncall

By comparing the signal levels with different phone state and at different times whenever one sim is under poor signal strength while conversation our application will automatically detect the threshold value when it reaches the threshold value the call automatically takes place with another sim which is present in the current handset and the call will be continues.

Final comparison after switchover takes place the incoming number is detected by the another sim and it automatically connects the call without any intervention.

vii) Final comparison with different phone states and two signal levels

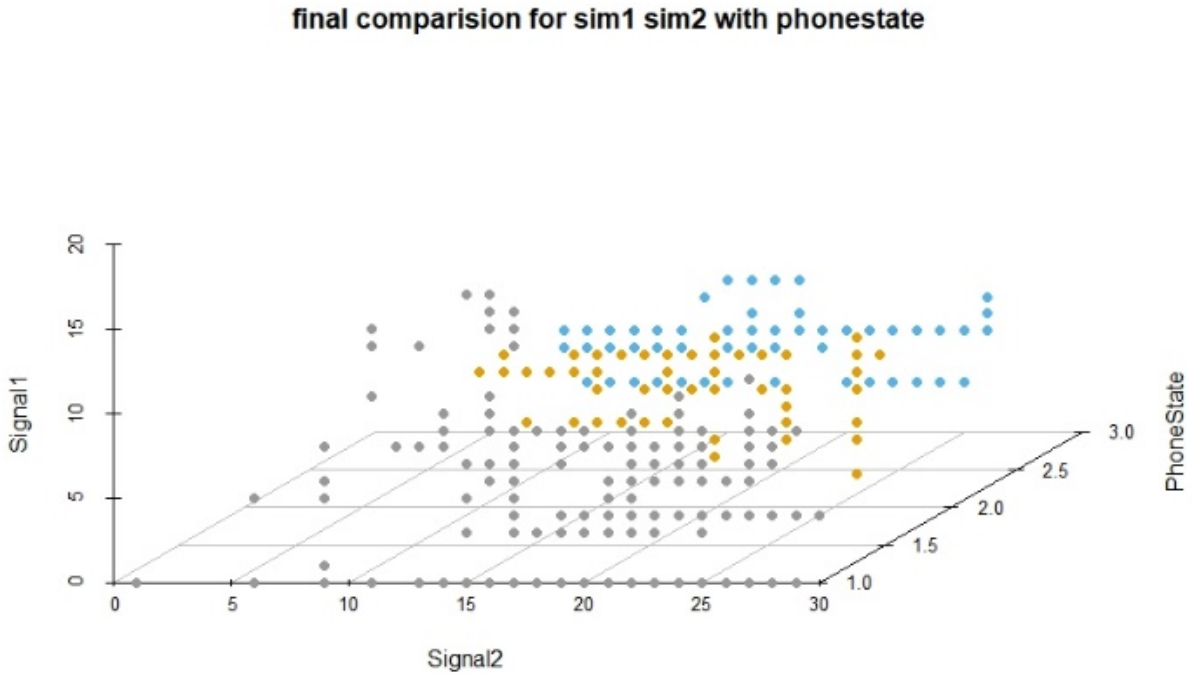
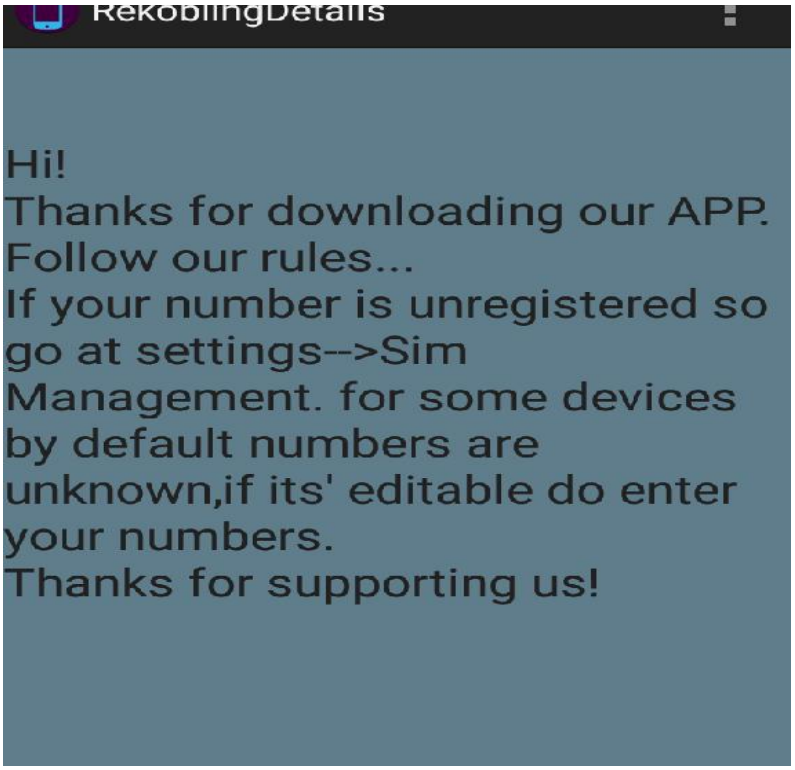
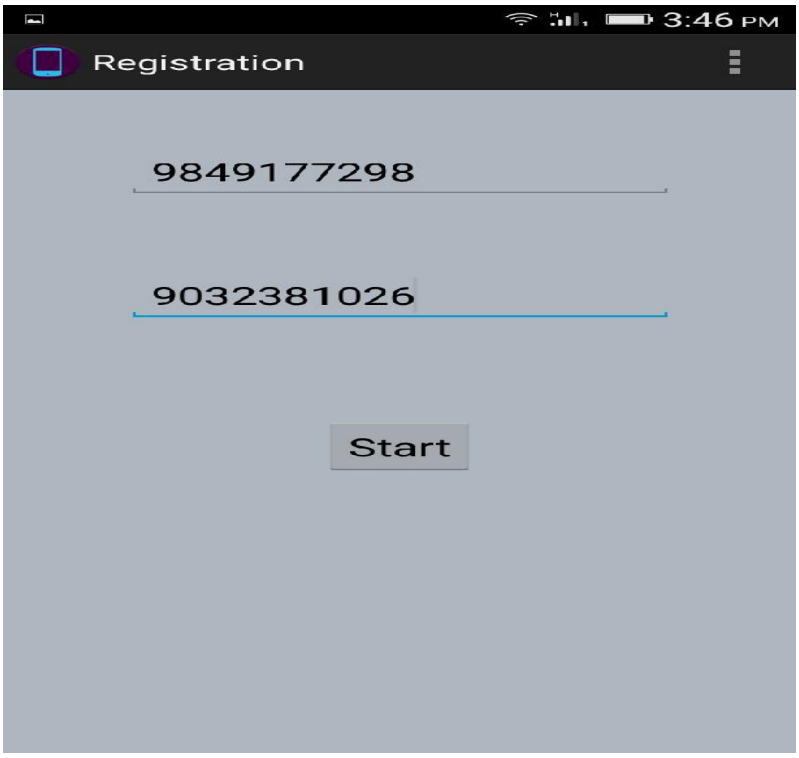


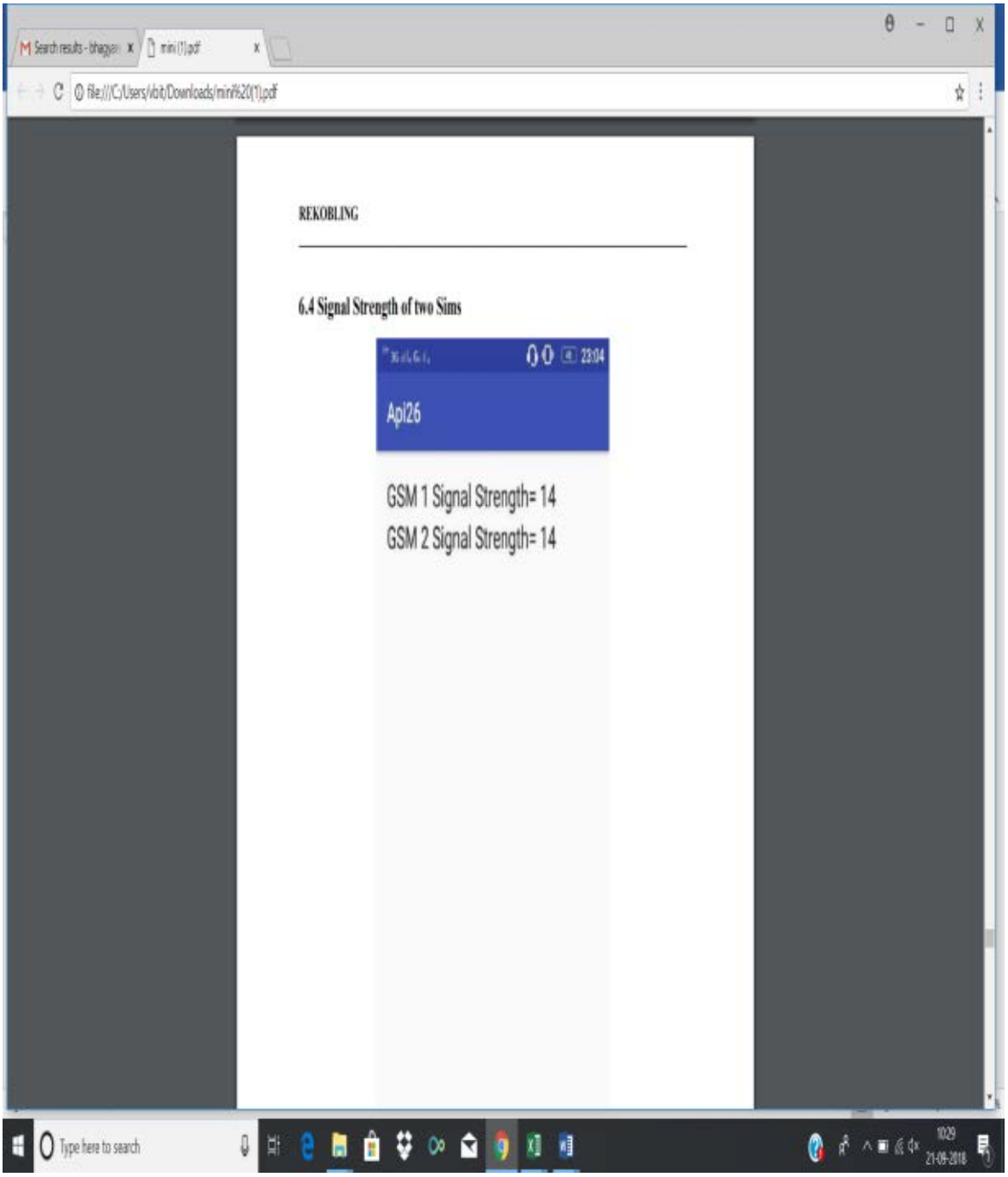
Fig 6.7 Final comparison with different phone states and two signal levels

After switchover the call continues this application is useful whenever there is more signal fluctuations happened when there is an important conversation call will not be terminated rather it smart call forwarded with another sim from present handset.

7. OUTPUT SCREENS



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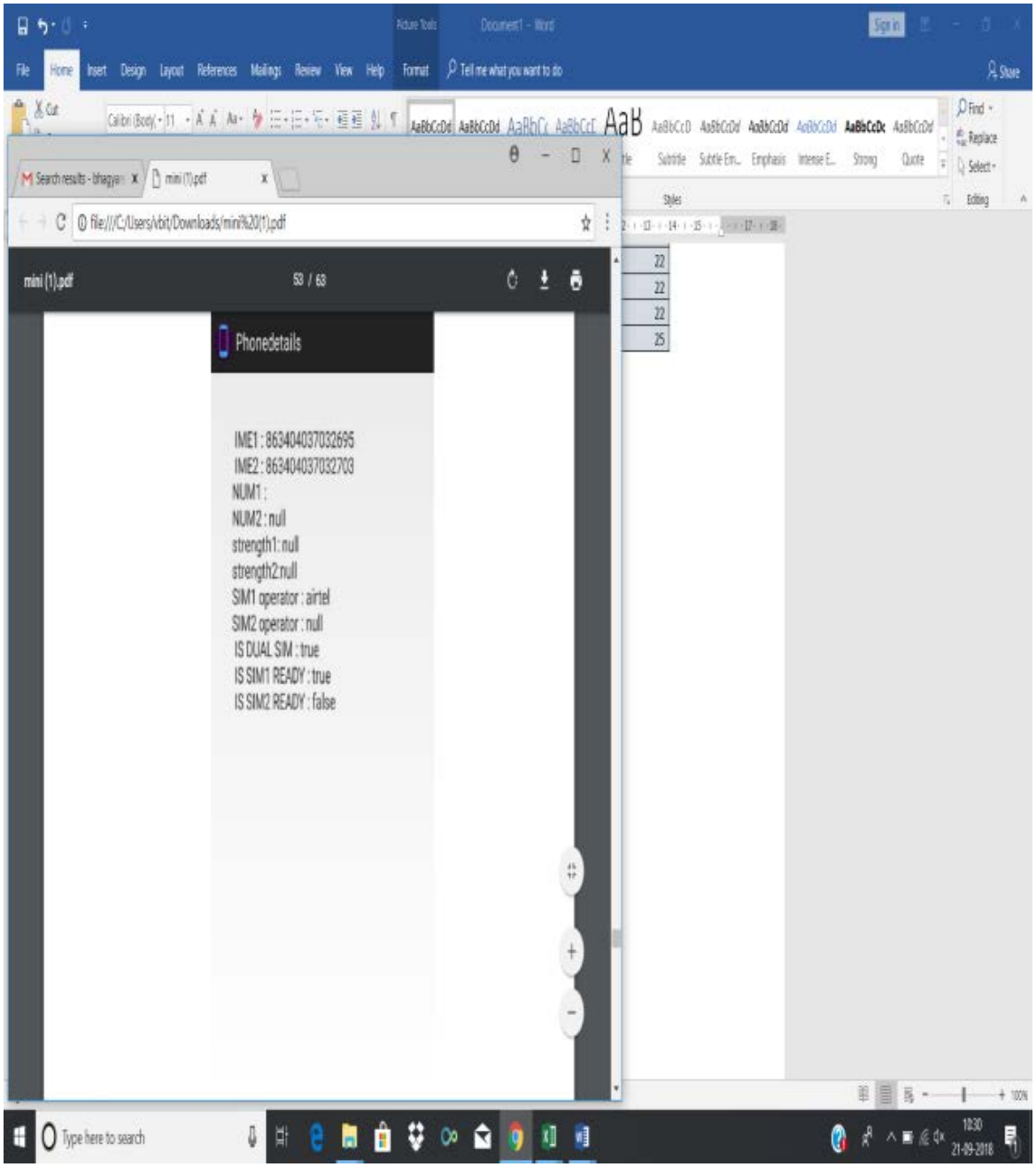
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IME1 : 863404037032695
IME2 : 863404037032703
NUM1 :
NUM2 : null
strength1: null
strength2:null
SIM1 operator : airtel
SIM2 operator : null
IS DUAL SIM : true
IS SIM1 READY : true
IS SIM2 READY : false

8.CONCLUSION AND FUTURE ENHANCEMENTS

This project describes a deployed Smartphone-based activity and application monitoring Call Forwarding takes place within the present handset. Due to difference in bandwidths, the telecommunication companies may provide stronger network at some regions and time, whereas bit weaker at other. This can be taken advantage of, and when one network is unable, the call can be advanced by forwarding to another.

Call Forwarding takes place within the present handset, which must have double SIMs. We capitalize the difference in bandwidths of telecom networks for more effectual phone call, the telecommunication companies may provide noticeably stronger network at some domain and time interval, whereas bit more impuissant at other. Such that, while the current call in going on and the network drops, it shall be forwarded to the next sim, making the connection untroubled – advancing the call further. Smart call forwarding is to provide the user with a liability to automatically switch between duple SIMs of a phone when there transpires an issue in call connectivity. The only requirement is the availability of information about both the registered numbers. In the case of double SIM handsets, when the call drops and fails to connect to the first network (which was initially dialed by the caller) Smart Call Forwarding switches and redirects the incoming call to the second SIM on the receiver's handset.The requisite for applying this is just availability of both the contacts in the database of the caller.

Acknowledgment

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Publications as Part of UGC Project

1.Published a research paper entitled “An examination of Switchover of calls of missive conveyance in a dual operating Android mobile device” (IJMTES) “International Journal of Management, Technology and Engineering”, Volume 8, Issue VIII, AUGUST/2018 Page no 156-171 (ISSN NO: 2249-7455).

2. Published a paper “Smart call Forwarding and conditional Network monitoring in ACM ICPS (SJR-Scopus Indexedjournal) Shimla, India — June 15 - 16, 2019 ACM New York, NY, USA ©2019 ISBN : 978-1-4503-6652-6 doi: 10.1145/3339311.3339312.

3. Published a research paper entitled “Implementation of Network Monitoring and Automatic Smart Call Forwarding In Duos Mobile” (IJITEE) International Journal of Innovative Technology and Exploring Engineering, ISSN: 2278-3075, Volume-8 Issue-9, July 2019 2019, Volume 6, Issue 3

4 “A STUDY ON VARIOUS TECHNIQUES OF MOBILE CALL DIVERSION AND CALL FORWARDINGTECHNIQUES IN DUAL SIM MOBILES” in Journal of Emerging Technologies and Innovative Research March.

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Authored by

Sangisetti. Bhagya Rekha Assistant Professor

From

Vignana Bharathi Institute of Technology

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An examination of Switchover of calls of missive conveyance in a dual operating Android mobile device

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Abstract: The main objective of this paper is to provide the user with a liability to automatically switch between duple Sims of a phone when there transpires an issue in call connectivity. The only requirement is availability of information about both the registered numbers. In case of double sim handsets, when the call drops and fails to connect to the First network (which was initially dialed by the caller), This application switches and redirects the incoming call to the second sim on thereceiver's handset. In addition to this, the advantage of knowing participants in a conference call is another feature. The requisite for applying this, is just availability of both the contacts in a database of the caller. The current call redirection manages to provide us with ability to redirect the call from initial device to another one, this can be a landline or office phone or simply another mobile set. This requires a subscription from the telecom company, and cost charges may hike based onthe location of the destination number. The call forwarding can be setup and directed via applications and portals too.We proposed a method Call forwarding takes place within the present handset. Due to difference in bandwidths, the telecommunication companies may provide stronger network at some regions and time, whereas bit weaker at other. This can be taken advantage of, and when one network is unable, the call can be advanced by forwarding to another.

Keyword : Android operating system, Cellular networks, Service Providers, Dual SIM Active Dual Stand By Call Forwarding Algorithms, LTE

1.Introduction Call Forwarding takes place within the present handset. Due to differenceinbandwidths, the telecommunication companies may provide stronger network at some regions and time, whereas bit weaker at other. This can be taken advantage of, and when one network is unable, the call can be advanced by forwarding to another.

i. Smart call forwarding mechanisms in duos mobile is call forwarding from one SIM to other SIM in the same device while conversation is going on with another Phone.

ii. To study and implement the Paper when cell coverage area is poor or unexpectedly call is disconnected this proposed mechanism automatically detect and connect the call to another SIM that already present in the DUOS Mobile. The method of working features of Smart call

forwarding mechanism . It must be a smart device with android operating system

which supports dual SIMs. This has to detect the signal strength always when the signal strength is becoming poor before the call is disconnectedThis Paper has to auto forward the call to another SIM that should be high signal strength. Smart call divert mechanism in duos mobile that phone must be dual SIM application based,configuring the phone by selecting a dual standby mode with a specific master configuration of the first SIM

application registering the second SIM application on a suitable cell of a wireless network activating a call forwarding function from the second SIM application to the first SIM application registering the firstSIM application on a suitable cell of the wireless network operating the phone by processing standby functions of the first SIM application receiving and incoming call via the first SIM application and handling requests for outgoing calls from the first SIM application. Pre Process: This Paper is the process by which you reroute an incoming call. For example, you can send all your calls to the office while you're on vacation. Then you have the luxury of having your cell phone and still making callsbut freely ignoring anyone who calls you. The options for call forwarding on your phone can be set by using either the Android operating system itself or the controls set up by your cellular providerScope of Project • Diverting calls can increase one's availability to a caller. The main alternative is an answering machine, but some callers do not wish to leave a recorded message, suspecting that the party will delay returning their messages. • Some businesses find that the human touch can improve contact, thus sales, but traditional wired answering services are expensive, so they have their This Paper to a call centre, so the client can reach an operator instead, of an answering call. Beforethe availability of call forwarding, commercial answering services needed to physically connect to every line for which they provided after-hours response; this required their offices be located near the local central exchange and be fed by a huge multi-pair trunk in which a separate pair of wires existed for each client subscriber. With call forwarding, there is no physical connection to the client's main telephone service, which is merely call-forwarded to the answering service (usually on a directinward dial number) at the end of the business day. • Often, a suburb of a large city is a toll call from many suburban exchanges on the opposite side of the same city, even though all of these suburbs are a local call to the city Centre. A business located in such a suburb may therefore benefit from obtaining a downtown number as an "extender", to be permanently forwarded to their geographic suburban number. • Where unlimited local calls are flat-rated and long-distance incurs high per-minute charges, the downtown number's wider local calling area represents a commercial advantage. Markham (directly north of Toronto) is long-distance to Mississauga (directly west of Toronto). A Markham business with a forwarded 416 number could receive calls from Toronto's entire local calling area without incurring long-distance tolls (as both legs, Mississauga → Toronto and Toronto → Markham, are each a local call).

2. RELATED WORK :

2.1 CALL FORWARDING: Call forwarding, or call diversion, is a telephony feature of some telephone switching systems which redirects a telephone call to another destination, which may be, for example, a mobile telephone, voicemail box or another telephone number where the desired called party is available. Call forwarding was invented by Ernest J. Bonanno. In North America, the forwarded line usually rings once to remind the customer using call forwarding that the call is being redirected. More consistently,
the forwarded line indicates its condition by stutter dial tone. Call forwarding typically can redirect incoming calls to any other domestic telephone number, but the owner of the forwarded line must pay any toll charges for forwarded calls. Call forwarding is often enabled by dialing *72 followed by the telephone number to which calls should be forwarded. Once someone answers, call forwarding is in effect. If no one answers or the line is busy, the dialing sequence must be repeated to effect call
forwarding. Call forwarding is disabled by dialing *73. This feature requires a subscription from the telephone company. Also available in some areas is Remote Access to call forwarding, which permit the control over call forwarding from telephones other than the subscriber's telephone.

2.2 Call Forwarding uses: Diverting calls can increase one's availability to a caller. The main alternative is an answering machine or voicemail, but some callers do not wish to leave a recorded message, suspecting that the party will delay returning their messages. Some businesses find that the human touch can improve contact, thus sales, but traditional wired answering services are expensive, so they have their calls forwarded to a call center,

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2.3 Remote Access to Call Forwarding: Remote Call Forwarding (RCF) requires neither a physical telephone set nor physical input by a customer to get calls forwarded. In this respect, it differs from the (similarly named) Remote Access to Call Forwarding in that the number is attached to a physical line where it rings normally until a call is made to a remote number to enable redirection. To activate Remote Access to Call Forwarding, a subscriber calls a provider-supplied Remote Access Directory Number,
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to be automatically forwarded to any answering location designated by the call receiver. Customers may have a remote-forwarding telephone number in a central switching office without having any other local telephone service in that office. One common purpose for this service is to enable customers to retain their telephone number when they move to a location serviced by a different telephone exchange. The service is useful for business customers with widely-advertised numbers which appear on headedpaper, vehicles and various marketing literature. When customers ring, their calls are seamlessly forwarded to the new location.

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2.6 Dual SIM Dual Standby (DSDS): DSDS devices work with one or two SIM cards inserted. You can receive calls and messages to both SIM cards. Before you can use the SIM cards, you have to enable them in the Dual SIM settings menu. Data traffic can only be handled on one SIM card at a time and you can select which SIM card you want to use. At any given time, you can select which SIM card to use for making a call or sending a text message (SMS). However, when one SIM card is engaged in a call, theother SIM card is temporarily disabled. This means, that, during a call, only the SIM card that you have selected to use (the active SIM card) is available for communications. It is impossible to handle two calls simultaneously on two different SIM cards. When you use one SIM card to handle calls, the other SIM card is disabled automatically. You can still receive calls to the disabled SIM card by using the Dual SIM reachability feature. If the Dual SIM reachability feature is activated and you use, for example, SIM 1 to handle an ongoing call, any calls to SIM 2 get forwarded to SIM 1. This means that you can put the ongoing call on hold and answer the call forwarded to SIM 1 from SIM 2 (which remains disabled). A Dual SIM reachability uses the Call forwarding feature. Check with your network operator to see if call forwarding is available in the networks that your SIM cards use. Call forwarding may not be available if you use SIM cards from two different countries/regions.

3. IMPLEMENTATION PROCESS: The process of development mainly divided according to the module that are included in our application. There are mainly 2 modules in our project and each has a development process and all these are again combined into a single application. Now we will discuss briefly about each and every module included in our application.

SERVICE 1: Register to be a Member Module. The first module is the register to be a member module which will alert a person about his register first. In this the module comprises the mobile app which will serve as the display of information and as the input component for the details of user's. The next component is the server which will process the inputs and stores them in the database. It also obtains the data from the database and alerts according to the time at which the call is to be forwarded.

Finally, the last component in this service is the follow, if the number is unregistered so the user have to make changes in his phone by going to phone settings. Here the client or user have to go to Sim Management and make the changes, for some devices it's a by default numbers are unknown, but whereas in other phones it's a editable were the user can change his or edit his sim number's. So for the this service it's both methods are supporting. After this service the This Paper mobile application will automatically get the contacts for your mobile device and its run's as a background process. The user just have to enter his sim

number that is sim1 and sim2.If the user click's the button next ,this servicer won't go to the next page ,because for few mobile devices it maybe a default numbers are saved and for few it may not be there to edit the number.

SERVICE 2: Network Module. In this service, we have the system components such as the mobile app, server with SQLite database. The mobile app is connected to the server and displays the application network information. The server will preprocess the data obtained from the components and stores in database. The other components that are used in this service which network the user is using, by the sim number of the user this This Paper application will identifies the user's network information is gathered.

Here the client can make his usage of applications by using this service. The network monitoring provides the details of the dual Sims monitoring information and this data is send to the server for processing. If, in case the user is having a conversation with the other person and suddenly the network is down, then the call is forwarded automatically. Generally, a strong mobile phone signal is more likely in an urban area, though these areas can also have some "dead zones", where no reception can

be obtained. The finally obtained application is simpler and easier to use as the implementation of the project is carried out in a perspective that it should be easily used by every person irrespective of age.

4. CONCLUSION AND FUTURE ENHANCEMENTS

This project describes a deployed smartphone-based activity and application monitoring Call Forwarding takes place within the present handset. Due to difference in bandwidths, the telecommunication companies may provide stronger network at some regions and time, whereas bit weaker at other. This can be taken advantage of, and when one network is unable, the call can be advanced by forwarding to another.

Acknowledgment

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Disclaimer: We hereby confirm that the disclosure made above are complete and correct to the best of myinformation and belief. We will not be participating in the discussion and decision making of this matter. We agree that if We become aware of any information that might indicate that this disclosure is inaccurateor that We have not complied with the conflict of interest policy, we will notify immediately.

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An examination of Switchover of calls of missive conveyance in a dual operating Android mobile device

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ABSTRACT:

The main objective of this paper is to provide the user with a liability to automatically switch between duple Sims of a phone when there transpires an issue in call connectivity. The only requirement is availability of information about both the registered numbers. In case of double sim handsets, when the call drops and fails to connect to the First network (which was initially dialed by the caller), This application switches and redirects the incoming call to the second sim on thereceiver's handset. In addition to this, the advantage of knowing participants in a conference call is another feature. The requisite for applying this, is just availability of both the contacts in a database of the caller. The current call redirection manages to provide us with ability to redirect the call from initial device to another one, this can be a landline or office phone or simply another mobile set. This requires a subscription from the telecom company, and cost charges may hike based onthe location of the destination number. The call forwarding can be setup and directed via applications and portals too.We proposed a method Call forwarding takes place within the present handset. Due to difference in bandwidths, the telecommunication companies may provide stronger network at some regions and time, whereas bit weaker at other. This can be taken advantage of, and when one network is unable, the call can be advanced by forwarding to another.

Keyword : Android operating system, Cellular networks, Service Providers, Dual SIM Active Dual Stand By Call Forwarding Algorithms, LTE

1.INTRODUCTION

Call Forwarding takes place within the present handset. Due to differenceinbandwidths, the telecommunication companies may provide stronger network at some regions and time, whereas bit weaker at other. This can be taken advantage of, and when one network is unable, the call can be advanced by forwarding to another.

i. Smart call forwarding mechanisms in duos mobile is call forwarding from one SIM to other SIM in the same device while conversation is going on with another Phone.

ii. To study and implement the Paper when cell coverage area is poor or unexpectedly call is disconnected this proposed mechanism automatically detect and connect the call to another SIM that already present in the DUOS Mobile. The method of working features of Smart call forwarding mechanism . It must be a smart device with android operating system

which supports dual SIMs. This has to detect the signal strength always when the signal strength is becoming poor before the call is disconnectedThis Paper has to auto forward the call to another SIM that should be high signal strength. Smart call divert mechanism in duos mobile that phone must be dual SIM application based,configuring the phone by selecting a dual standby mode with a specific master configuration of the first SIM application registering the second SIM application on a suitable cell of a wireless network activating a call forwarding function from the second SIM application to the first SIM application registering the firstSIM application on a suitable cell of the wireless network operating the phone by processing standby functions of the first SIM application receiving and incoming call via the first SIM application and handling requests for outgoing calls from the first SIM application. Pre Process: This Paper is the process by which you reroute an incoming call. For example, you can send all your calls to the office while you're on vacation. Then you have the luxury of having your cell phone and still making callsbut freely ignoring anyone who calls you. The options for call forwarding on your phone can be set by using either the Android operating system itself or the controls set up by your cellular providerScope of Project • Diverting calls can increase one's availability to a caller. The main alternative is an answering machine, but some callers do not wish to leave a recorded message, suspecting that the party will delay returning their messages. • Some businesses find that the human touch can improve contact, thus sales, but traditional wired answering services are expensive, so they have their This Paper to a call centre, so the client can reach an operator instead, of an answering call. Beforethe availability of call forwarding, commercial answering services needed to physically connect to every line for which they provided after-hours response; this required their offices be located near the local central exchange and be fed by a huge multi-pair trunk in which a separate pair of wires existed for each client subscriber. With call forwarding, there is no physical connection to the client's main telephone service, which is merely call-forwarded to the answering service (usually on a directinward dial number) at the end of the business day. • Often, a suburb of a large city is a toll call from many suburban exchanges on the opposite side of the same city, even though all of these suburbs are a local call to the city Centre. A business located in such a suburb may therefore benefit from obtaining a

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will automatically get the contacts for your mobile device and its run's as a background process. The user just have to enter his sim number that is sim1 and sim2.If the user click's the button next ,this servicer won't go to the next page ,because for few mobile devices it maybe a default numbers are saved and for few it may not be there to edit the number.

SERVICE 2: Network Module. In this service, we have the system components such as the mobile app, server with SQLite database. The mobile app is connected to the server and displays the application network information. The server will preprocess the data obtained from the components and stores in database. The other components that are used in this service which network the user is using, by the sim number of the user this This Paper application will identifies the user's network information is gathered.

Here the client can make his usage of applications by using this service. The network monitoring provides the details of the dual Sims monitoring information and this data is send to the server for processing. If, in case the user is having a conversation with the other person and suddenly the network is down, then the call is forwarded automatically. Generally, a strong mobile phone signal is more likely in an urban area, though these areas can also have some "dead zones", where no reception can

be obtained. The finally obtained application is simpler and easier to use as the implementation of the project is carried out in a perspective that it should be easily used by every person irrespective of age.

4. CONCLUSION AND FUTURE ENHANCEMENTS

This project describes a deployed smartphone-based activity and application monitoring Call Forwarding takes place within the present handset. Due to difference in bandwidths, the telecommunication companies may provide stronger network at some regions and time, whereas bit weaker at other. This can be taken advantage of, and when one network is unable, the call can be advanced by forwarding to another.

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I gratefully acknowledge the computational facility provided in the college under **SERO -UGC MINOR RESEARCH PROJECT** MRP ID:MRP UGC6944/16 with proposal number [1377] titled "**Study on Smart**

call forwarding in DUOS Mobile" with which helped me to carry out the work. I thank the management of **Vignana Bharathi Institute of Technology** for their support and kind encouragement.

Disclaimer: We hereby confirm that the disclosure made above are complete and correct to the best of myinformation and belief. We will not be participating in the discussion and decision making of this matter. We agree that if We become aware of any information that might indicate that this disclosure is inaccurateor that We have not complied with the conflict of interest policy, we will notify immediately.

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A STUDY ON VARIOUS TECHNIQUES OF MOBILE CALL DIVERSION AND CALL FORWARDING TECHNIQUES IN DUAL SIM MOBILES

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Abstract— **In Cellular Technology, Call Diversion could be an ancient telecommunication service that permits user to forward or direct the incoming mobile calls to associate degree alternate range, in same mobile device or another. User may intend to better to divert incoming calls on to another device. Once call diversion is enabled, the mobile doesn't ring at the first device of the incoming call, however rather at the locations the call had been entertained to. The Call diversion needs the user to manually on the feature and on the feature of the mobile phone. This approach requires a lot more manual intervention even in dual operating SIM handsets. Although current call diversion manages to supply with a capability to direct the call from the initial mobile device to a another one, that might be a land line or workplace phone or just another mobile set, however needs a subscription from the telecommunication company, the price charges might hike supported the situation of the destination range. The mobile call forwarding is often setup and directed via applications, portals.**

Keywords— Android operating system, Cellular networks, Service Providers, Dual SIM Active Dual Stand By Call Forwarding Algorithms, LTE

1. INTRODUCTION

Call forwarding, or call diversion, could be a telecommunication feature of some cellular exchange systems that redirects a telephone to a different destination, which can be, as an example, a subscriber mobile cellular phone, or another mobile number wherever the specified referred to as party is accessible. Telephony call was forwarded line sometimes ring once cue the client victimization device that the call is being redirected. Additional systematically, the forwarded call and receiver device indicates that its condition by call diversion. Telephony usually will send incoming calls to the other domestic number; however, the owner of the forwarded line should pay some toll free or paid charges for diverted calls. Telephony is commonly enabled by dialing some code followed by the phone range to that calls ought to be forwarded. Telephony is disabled by dialing. This feature needs a subscription from the network suppliers. Collectively obtainable in some areas is Remote Access to cellular mobile telephony, which enables the management over telephony from phones aside from the sender and receiver subscriber's telephone. VOIP and cable phone systems collectively usually enable mobile telephony to be started and directed via their internet portals. Diverting calls can increase receiver's availability to a caller. The main alternative is a receiving mobile phone or voicemail, but some mobile callers do not wish to leave a recorded message, suspecting that the caller mobile will delay returning their messages.

Call diversion to a specified mobile number of one or more of the following situations:

1.**All calls** once all-Call call forwarding is activated by a phone user; all incoming calls are diverted. The target mobile for diverted calls can be laid out in the router configuration or by the phone user with a soft key or feature access number.

2.**No answer Incoming calls** are diverted once the extension doesn't answer before the threshold timeout expires. The target destination for diverted calls is laid out in the network router configuration.

3. **Busy Incoming calls** are diverted once the extension is engaged and call waiting isn't active. The target mobile for diverted calls is selected within the network router configuration.

4.**Night service —all incoming** Night service and all incoming calls are mechanically diverted throughout night-service hours. The target destination for diverted calls is laid out in the network router configuration.

5.**In progress call** —perpetual call on hold or transfer it as per demand. The incoming calls is additionally forwarded. Directory range will have all four style of conditional call

forwarding outlined at an equivalent time with a distinct forwarding destination outlined for every variety of call forwarding. If quite one variety of call forwarding is active at only once, the order for evaluating the Various sorts are as follows:

1. Call forward night-service
2. Call forward all
3. Call forward busy and call forward no-answer
4. Ongoing call forward

The rest of the paper has been organized as accordingly:
Section 2 describes Signal Strength Section 3 describes some Architecture for call forwarding mechanisms. Section 4 describes Comparative analysis on different algorithms Section 5 concludes the paper.

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2. SIGNAL STRENGTH

The quality of the call depends on the strength of the cellular signal of the area. The mobile phone displays current signal strength as a series of vertical or horizontal bars on the left-hand side of its display screen - the more number of bars, the better the signal in the cellular area. If the signal strength is poor, we can try moving the mobile phone slightly to improve reception. If we are using the mobile phone in a building, you may find that reception of signal is better near a window. Signal strength-based call forwarding for wireless phones: A mobile station monitors received signal strength from a base transceiver station, either directly or by monitoring or some other measure of received signal quality, such as the ratio Ec/Io in a CDMA network. When the signal strength drops below a threshold, the mobile station is programmed to automatically send a feature code to the wireless network to activate unconditional call forwarding to a previously programmed directory number. When the mobile station re-enters the service network, i.e., the signal strength improves to an acceptable level or goes above the threshold, the mobile station automatically sends a feature code to turn off the unconditional call forwarding. Thereafter, incoming phone calls are directed to the mobile station. signal strength from a base transceiver station in a cellular system, for instance, a subscriber's profile may indicate how the service provider should handle or respond to attempts to connect cellular calls to or from a given subscriber. For example, the subscriber's profile may indicate that the subscriber is not allowed to place calls to certain mobile phones, and so the service provider may block any attempt by the subscriber to place calls to those mobile areas. As another example, the subscriber's profile may indicate that some or all calls to the subscriber should be forwarded to another number or to voice mail under certain conditions, and so the service provider may accordingly forward an incoming call under those conditions First, confirm that you have the correct template for your paper size. Maintaining the Integrity of the Specifications

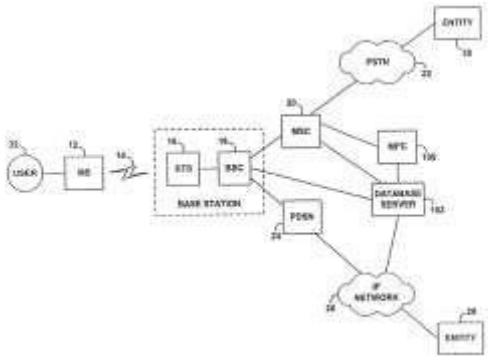

Fig 1. Flow of Mobile Call Establishment

Fig 1: Explains the flow of call establishment mentioned long term Evolution (LTE) exhaustive in the view of technological design, use, specifications, speed, etc., however we'd like to recollect its forerunner. New technologies, LTE enclosed, wouldn't be the speedy large it's nowadays while not learning from those technologies United Nations agency lived before it. GSM[13] is one in all them. To with success perceive our future, we tend to should perceive our past. So, GSM (Global System for Mobile Communications, originally Groupe Special Mobile), could be a customary set developed by the ecu Telecommunications Standards Institute (ETSI) to explain protocols for second generation (2G) digital cellular networks employed by wireless phones. originally, the GSM customary was developed to switch the primary generation (1G) analog cellular networks, and was represented a digital, circuit switched network optimized for full duplex voice telecommunication. Over time, GSM's capabilities dilated to the cellular mobile knowledge communications, initial by circuit switched transport, then packet knowledge transport via GPRS (General Packet Radio Services) and EDGE (Enhanced knowledge rates for GSM Evolution or EGPRS). Further enhancements to GSM were created once the 3GPP developed third generation (3G) UMTS standards followed by fourth generation (4G) LTE Advanced and the radio network consists of an outsized variety of BTSs. every BTS is given associate identity. These BTSs are classified consistent with location space, conjointly given associate identity. every MS C/VLR (Mobile Services change Centre/Visitor Location Register) serves the BTSs in associate variety of location areas. The GSM phones reports to the network (VLR) once it moves from a BTS in one llocation space to a BTS in another device location space. GSM network apprehend wherever the subscribers are , The VLR continually is aware of during

which location space the GSM subscriber is found in at any given moment. consequently, the HLR continually is aware of that MSC/VLR the GSM subscriber is at additionally. Then, the GSM subscriber's signalling tells the network that HLR the particular GSM subscriber belongs to. GSM transportable. The call is routed through mobile network to the highest master's degree to the known as GSM subscriber. Next, entranceway master's degree checks with HLR, asking "Where is that the GSM subscriber?" at that time, the decision is established to the particular MSC/VLR (Visiting MSC) either directly or through the fastened or international phone network. Finally, the request for a mobile decision is transmitted over all BTSs within the actual location space of the known as GSM subscriber. Mobile acknowledges its own identity, and also the decision begins. Call from a GSM Phone to a GSM Phone How will it work for GSM, business from mobile device to mobile device? Well, All India Radio the radio path and also the base station network a decision request for a GSM subscriber is shipped from a transportable to MSC/VLR).

3. ARCHITECTURES FOR CALL FORWARDING

3.1 Automatic event triggered call forwarding mechanism for mobile phone [1] Call forwarding is a traditional cellular telecom service that allows a user to forward or divert incoming calls to another number it may be cellular mobile device or landline. This service requires the customer to manually on and off the feature and therefore may not be very convenient. There is a sophisticated automatic call- forwarding algorithm (CFA) for mobile phones. The application software must be installed in a Smartphone, call forwarding is automatically on (e.g., when the phone is under a charging condition or is turned off) or disabled (e.g., when the phone is low battery level or is turned on). The performance of the CFA was investigated by analysis, simulation, and performance measurement. This study indicates that CFA is very feasible for commercial or business use

3.2 Routing for diverting calls [2] Integrated cellular and ad hoc relaying systems (ICAR)[2] There a new wireless cellular system architecture based on the combination of traditional cellular and modern ad hoc relaying technologies. The ICAR system can balance traffic loads of the cellular mobile phones, increase the device capability capacity cost effectively, reduce transmission power for mobile hosts and extend system coverage by using adhoc relaying stations (ARS) to relay traffic from one cellular network to another dynamically. Thus, the adhoc relaying stations are imported to forwarding a call from a congested cellular cluster (hot spot) to a non-congested cellular cluster, a fast-efficient relaying routing protocol that can reflect the cell's status is needed in ICAR networks. The advantage is time delay of the call establishment is within acceptable range that can basically meet the performance and accuracy of ICAR application.

3.3 Handover between fixed and mobile networks for dual mode [3]. A modern telecommunications system and method for performing a call forwarding between the fine-tuned land lines wired networks and mobile networks during a call placed called and caller a dual mode device, without any noise or interruption in the voice or data connection. Ergo, for calls initiated in the fine-tuned network, once the calling subscriber leaves the network coverage area for the fine-tuned mode of the dual mode device, the call preserves as normal by transferring the call to the receiver mobile network. Similarly, for calls initiated in the mobile network, once the subscriber moves back into the fixed or land line mode coverage area, the call can be transferred to the secure network in order to provide a lower signal rate to the subscriber, without any service intervention.

3.4 A novel smart forwarding scheme in LTE-advanced networks [4,14] Long Term Evolution (LTE) and IEEE 802.16 WiMAX. LTE complies with 3GPP standards whereas 802.16 WiMAX is regulated by the Institute of Electrical and Electronics Engineers (IEEE). Albeit WiMAX is, the system is an independent incipient system that is incompatible with the current 3G system. On the other hand, LTE conforms to 3GPP that is fortified by telecommunication manufacturers and other operators and is, moreover, rearward compatible with 3G/UMTS mobile radio cellular systems. The LTE designations define how to utilize infrastructure (UI) connects and communicates with evolved Node B (eNB) base stations. The enhanced version, LTE-Advanced, integrates a developing entity called the relay node (RN) to widen accommodation coverage, albeit this change has resulted in a more intricate architecture. Mobility management and call forwarding are important components in wireless mobile networks. This method is efficient and handover architecture in LTE-Advanced networks and proposes a creative forwarding to handover performance. Simulation studies show that the Astute call

Forwarding scheme employs a better operational transmission path that efficaciously reduces handover latency and signals overhead.

3.5 A new technique of call forwarding using remote mobile [5] in ancient call forwarding, a caller can forward their calls to another mobile subscriber in another device by configuring their mobile. An incipient approach in which a both mobile subscribers can forward their calls to another mobile subscriber by configuring their mobile utilizing the available mobile handset.

3.6 Concept of multiple sim cards in single usim [6] now a days every person wants to carry more than one SIM card to relish different accommodations provided by a telecom operator. So, the user has to carry multiple SIM cell phones. But in general, there are lots of quandaries to these kinds of cell phones. To overcome this issue there is a proposal. This single USIM has the capability of handling multiple network access. Has been proposed, here they are providing single SIM in lieu of multiple where a different operator can store different network keys to access their respective network at different situations. An advantage to utilizing these USIM is that use of multiple SIM can be evaded. For this, they have to make transmutations in mobile software as well as the internal architecture of SIM card had been used. The concept proves itself worth mentioning contribution towards wireless, Cellular and tele communication.

3.7 Context aware relinquishing algorithms for mobile positioning systems [7] Context-aware computing will play a major role to improve the services of mobile networking systems. To fixate on optimizing relinquishing choices in different environments and different scenarios, wherever the user is recognized by Cisco Unified CME, includes a selection among different mobile networks notwithstanding however it had been entered and placed and different access points. In our approach, the choice isn't the call with signaling and calling region. only supported the signal quality, however to boot on the data regarding the context of mobile devices and access points. Since context data and context process evolves quickly, we tend to propose a versatile, integrated approach for context management[12], which might adapt in many ways that. The design encompasses programmable platforms and distributed context management parts in network nodes and mobile devices, in addition as a service preparation theme for network services. This important design is in a position to actively deploy in different relinquishing networks. It manages dynamic context data and sanctions mobile devices to be forever connected to the access network. This design is valid during a paradigm implementation and performance results are mentioned.

3.8 Distributed call admission management in mobile/wireless networks [8]

Call Admission Management(CAM) is a main component within the provision of bonded quality of service in wireless networks. The actual planning of call admission management (CAM) algorithms for mobile cellular networks is particularly difficult given the circumscribed with extremely variable resources, and therefore the quality of users encountered in such networks this (CAM) paper concludes on the state of current analysis and points out a number of key problems that require to be addressed within the context of call admission management for future extended cellular networks.

3.9 Configuring call Transfer and Forwarding [9] Call forwarding diverts calls to a nominative range of 1 or a lot of of the subsequent conditions• All calls—when all-call telephone is activated by a phone user, all incoming calls are diverted. The target destination for diverted calls will be laid out in the router configuration or by the phone user with a soft key or feature access code. The foremost recently entered destination

No answer—Incoming calls are diverted once the extension doesn't answer before the timeout expires. The target destination mobile device for diverted calls is laid out in the router configuration.

Busy—Incoming calls are diverted once the extension is busy and telephony isn't active. The target destination for diverted and forwarded calls are established and calls are laid out in the router configuration.

Night service —All incoming calls are mechanically diverted throughout night-service hours. The target destination for diverted calls is laid out in the router configuration. A directory range will have all four forms of telephony outlined at an equivalent time with a special forwarding destination outlined for every variety of call forwarding.

3.10 One Number Service Using Mobile Assisted Call Forwarding Facilities [10] call diversion is an automation feature in a mobile phone provides automated on and off of conventional carrier system calls forwarding. The mobile phone provides for storing multiple call forwarding mobile phone numbers, selecting a call forwarding telephone number based upon location information, automatically activating call forwarding to the selected telephone number during a wireless telephone power down sequence, and automatically deactivating the call forwarding during a mobile phone power up sequence. Programming is also provided for configuring and enabling the conditional call forwarding feature. In another embodiment, the mobile phone automatically prompts the user for on of call forwarding each time the user powers down the mobile phone. The process also provides the user with an ability to select from a list of stored call forwarding telephone numbers to use, as well as providing the user with an ability to manually input a new mobile number. In this embodiment, the location information is used only to provide a suggested forwarding mobile

number, rather than automatically activating call forwarding without user input during the power down sequence. If user input is not received during a defined time period in response to the prompt, the mobile phone automatically ON the call forwarding only if an automatic call forwarding time-out default option is enabled. The user is also automatically prompted each time the user powers up the wireless telephone to deactivate call forwarding if call forwarding is activated, and real-time idle mode automated call forwarding activation and deactivation service are also provided.

3.11 Using Two Sim Cards with Same Msisdn Number [11] A method and equipment for using multiple SIM cards with the same MSISDN number in a mobile communication system. To at least one subscriber identifier are allocated at least two identity modules (SIM), of which the only one at a time can be registered as active. In connection with location updating, it is checked whether the location updating relates to a subscriber identifier to which at least two identity modules (SIM) have been allocated. If yes, it is checked whether the identity module (SIM) concerned is at that particular moment registered as passive and if yes, it is activated 3and the identity module (SIM) earlier registered as active is deactivated. If the identity module (SIM) earlier registered as active is involved in an ongoing call while location updating is being performed using an identity module (SIM) earlier registered as passive, the location updating is rejected or delayed until the ongoing call has been ended

Table 1 Explains the different methods of call forwarding and comparison of CFA, ICAR, Handover between fixed and mobile networks for dual mode and LTE advanced systems. Each and every technique is having its own pros cons also used in various conditions.

Analysis on different methods for call forwarding

S.No	METHODS	ANALYSIS
1	Ref no 2	CFA is very feasible for commercial and business use
2	Ref no 3	fast-efficient relaying routing protocol that can reflect the call's status is needed in ICAR networks
3	Ref no 4	Secure network in order to provide a moderate rate of signal to the subscriber, without any service intervention.
4	Ref no 5	This scheme employs a better operational transmission path that efficaciously reduces handover latency and signals overhead.

Table 1. List of Methods

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4. CONCLUSION AND FUTURE WORK

Call Forwarding takes place within the present handset, which must have double SIMs. We capitalize the difference in bandwidths of tele come networks for more effectual phone call, the telecommunication companies may provide noticeably stronger network at some domain and time interval, whereas bit more impuissant at other. Such that, while the current call in going on and the network drops, it shall be forwarded to the next sim, making the connection untroubled – advancing the call further. The main objective of smart call forwarding is to provide the user with a liability to automatically switch between duple SIMs of a phone when there transpires an issue in call connectivity. The only requirement is the availability of information about both the registered numbers. In the case of double SIM handsets, when the call drops and fails to connect to the first network (which was initially dialed by the caller) Smart Call Forwarding switches and redirects the incoming call to the second SIM on the receiver's handset. The requisite for applying this is just availability of both the contacts in the database of the caller.

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Implementation of Network Monitoring and Automatic Smart Call Forwarding In Duos Mobile

Bhagya Rekha Sangisetti,

Abstract. Call forwarding is a traditional telecom service that allows a user to forward incoming calls to another mobile number in the same mobile device or to another device. In the present scenario in mobile phone technology, call divert is a phone feature that enables the user to forward or redirect their incoming calls to an alternate number, which can be either a landline or mobile phone. Users can also choose to divert incoming calls directly to voicemail. When call divert is enabled, the phone does not ring at the original number of the incoming call, but rather only at the location the call had been diverted to. This service requires the user to manually activate and deactivate the feature. This approach needs more manual intervention even in dual operating SIM mobiles as well. To overcome this problem a smart call, divert mechanism in dual operating mobile is proposed as an automatic Smart call-forwarding mechanism (SCF). In this mechanism, if one SIM is under poor signal strength call is automatically forwarded to another SIM which is present in the same Mobile device. By installing software in a smartphone, call forwarding is automatically triggered

Keywords: Android operating system, telephony subscription manager, Long term evolution (LTE),3G, 5G, Handoff mechanisms.

I. INTRODUCTION

Call Forwarding takes place within the present handset. Due to the difference in bandwidths, the telecommunication companies may provide a stronger network in some regions and time, whereas bit weaker at other. This can be taken advantage of, and when one network is unable, the call can be advanced by forwarding to another.

i. Smart call forwarding mechanisms in duos mobile are call forwarding from one SIM to other SIM in the same device while the conversation is going on with another Phone.

ii. To study and implement the Paper when cell coverage area is poor or unexpectedly call is disconnected this proposed mechanism automatically detect and connect the call to another SIM that already present in the DUOS Mobile. The method of working features of Smart call forwarding mechanism. It must be a smart device with Android operating system which supports dual SIMs. This has to detect the signal strength always when the signal strength is becoming poor before the call is disconnected. This Paper has to auto-forward the call to another SIM that should be high signal strength. Smart call divert mechanism in duos mobile that phone must be dual SIM application based, configuring the phone by selecting a dual standby mode with a specific master configuration of the first SIM application registering the second SIM application on a suitable cell of a wireless network activating a call forwarding function from the second SIM application to the first SIM application registering the first SIM application on a suitable cell of the wireless network operating the phone by processing standby functions of the first SIM application receiving an incoming call via the first SIM application and handling requests for outgoing calls from the first SIM application.

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II. METHODOLOGY

This project include several modules like

Network monitoring includes: Here it monitors the signal of subscribers.It also gives invoice when there is poor network.

Auto termination: When there is a poor network, ongoing call automatically.

Auto activation: After call termination, the network is switched to another subscriber that has high signal.Then it makes an outgoing call from the subscriber that has high signal.

There are four modules in the process of implementation of this project

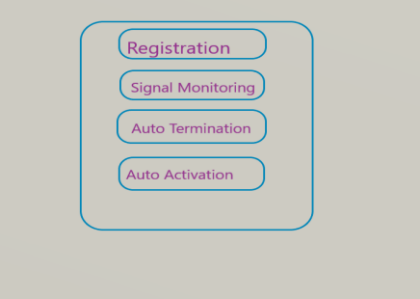

Fig.2.1 Modules in application

2.1 Registration

Register to be a Member Module. The first module is the register to be a member module which will alert a person about his register first. In this, the module comprises the mobile app which will serve as the display of information and as the input component for the details of user's. The next component is the server which will process the inputs and stores them in the database. It also obtains the data from the database and alerts according to the time at which the call is to be forwarded. Finally, the last component in this service is the following, if the number is unregistered so the user has to make changes in his phone by going to phone settings. Here the client **or** user has to go to Sim Management and make the changes, for some devices it's a by default numbers are unknown, but whereas in other phones it's editable were the user can change his or edit his sim numbers.

So for this service, it's both methods are supporting. After this service, This Paper mobile application will automatically get the contacts for your mobile device and its run's as a background process. The user just have to enter his sim

2.2 System Architecture

Below architecture diagram represents how the application works

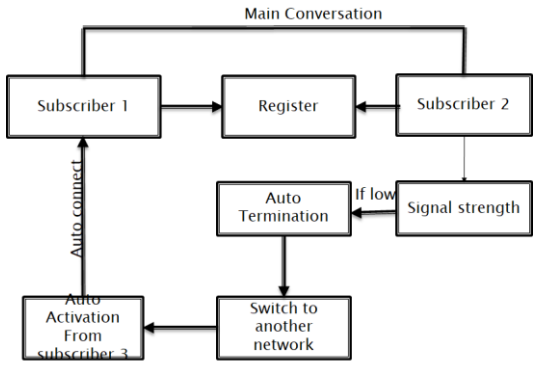

Fig.2.2. System Architecture

- Initially the subscriber numbers are automatically detected in duos mobile.
- When there is main conversation call between subscriber1 and subscriber2.
- Here application monitors the signal strength.
- If there is sudden decrease in signal at subscriber2 the main conversation is automatically terminated.

The quality of the call depends on the strength of the cellular signal in our area. The mobile displays current signal strength as a series of bars on the left-hand side of its display screen - the number of bars, the better the signal in the cellular area. If the signal strength is poor, we can try moving the mobile phone slightly to improve reception. If we are using the mobile phone in a building, you may find that reception is better near a window. Signal strength-based call forwarding for wireless phones: A mobile station monitors received signal strength from a base transceiver station, either directly or by monitoring or some other measure of received signal quality, such as the ratio Ec/Io in a CDMA network. When the signal strength drops below a threshold, the mobile station is programmed to automatically send a feature code to the wireless network to activate unconditional call forwarding to a previously programmed directory number. When the mobile station re-enters the service network, i.e., the signal strength improves to an acceptable level or goes above the threshold, the mobile station automatically sends a feature code to turn off the unconditional call forwarding. Thereafter, incoming phone calls are directed to the mobile station. signal strength from a base transceiver station in a cellular system, for instance, a subscriber's profile may indicate how the service provider should handle or respond to attempts to connect cellular calls to or from a given subscriber. For example, the subscriber's profile may indicate that the subscriber is not allowed to place calls to certain mobile phones, and so the service provider may block any attempt by the subscriber to place calls to those mobile areas. As another example, the subscriber's profile may indicate that some or all calls to the subscriber should be forwarded to another number or to voice mail under certain conditions, and so the service provider may accordingly forward an incoming call under those conditions.

2.3 Network Monitoring

SIM 1	SIM 2	P .State	Time	Date
0	29	IDLE	10:32:31	13-Feb-19
9	29	IDLE	10:32:31	13-Feb-19
9	28	IDLE	10:32:35	13-Feb-19
0	28	IDLE	10:41:54	13-Feb-19
0	1	IDLE	04:15:10	23-Feb-19
0	1	IDLE	04:15:14	23-Feb-19
0	23	IDLE	03:14:54	26-Feb-19
8	23	IDLE	03:14:54	26-Feb-19
5	18	ONCALL	04:05:22	28-Feb-19
5	17	ONCALL	04:05:23	28-Feb-19
5	16	ONCALL	04:05:24	28-Feb-19
5	14	ONCALL	04:05:26	28-Feb-19
5	12	ONCALL	04:05:28	28-Feb-19
0	15	IDLE	09:07:45	01-Mar-19
17	15	IDLE	09:07:45	01-Mar-19
17	16	IDLE	09:07:45	01-Mar-19
0	9	IDLE	10:24:47	02-Mar-19

5	9	IDLE	10:24:47	02-Mar-19
5	12	RINGING	10:24:47	02-Mar-19
5	19	RINGING	10:24:47	02-Mar-19
5	16	RINGING	10:24:50	02-Mar-19
5	9	RINGING	10:24:52	02-Mar-19
5	10	RINGING	10:24:53	02-Mar-19

Table 2.1: Signal Strength Monitoring

2.4 Auto Disconnect

The signal strength on both the network in a Dual-SIM handset is monitored in real-time, on the initiation of a call from the user of the application, the network strength is quickly monitored and if the signals are below a threshold, the call is automatically disconnected, and further corrective steps are taken. A similar approach is implemented in the case of a call in progress, considering a case wherein the call is in progress through a particular network and the strength of the signal drops, the network strength of both the SIM cards are compared, if the inactive SIM card has a strength higher than a threshold of the active SIM card then the call is disconnected and Auto Activation takes place.

2.5 Auto Activation

Auto-activation is the second step in the sequence, once a call is automatically disconnected by the application, an attempt is made to fulfill the requirement by activating a call diverting from the subscriber's network that received the call to the other idle network with a better signal strength. With pro-active signal strength measuring, the live status of both the SIM cards is known to the application and a decision can be taken quickly about which network is a more reliable option for the call connection. Based on the network strength the application uses the Smart Call Forwarding algorithm to determine the best available network and automatically enables or disables the call forwarding. This automated activation of the call forwarding feature on a Dual SIM enabled smartphone can effectively improve the quality of communication without any manual intervention or adjustment of settings.

2.6 Auto Answer

The Auto Answer is one of the important parts of the application for a seamless transition through the networks, this feature of the application comes in action once a call request is sent. The Applications on both the subscribers phone communicate actively and inform each other with information about the change in the network strength on the available networks and about the phone state, when an instance of call follows the Auto Disconnect and Auto Activation process, the subscriber that is said to receive the call is automatically informed and the application on the subscribers phone automatically accepts the call for a seamless flow. This is done by effectively communicating information about the state of the subscriber, signal strength and the unique reference number for the call.

III. SMART CALL FORWARDING ALGORITHM

We proposed a new algorithm called Smart Call Forwarding algorithm this is applicable with duos mobile phones only.

Algorithm:

Input: Two subscriber numbers to be registered in an android Handset

Step:1 Check the signal strength on both the network on the subscriber's phone and keep a track of both the signal strength.

Step:2 If the call is received on the network with low signal strength then the call forwarding feature to the other network is automatically activated.

Step:3 The call received is automatically received by the application for a seamless transition of the call.

```
While (on call) {

  If (Sim1>=Sim2)
            Present call continues….
  If(sim1<=Sim2)
            Current call auto ends
            Sim2 makes a call to incoming number
mless Transmission of call

If(sim1==sim2)
  No change in current call
}
```

IV. ANALYSIS

Signal Strength and Phone State comparison done from 28 Feb to 1 March 2019 with dual sim mobile with JIO And Airtel Networks we have monitored during different phone status like Ringing, Idle, on call and also After the switchover with our proposed smart call Forwarding algorithm.

Initially application will monitor the both the signal strengths continuously,

We simulated their signal strengths during different conditions and in different climates with different locations.

Experiment conducted with phone IDLE, RINGING and ONCALL states first it will read both subscriber signal level. Whenever a call is established between third party and sim1 in our present handset during conservation if any fluctuations occurs with the signal then signal level drops.in that case if it reaches cut off region the conversation automatically takes over by the sim2 from the current hand set to the called party.

From receivers end they should have this application and it also continuously monitors the signal level. While conversation if there is nay low signal strength of calling then it automatically receives the call from the sim2 of receivers mobile. Then there is intervention in the conversation call is continues

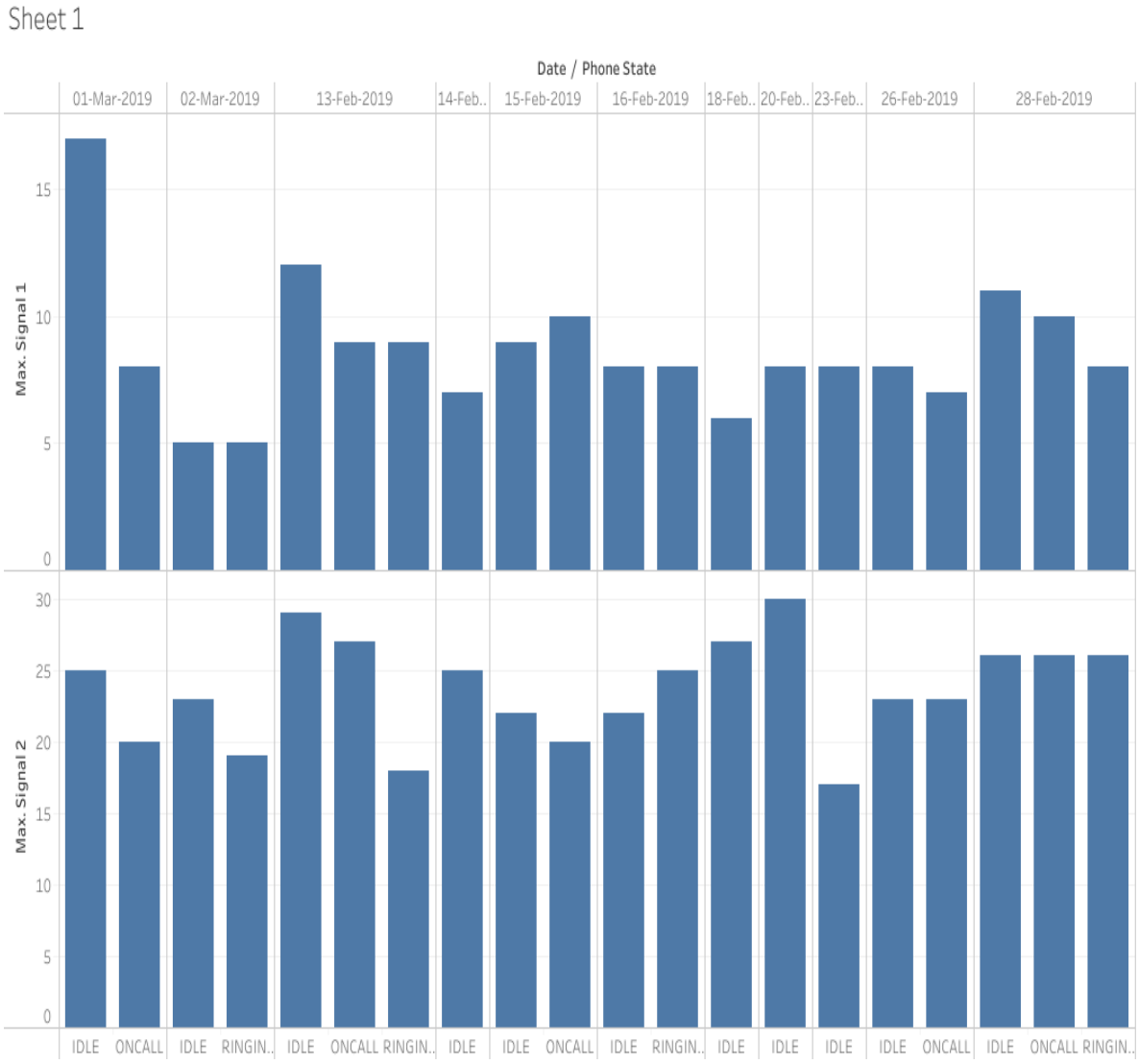

Fig.4.1. comparison between two sims signals with the phone state

V. CONCLUSION

This project describes a deployed smartphone-based activity and application monitoring Call Forwarding takes place within the present handset. Due to difference in bandwidths, the telecommunication companies may provide stronger network at some regions and time, whereas bit weaker at other. This can be taken advantage of, and when one network is unable, the call can be advanced by forwarding to another.

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SMART CALL FORWARDING AND CONDITIONAL SIGNAL MONITORING IN DUOS MOBILE

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In this approach we infer the influence of a smart call forwarding service on the call connection process in modern cellular communication networks in mobiles. We analyze in detail only the case when the called user and call receiver signals strengths are low. It is proved that smart call forwarding not only increases usage of services and the percent of successful calls and prevents call drops and the call dismission. On the simple example, we showed that this call loss increase is greater in the case of local (internal) and incoming calls, but smaller in the case of outgoing calls. The reason for this conditional behavior is within the role of call forwarding operates within the case of internal and incoming signal. In this article different call forwarding techniques in LTE network are discussed. Some of these techniques have a few drawbacks such as the performance of the call forwarding mechanism depends on the channel quality and speed of the mobile node, the smart call forwarding optimizing algorithms tend to increase the switchover rate and the switchover prediction techniques cannot predict the switchover if the signal strengths are low. The survey also indicates the promising factors of the switchover mechanisms in LTE as compared to another cellular strength also this approach discusses about conditional smart call forwarding techniques affairs smart call forwarding function decreases the impact of restricted range of users on the limitation of offered signal strength, scrutiny to the case of internal and incoming signal strength without smart call forwarding. This statement is illustrated by comparison on different phone states when Idle, ringing and outgoing calls. After smart call forwarding function, and with this function when considering, separately, internal, incoming, and outgoing calls after the automatic smart call forwarding with the help of other subscriber identity number which is present in the current mobile hand set

KEYWORDS

Conditional Call Forwarding Busy Service, External & Internal Connection, telephony & subscription manager, Auto answer, auto redial, auto end, Long Term Evolution, Handover, ping-pong rate, Handover optimization, Handover prediction

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1 INTRODUCTION

Modern technologies and modern services appear in modern telephone techniques. That is why calling process [1] models that describe modern cellular telephone systems are also modified and using Android operating mobile cellular phones with dual sim dual operating sim mode for 15 years. Mobile networks provide high end user with wireless services such as voice call, data access, etc. Current LTE system is evolved from 3G system. Cellular network is combination of radio network and core network. Radio network interfaces, User Equipment device with the controller and core network interfaces controller with external IP network.

Each generation of cellular mobile communication network uses verities of radio access technology for its radio access network. Time Division Multiple Access (TDMA) [2] used in 2G allows more number of users to share and access the same cellular frequency channel by dividing the cellular network signal into different time slots. The users always transmit the data in rapid succession, one after the other. Each mobile user uses its own time and frequency slot. This allows various mobile stations to share the same transmission medium. Long Term Evolution (LTE) is an upgraded version of 3G UMTS to meet the most popular mobile users requirements such as high-speed data access with a better Quality of Service (QoS)[3]. 3GPP standard introduces handover mechanism [3] to meet the additional mobile user requirement of handling continuous mobility across multiple cellular regions. During call forwarding process[6], there is a challenge to meet the better QoS especially for real time services such as voice call and handover of call. Call forwarding occurs more frequently in a high-speed mobility. This is also the case when end user is at the edge of the cell. However, there are various techniques that exist to allow for efficient call forwarding to happen without affecting the service experienced by the end user.

Vertical call forwarding [4] is based on the single criteria decision may leads to inefficient call handover therefore multiple criteria for call forwarding is gaining importance due to the enhancements brought by the mobile device models in Fourth Generation (4G) technologies. Since the complexity and processing of multiple criteria during switchover is a complex task requiring high forwarding time leading to the high data packets loss and even in breaking of connection. Moreover, these enhancements are limited to specific situations and hence do not provide support for generic mobility. Similarly, various schemes are suffered from the high dat packet loss, frequent switchover, too early and late switchover, inappropriate network channel selection, etc. In order to rectify these problems a new methodology smart call forwarding based vertical handover decision model in order to improve QoS in various wireless networks. An improved call forwarding technique will also be applied to make the connection alive without any intervention. Call forwarding decision is based on triggers which are generated from different cellular networks based on their threshold value.

1.1 Handover in LTE Networks

Over the last decade a major deal of the researcher and academicians is accentuation on enhancing the information rates and rising Quality of Service (QoS) to supply mobile users an uninterrupted service .Wireless networks [4] , application and devices are undergoing a significant evolution to attain the high information rates. Because of the complexity of the wireless environment, no single technology can be efficient to provide mobile users with high data rate and good Quality of Service (QoS) over all situations. to meet the increasing demand of mobile users, the use of various wireless technologies has increased as it is allowing the mobile users to be connected at anytime and anywhere in different situations. Different kinds

Of wireless networks may incorporate various radio access technologies including GSM, GPRS, HSPA, UMTS, Wi-Fi, Wi-Max and even LTE which is becoming the new 4G standard for wireless communication.

The main objective of the interworking of several heterogeneous networks is to supply with great performances by achieving great rate and provide busy service [2] supporting high quality video telecommunication, continuous and multicasting with high QoS levels and continuous internet services to the users.

Various problems associated with the heterogeneousness of these wireless setting ought to be self-addressed, truly, qualitative and multi-homing management, good resource allocation, security, high QoS support and continuous relinquishment. Handover is the action of moving a Mobile Terminal (MT) from one wireless cell/technology to wireless cell.

2 IMPLEMENTATION OF SMART CALL FORWARDING

2.1 CALL FORWARDING

Call forwarding [1] is an extremely handy life-saving perk used to jump inbound calls to a specified number. Due to difference in channel frequency, the telecommunication companies may provide stronger network at some regions and time, whereas bit weaker at other. when one of the networks are not available, the call can be advanced by forwarding to another.
In smart call forwarding, it must be a smart device with android operating system which supports dual SIMs [9]. Here it has to detect the signal strength always and when the signal strength is below threshold level then the network should automatically switch to another SIM that has high signal strength before call is disconnected.

smart call forwarding mechanism in duos mobile that phone must be dual SIM application based configuring the phone by selecting a dual standby mode with a specific network configuration [7].
Here it automatically identifies the subscriber mobile numbers that are already present in duos mobile.
The options for call forwarding [11] on your phone can be set by using either the Android operating system itself or the controls set up by your cellular network provider.

2.2 SYSTEM FEATURES

Signal Monitoring: It monitors the signal strengths of two of the subscribers which are present in the duos mobile.

- Here it monitors the signal of subscribers.
- It also gives invoice when there is poor network

Auto end: In our application as we monitor signal strength always, when signal strength of the incoming sim is poor then it auto ends the call automatically by our application. When there is a poor network, ongoing call is ended automatically.
Auto switch: After automatically ending the call, the network will switch to another Subscriber in the same duos mobile that has high signal. After call termination, the network is switched to another subscriber that has high signal.
Then it makes an outgoing call from the subscriber that has high signal
Auto connect: Here we automatically make a call to the incoming number from the Subscriber that has high signal in the present duos mobile.

The main objective of ***Smart Call Forwarding*** is to provide the user with a liability to automatically switch between duple SIMs of a phone when there transpires an issue in network. In case of dual SIM handsets, due to difference in bandwidths, the telecommunication companies may provide stronger network at some regions and time, whereas bit weaker at other. when one network is unable, the call can be advanced by forwarding to another. Forwarding calls can increase one's availability to a caller. Here it enhances the regular communication through phone calls by providing a conveyance of call between the subscribers

.

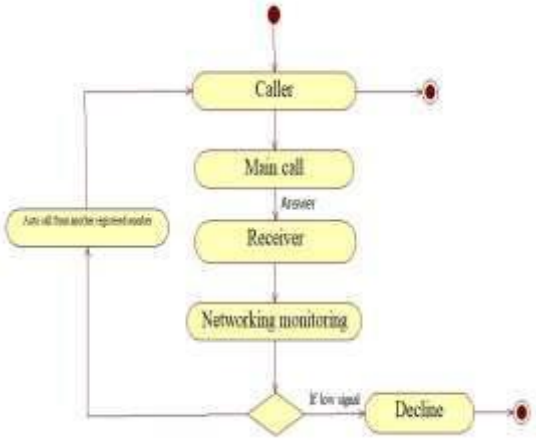


Fig. 1 Establishment of smart call forwarding when active call process

Figure 1. explains about the establishment of smart call forwarding mechanism when the ongoing call which is suffering with poor signal strength then another subscriber automatically takes the action of calling to the incoming number without any intervention in the call process.

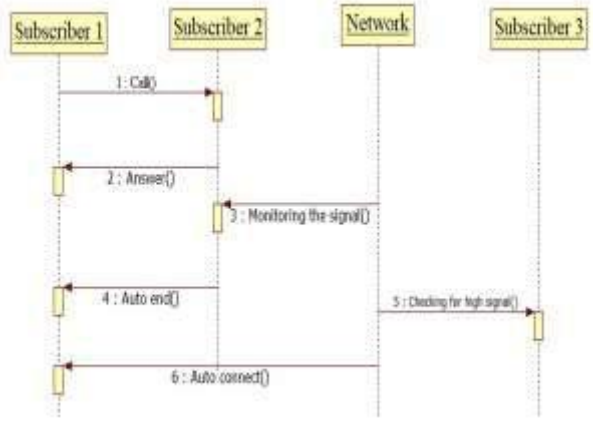
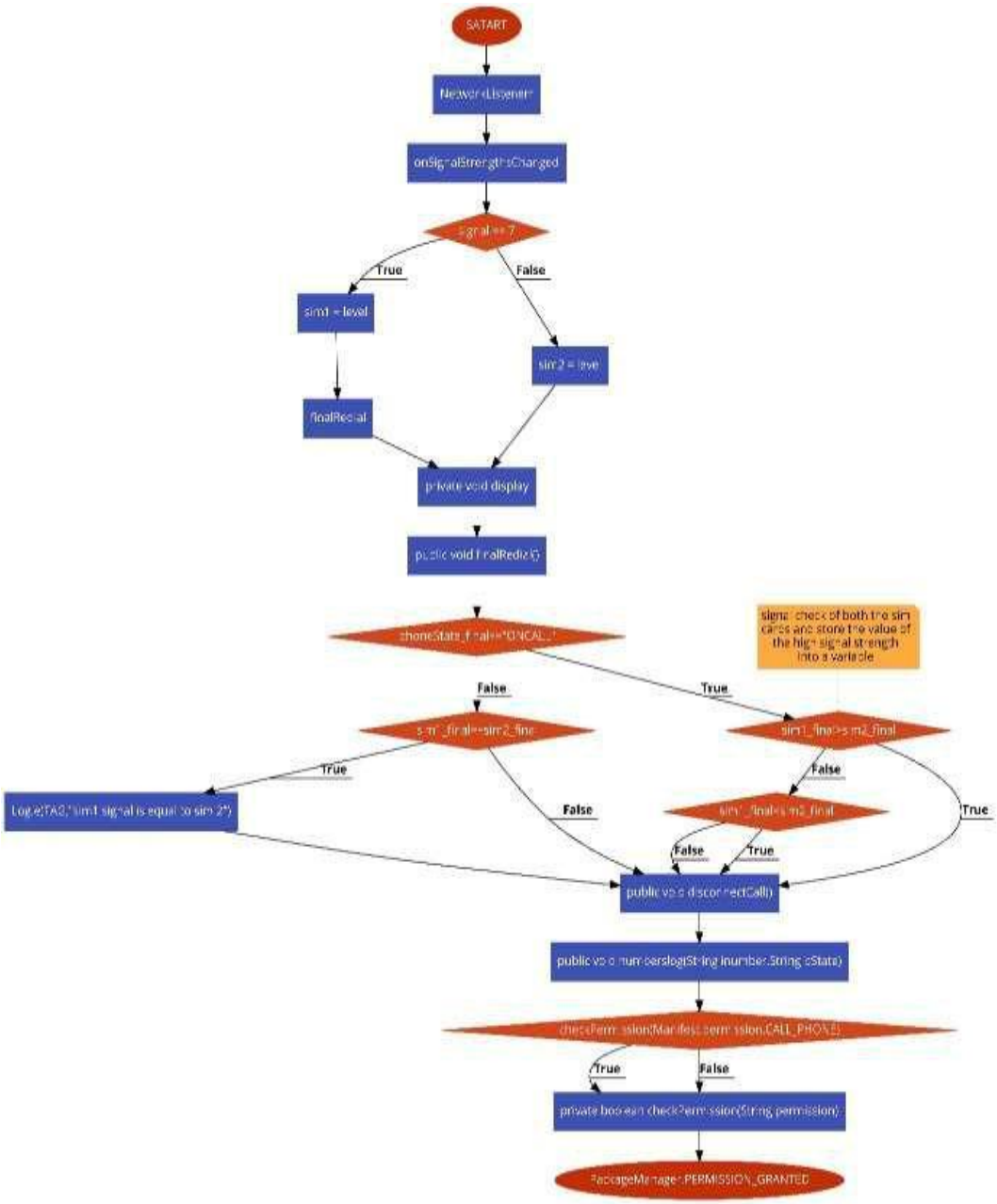


Fig 2: Sequential flow of SCF in call process

Figure 2 Explains the flow how subscriber 1, subscriber 2 are interchanging their call process after the application works. subscriber 3 in in the same handset if it has higher signal rate it handed over the call without delay



SMART CALL FORWARDING FLOWCHART

ALGORITHM 1: SMART CALL FORWARDING ALGORITHM

Smart call forwarding is technique which always monitors the signalling of duos mobile in two sims are present.
Step1: It always monitors the two sims signal rate in Decibels.
Step2: Application will always check with the signal strength of received sim with threshold value.
Step 3: Application compares the two networks signal level

```
While (oncall)
{
        If ( Sim1>=Sim2)
            Present call continues….
        If(sim1<=Sim2)
                    Current call auto ends
                    Sim2 makes a call to incoming number        If(sim1==sim2)
              No disturbance in current cal


    }
```

Step4: After Switchover incoming call sim of called party will get a new call from the other sim from called mobile

```
public void finalRedial(String num,StringpS,int sig1,int sig2)
    {
       if(phoneState_final=="ONCALL")
       {
          if(sim1_final<=poor)
{  Log.e(TAG,"sim1 signal is falling down");
if (eckPermission(  Manifest.permission.CALL_PHONE))
{
setFlags(Intent.FLAG_ACTIVITY_NEW_TASK);
callIntent.setData(Uri.parse("tel:"+ num_final));
startActivity(callIntent);
callIntent.putExtra("com.android.phone.extra.slot", 1);
disconnectCall();
                                Connect_call2(num);
             }
             else {
                "Permission Call Phone denied", }
          }
          else if(sim2_final<=poor)
          {
```

```
Log.e(TAG,"sim2 signal is falling down");
            if (checkPermission(Manifest.permission.CALL_PHONE))
{  disconnectCall();
              connect_call1(num);
            }
            else {
                                Permission denied
            }
          }
          else if (sim1_final==sim2_final)
          {
Log.e(TAG,"sim1 signal is equal to sim 2");
          }
       }
    }
```

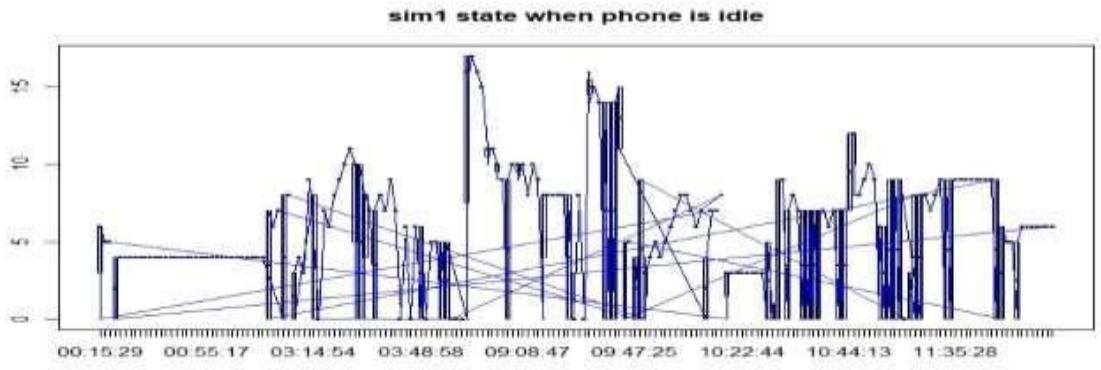
.

4 EXPERIMENTAL RESULTS

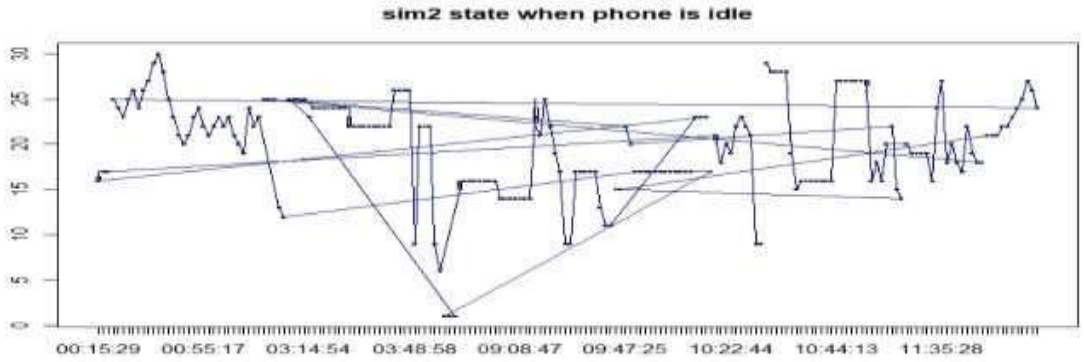
Signal strength monitoring when phone is in different states (idle, ringing, oncall) we have conducted experiments in different places in one day in different times. The two different network one is AIRTEL and Another one is Jio network.

These are the experimental results with signal and time variants.

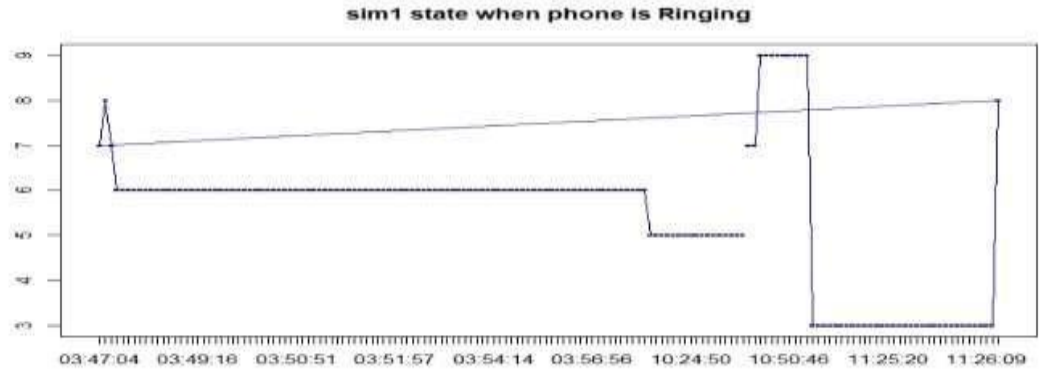
i) Sim1 signal level when phone is Idle.



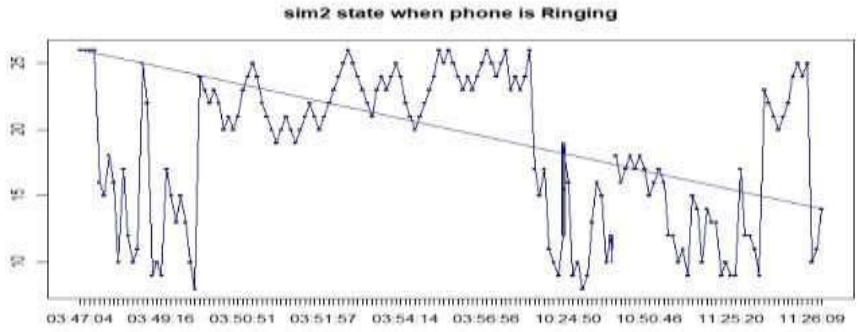
ii) Sim2 signal level when phone is in Idle.



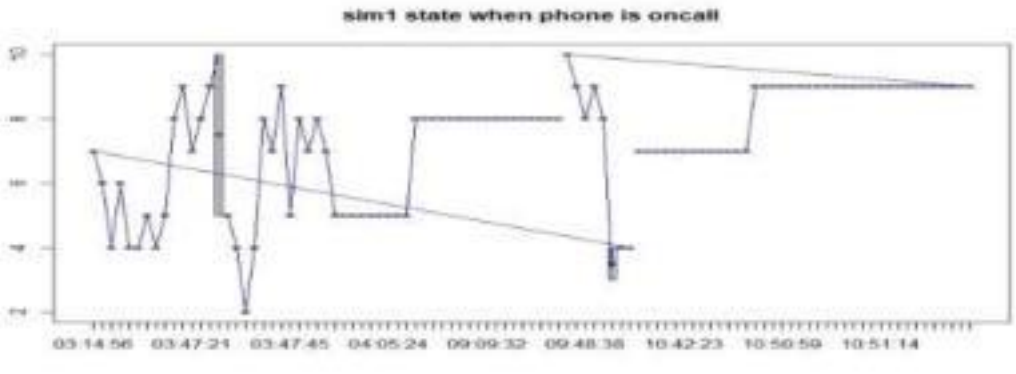
iii) Sim1 signal level when phone is in Ringing.



iv) Sim2 signal level when phone is in Ringing.



v) Sim1 signal level when phone is in Oncall.

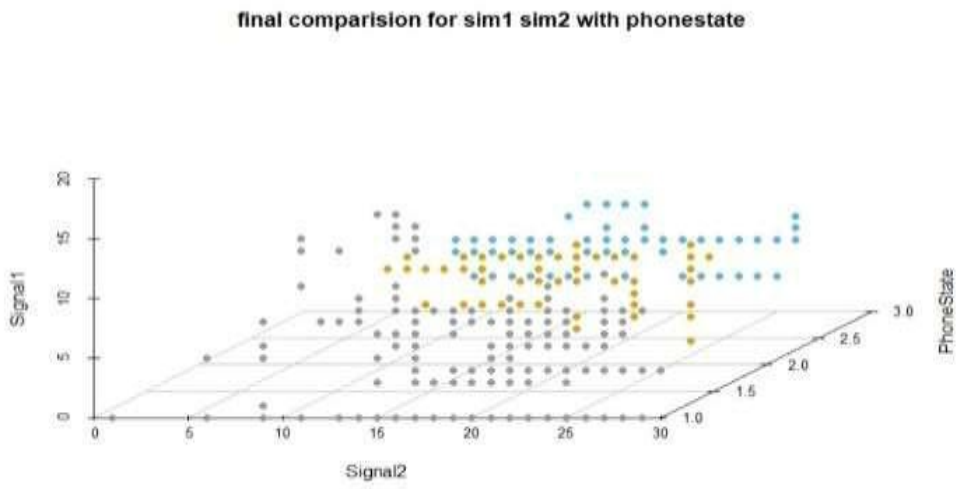


vi) Sim2 signal level when phone is in Oncall.

By comparing the signal levels with different phone state and at different times whenever one sim is under poor signal strength while conversation our application will automatically detect the threshold value when it reaches the threshold value the call automatically takes place with another sim which is present in the current handset and the call will be continues.

Final comparison after switchover takes place the incoming number is detected by the another sim and it automatically connects the call without any intervention.

vii) Final comparison with different phone states and two signal levels



After switchover the call continues this application is useful whenever there is more signal fluctuations happened when there is an important conversation call will not be terminated rather it smart call forwarded with another sim from present handset.

5 CONCLUSIONS

This project describes a deployed smartphone-based activity and application monitoring Call Forwarding takes place within the present handset. Due to difference in bandwidths, the telecommunication companies may provide stronger network at some regions and time, whereas bit weaker at other. This can be taken advantage of, and when one network is unable, the call can be advanced by forwarding to another

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