MINIMIZATION OF CALL DROP IN CODE DIVISION MULTIPLE ACCESS 2000IX IN 3G WIRELESS NETWORKS

Udeh I.J, Offia I.S, Ibekwe B.E
Department of Electrical and Electronics, Engineering
Enugu State University of Science and Technology, *Enugu State Nigeria*
jamesudeh145@yahoo.com

Abstract: This paper focuses on the minimization of call drop in code division multiple access 20001x in 3G wireless Network System. During the data collection procedure the average calls intensity expressed in terms of the average attempt calls, as well as the number of answered calls and busy calls for each A-interface route at mobile station controller test point were collected from the operation and maintenance center which is made by Accalel with model number 165R and has a maximized capacity of 50,000 cells and 15,000 transmitter. There data were collected 24 hours for days, months at daily bases. Results show that between 9.00am and 10.ooam 17203 calls were answered which is 59% of the total calls at arrived at the network while between 11.00pm and midnight 25% of the attempted were answered compare to the former rate of reduction.

Keywords: Call Drop, CDMA2000Ix, Pseudo code, 3G wireless Mobile.

1.0 Introduction

In recent times, it has been noticed that most of the wireless networks do not meet the need of their subscriber in terms of the provision of high quality voice and data rate services. These wireless network operators instead of concentrating on providing the solution to the existing problem prefer to accumulate many subscribes on their network. Several attempts such as adding more base stations or relocating base stations have been made by these wireless network operators to proffer solution to the existing problem but all efforts yielded minimal results because the fundamental cause of the problem has not been identify. Call drop has been identified as one of the fundamental cause of the unsatisfactory voice and data services rendered to subscribers. Call drop is a measure of the ability of the network to maintain a call until it is terminated [1]. Call drop on wireless network can result from network transmission, handoff, interference, data traffic, weak signal, and equipment default [2]. Code Division Multiple Access (CDMA) 20001x is one of the third generation wireless networks that is prone of the existing problem resulting from call drop. In CDMA20001x network, special pseudo codes are used to identify and separate users on the network [3]. Therefore, in order to proffer solution to this existing problem of unsatisfactory voice and data services from the wireless network, the

investigation of call drop in CDMA20001x network must be carried out so as to provide a guide for the solution of the problem.

2.0 Evolution of 3G Mobile Communication

The evolution of mobile communication from Second Generation (2G) network to third Generation (3G)

network is shown in Figure 1 Below. The widespread success of mobile communication has led to the development of new wireless systems and standards

which are Global System of Mobile Communication (GSM), Pacific Digital Cellular (PDC), Integration of Digital Enhance Network (IDEN), Interim Standard 136 (IS-136), and Interim Standard 95A (IS- 95A). These are all 2nd Generation (2G) mobile communication system [4]. General Packet Radio Service (GPRS), part of Enhanced Data Rates for GSM Evolution (EDGE) and IS-95B are 2.5 Generation (2.5G). The Universal Mobile Telecommunication System (UMTS), IXRT CDMA2000 subdivided into IXEV-Do, CDMA2000 and IXEV-VD CDMA2000 are, third Generation (3G) mobile communication systems. The GSM account for 65% of the world mobile digital market while CDMA2000 is 20%[5].

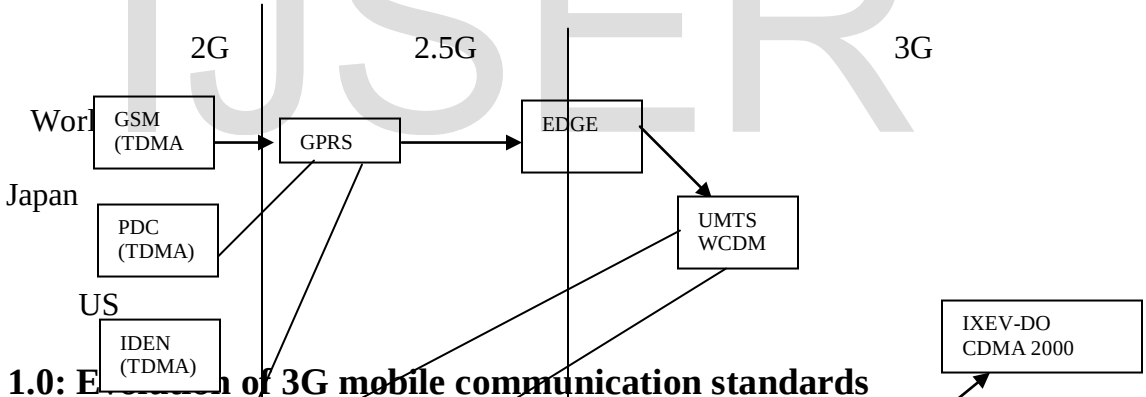


Fig: 1.0: Evolution of 3G mobile communication standards

3.0 [illegible]tion

Figure 2 shows the block diagram of the collection point for the traffic data. The traffic [illegible] obtained from Operation Maintenance Centre (OMC) of the CDMA20001x network. The OMC network element is inbuilt inside the mobile communication network. The OMC run of UNIX operating system and other special software that are incorporated into a counter situated at the Base Station Controller (BSC) and Mobile Station Controller (MSC) point. The BSC and MSC are connected to the OMC [illegible]. The [illegible]llected dur[illegible]experi[illegible]rom a Visafone network which is a CDMA20001x network located along Enugu/Port Harcourt expressway in Enugu State of Nigeria. The base station from where the filed data was collected was designated EN 001. Following the collection of data procedure, the average calls intensity expressed in terms of the

average attempt calls, as well as the number of answered calls and busy calls for each A-interface route at MSC test point were presented for 24 hours daily as shown in Table 1.

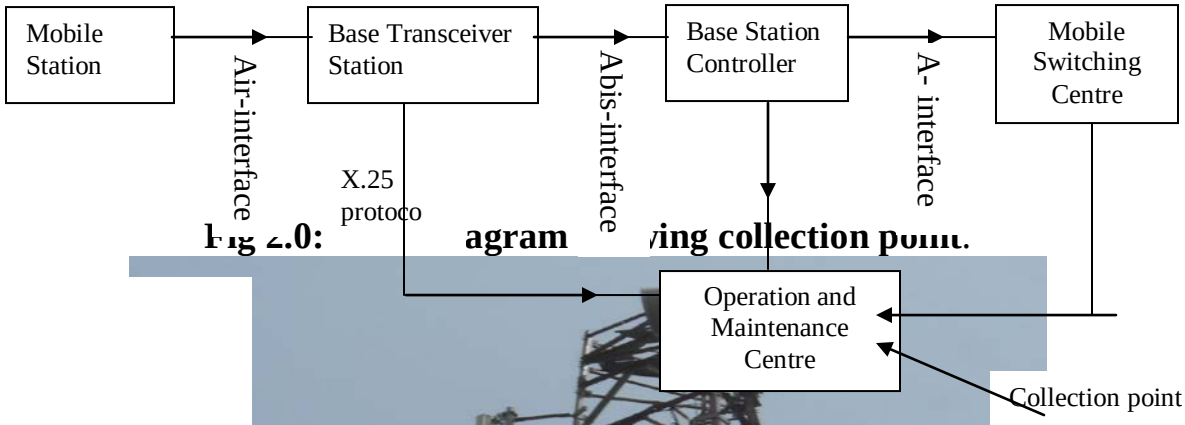


Fig 2.0: agram ing collection point.

Fig 3.0: Test bed Environment of the Base Stations used

Figure 3.1: Measurement Setup

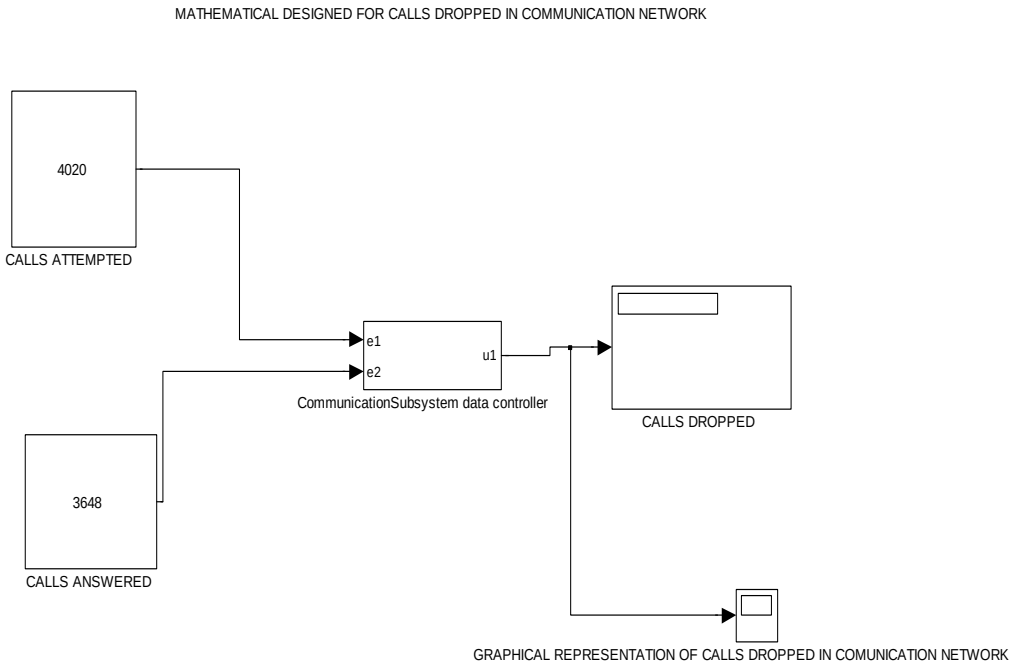


Fig 3.2

4.0 Data Presentation and Analysis

The calls intensity data collected which include calls attempted, calls answered, call drop in shown in days and months where shown in table 3 and 4 respectively while the graphical presentation of the calls attempted, calls answered and call drop against time is shown in Figure 4,5 and 6 respectively.

Table 4.1: Field Data Measurements

Time in Hours	Calls Attempted	Calls Answered	Call Drop
00.00-01.00	4099	3944	155
01.00-02.00	5012	4664	348
02.00-03.00	3775	3246	529
03.00-04.00	2216	1925	291
04.00-05.00	1726	1426	300
05.00-06.00	5835	4873	962
06.00-07.00	16925	9025	7900
07.00-08.00	21999	12979	9020
08.00-09.00	29780	16423	13357
09.00-10.00	36108	18203	17905
10.00-11.00	23199	17923	14276
11.00-12.00	27437	15803	11634

12.00-13.00	25309	14964	10345
13.00-14.00	24157	14457	9700
14.00-15.00	18406	16906	1500
15.00-16.00	29314	17519	11795
16.00-17.00	17428	11287	6141
17.00-18.00	16291	9557	14734
18.00-19.00	15107	16702	1000
19.00-20.00	22523	12443	10080
20.00-21.00	25927	25937	110
21.00-22.00	11900	6110	5790
22.00-23.00	11907	7237	4670
23.00-24.00	5057	3857	1200

Table 4.2: Statistics for call attempted, calls answered and call drop for the Month of December to May.

Time in months	Call attempted	Calls answered	Call drop
December	1580352	11853264	3951088
January	10002166	7815692	2186474
February	9009657	7264901	1744756
March	8802281	7198946	1603335
April	12807657	10416472	2391185
May	9001114	7650947	135067

Table 4.3: Statistics for cells measured for one week

Time in day	Calls attempted	Calls answered	Calls drop
Sunday	265890	243956	21934
Monday	396734	296690	100044
Tuesday	375690	296789	78901
Wednesday	369956	345986	23970
Thursday	358690	286674	72016
Friday	333268	255716	87552
Saturday	316543	224848	91695

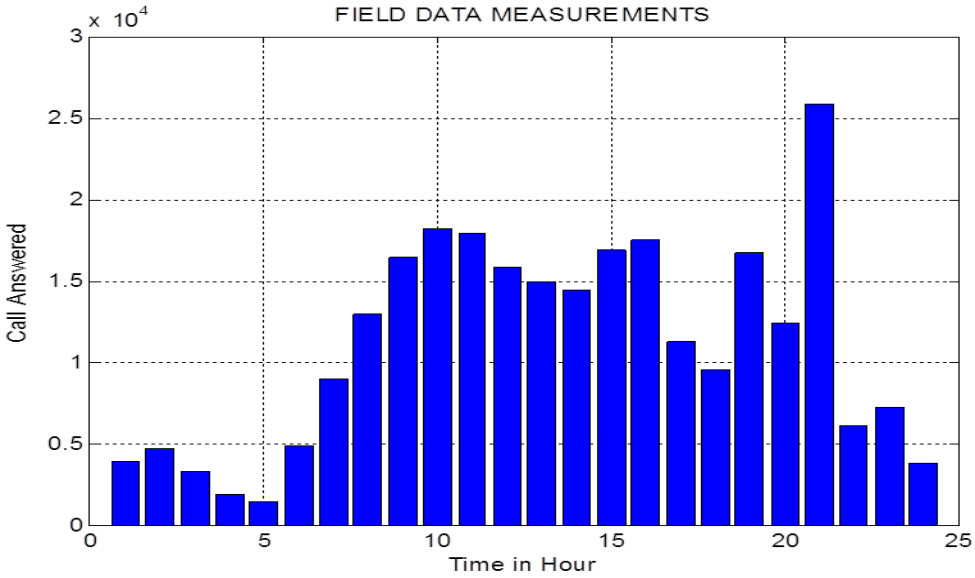
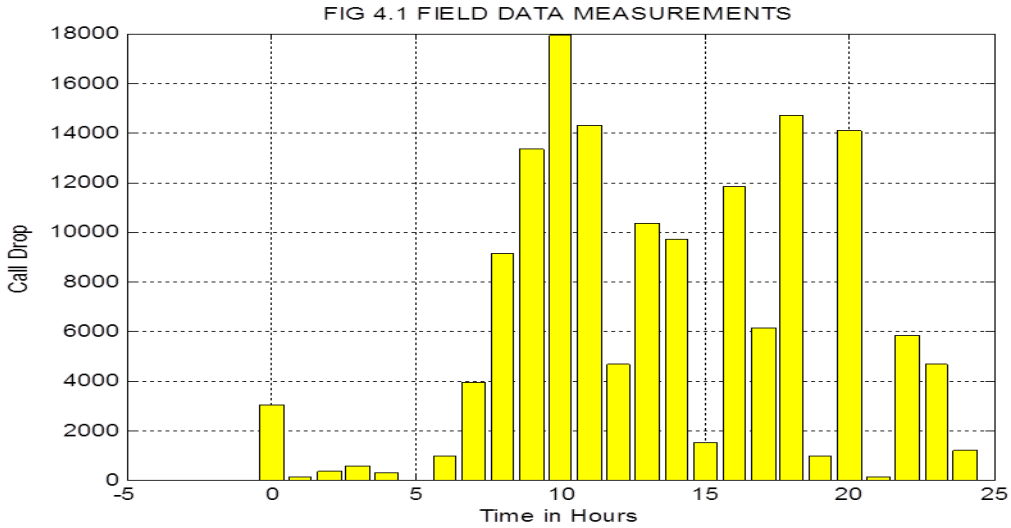


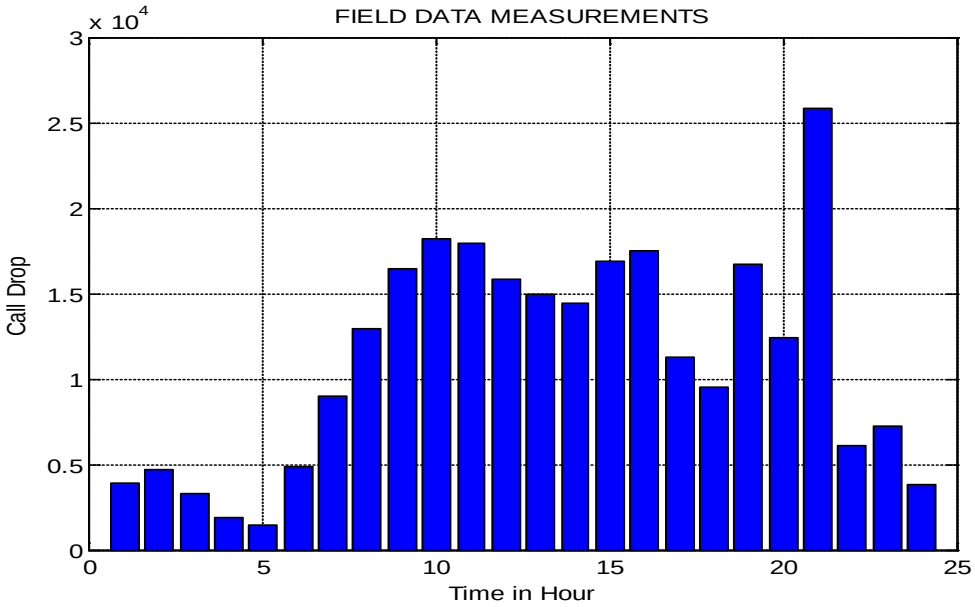
Fig 4.1: Plot of calls attempted against time.

In Figure 3, it was observed that between 09.00 am and 10.00am that the network was at its peak with over 33000 calls arriving in the network. The call arrival rose up again between 2pm and 4pm after which it came down to 4957 calls between 11pm and 12midnight probably when subscribe have gone to bed, the minimum calls arrival were experienced between 04.00am and 5.00am with only 1698 calls. The average number of calls experienced by the network is 16724 calls.



In Figure 4.2, the rate at which call drop is minimal between 1.00am to 5.00am. It was observed, that between 9.00am and 10.00am that 17203 calls were answered which is 52% of the total calls that arrived the network. Between 11.00pm and 12midnight 75% of the calls attempted were answered. It was so because the base station carrier is not enough to carry the number of calls that

was attempted in the network at busy hours



In Figure 4.3: it was observed that on Mondays there were heavy traffic on the network. This is because it is the beginning of the business activities for the week and many subscribers are calling for different business activities. As the week runs down the traffic become less.

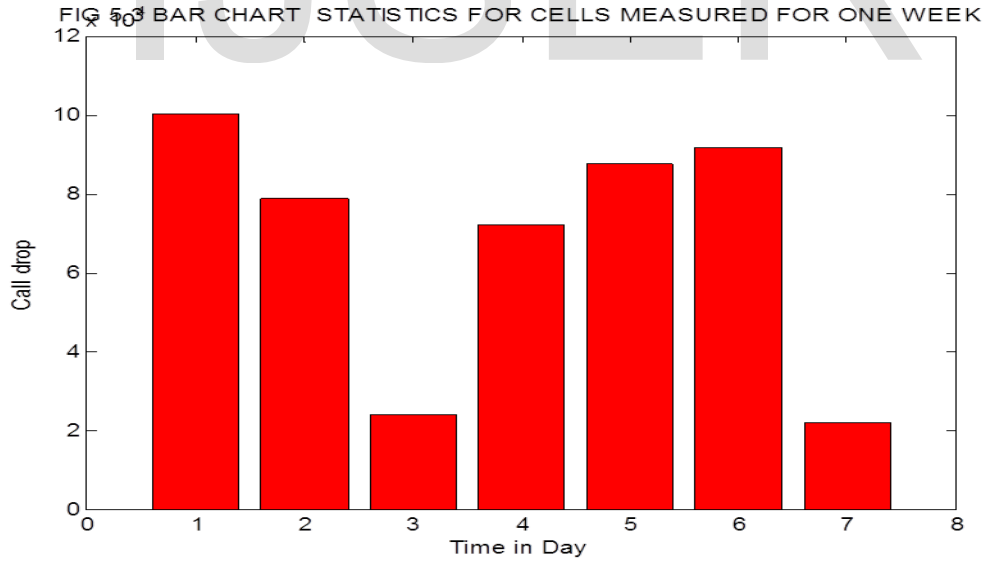


Fig 4.4

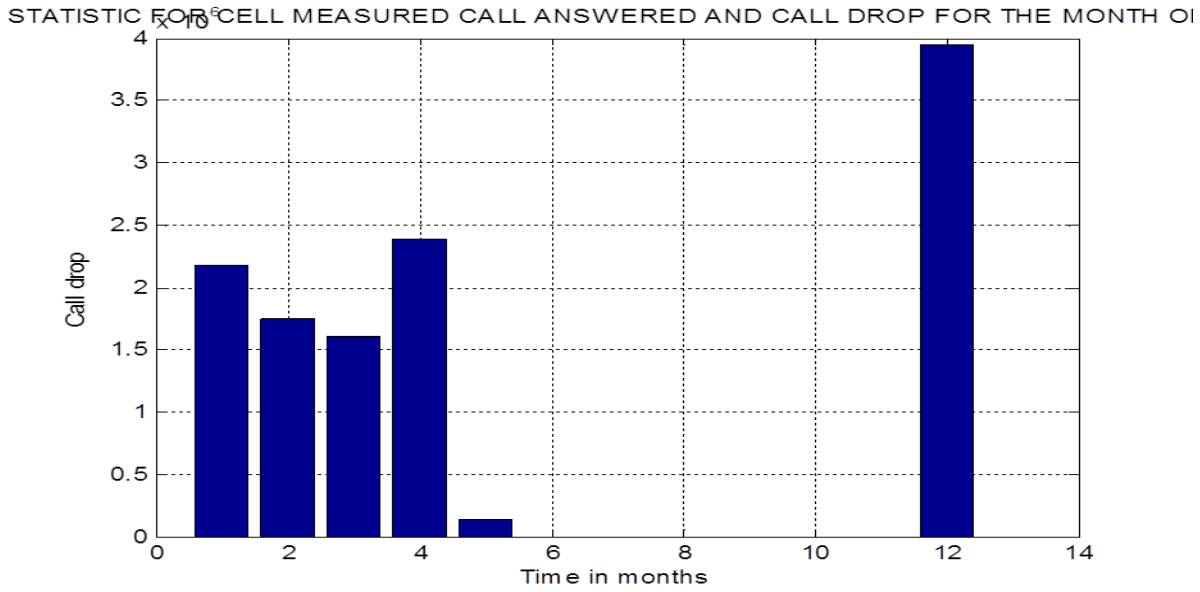


Fig 4.5

5.0 Conclusion

In this paper, the various causes of call drop in wireless network have been identified. It was observed from the traffic data measured, that excessive call drop in the network was as a result of longer response time for handoff request, insufficient base stations to accommodate the number of subscribers, overloading the exchanges without corresponding route dimensioning, and improper matching of the hand shake between BTS and other BTS as well as the MSC.

REFERENCES

[1] Abudulova, V. and Aybay, 1. (2006) "Handoff Prioritizating Schemes in Cellular Wireless Networks". IEEE Computer Networks Symposiums. 16 (18), Pp 1-6.

[2] Ariton, E and Xhafa, (2005), "Dyamic Priority Queuing of Handoff Calls in Wireless Network". An Analytical Framework. 22 (5), Pp. 904916.

[3] Garg, v.k., (2005), "IS-95 CDMA and CDMA2000". Cellular/PCS System Implementation, Prentice Hall PRT. pp 221-224.

[4] Rappaport S.T.(2003), "Wireless Communication Principles nd Practice, 2nd Edition, Prentice Hall of India Private Limited", New Delhi, Page 35-62.

[5] Nigeria Communication Commission Technical Report, 3/9/2010,pp5-6(www.ncc.gov.ng).

[6] Juha K., (2003), "Introduction to 3G Mobile Communication", Second Edition, Artech House, Inc, Page 233-278.