

MOBILE BROADBAND SPEED AND DATA VOLUME ANALYSIS

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ABSTRACT

This work carries out mobile broadband speed and data volume analysis of three GSM service providers (MTN, GLO and AIRTEL) in Okada, Edo State of Nigeria. The download and upload speeds as well as the data volume were investigated under certain conditions. The modems for the three different GSM Networks were made available while a software (NETWORX) was used to monitor the traffic. The data and graphical representation of each of the service provider's speed and data volume was presented over a period of time. A critical analysis of the data and graphs showed that MTN network provides better service irrespective of the condition followed by GLOBACOM and AIRTEL networks in Okada town.

KEYWORDS: GSM, Broadband, Download, Upload, Bandwidth, Modem, Data, Speed

INTRODUCTION

Mobile Broadband is a wireless internet access technology which allows connection to the internet at anytime and anywhere. mobile broadband means "having instantaneous bandwidths greater than 1MHz and supporting data rates greater than about 1.5Mbit/s. [1] [2] Wireless Broadband networks feature speeds roughly equivalent to wired broadband networks, such as that of ADSL or a cable modem. [3] [4] Wireless Broadband networks can also be Symmetrical, meaning bandwidth travelling in both directions (download/upload), which is most commonly associated with 'Fixed Wireless' networks. A Fixed Wireless network link is a stationary terrestrial wireless connection (similar to satellite, but with far superior speeds), rather than mobile, which allows for greater speeds. Most broadband wireless access services are estimated to have a range of 50 km (30 miles) from a tower [5] [6]

Mobile broadband is different from standard fixed-line broadband because it works via the mobile phone networks. Whereas fixed lines run on copper wires or fibre-optic cables, mobile broadband is a wireless solution. It is also different from Wi-Fi because you can access broadband from anywhere that provides mobile coverage, which is the vast majority of the country.[7] [8]

Mobile broadband uses a 3G technology which provides download speeds of up to 7.2Mbps. A 3G technology refers to pending improvements in wireless data and voice communication through any of a variety of proposed standards. [9] [10]

METHODS

The software (Network) was installed on three PCs (Personal Computers). After installation, the modem of each of the service provider was inserted into one of the ports of each PC. It then records the speed, downloading and uploading

rate as well as the data volume of each service provider over a period of fourteen (14) days. The modem of each of the service provider was inserted into a each PC so as to measure the Incoming and Outgoing Current Transfer Rate, Incoming and Outgoing Average Transfer Rate, Incoming and Outgoing Maximum Transfer Rate.

The Average Download/Upload Rate measures the hourly download/Upload rates of each of the service provider's modem in kilobits/seconds (Kbits/s). The Average Download/Upload Volume measures the hourly download/Upload volume of each of the service provider's modem measured in kilobytes (KB).

The average of the hours for each day was taken with particular interest on when the weather was normal and when there was rainfall since this tends to affect the parameters under consideration so that proper analysis could be made. This was done over a spread period of fourteen (14) days for both clear weather as well as raining weather and the results are presented.

RESULTS

Table 1: MTN Reading Speed during Normal Climate

	Average DL Rate	Average UL Rate	DL Volume	UL Volume	Average Total Data Volume
Day 1	7.99 kbit/s	1.66 kbit/s	3.43 MB	728 KB	4.14 MB
Day 2	240 bit/s	104 bit/s	108 KB	48.8 KB	157 KB
Day 3	14.0 kbit/s	2.75 kbit/s	5.99 MB	1.18 MB	7.17 MB
Day 4	26.0 kbit/s	4.34 kbit/s	11.2 MB	1.87 MB	13.0 MB
Day 5	21.2 kbit/s	3.25 kbit/s	9.08 MB	1.39 MB	10.5 MB
Day 6	96 bit/s	96 bit/s	45.1 KB	42.7 KB	87.8 KB
Day 7	7.91 kbit/s	2.43 kbit/s	3.40 MB	1.05 MB	4.44 MB
Day 8	21.3 kbit/s	3.94 kbit/s	9.16 MB	1.69 MB	10.9 MB
Day 9	22.2 kbit/s	3.94 kbit/s	9.53 MB	1.69 MB	11.2 MB
Day 10	5.38 kbit/s	1.87 kbit/s	2.31 MB	825 KB	3.12 MB
Day 11	1.86 kbit/s	616 bit/s	821 KB	273 KB	1.07 MB
Day 12	2.88 kbit/s	1.81 kbit/s	1.24 MB	795 KB	2.01 MB
Day 13	4.91 kbit/s	2.35 kbit/s	2.11 MB	1.01 MB	3.12 MB
Day 14	4.01 kbit/s	2.03 kbit/s	1.72 MB	894 KB	2.59 MB

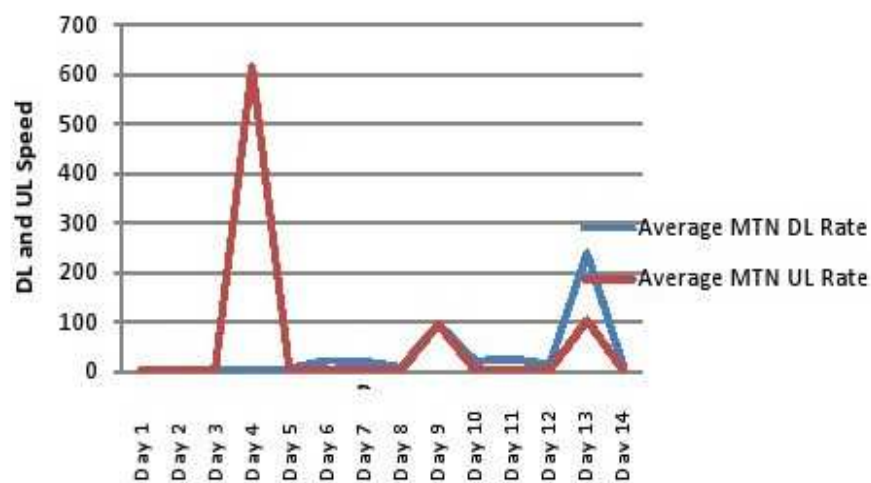


Figure 1a: MTN Upload and Download Rate (Normal Climate)

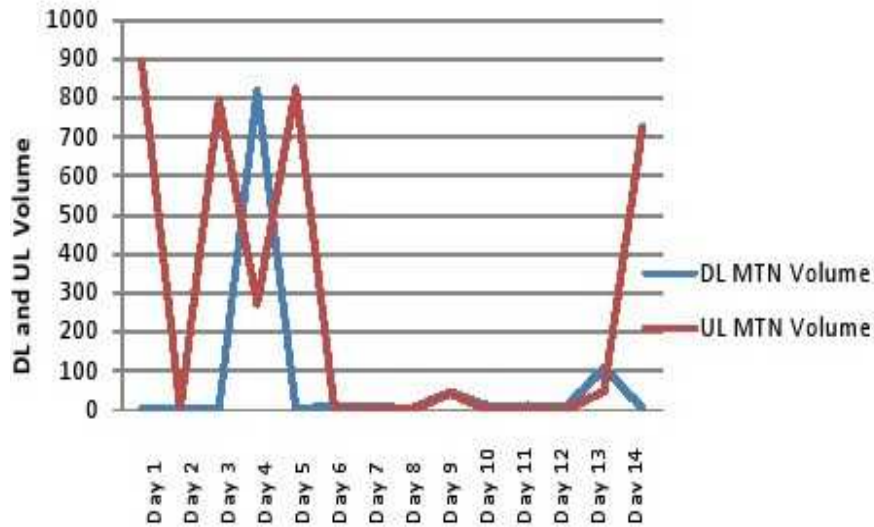


Figure 1b: MTN Upload and Download Volume (Normal Climate)

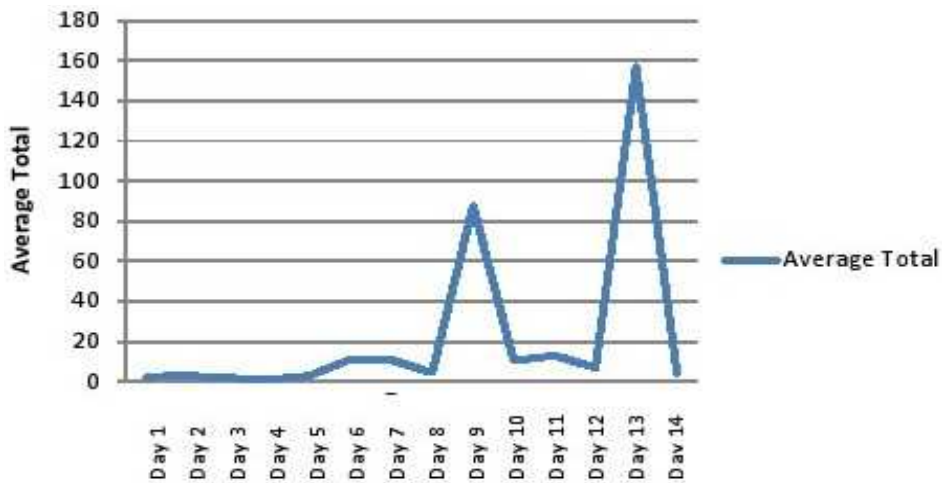


Figure 1c: MTN Average Volume (Normal Climate)

Table 2: GLOBACOM Reading Speed during Normal Climate

	Average DL Rate	Average UL Rate	DL Volume	UL Volume	Average Total Data Volume
Day 1	9.54 kbit/s	2.74 kbit/s	4.10 MB	1.18 MB	5.27 MB
Day 2	8.24 kbit/s	2.87 kbit/s	3.54 MB	1.23 MB	4.77 MB
Day 3	8.23kbit/s	2.42kbit/s	3.53 MB	1.04 MB	4.57 MB
Day 4	5.33 kbit/s	3.44 kbit/s	2.29 MB	1.48 MB	3.77 MB
Day 5	5.81 kbit/s	2.76 kbit/s	2.50 MB	1.18 MB	3.68 MB
Day 6	8.74 kbit/s	3.10 kbit/s	3.75 MB	1.34 MB	5.09 MB
Day 7	4.28 kbit/s	2.55 kbit/s	1.84 MB	1.10 MB	2.94 MB
Day 8	2.84 kbit/s	1.72 kbit/s	1.22 MB	756 KB	1.96 MB
Day 9	5.13 kbit/s	2.24 kbit/s	2.20 MB	0.96 MB	3.16 MB
Day 10	10.0 kbit/s	2.99 kbit/s	4.31 MB	1.28 MB	5.59 MB
Day 11	10.3 kbit/s	2.77 kbit/s	4.41 MB	1.19 MB	5.60 MB
Day 12	2.94 kbit/s	1.57 kbit/s	1.27 MB	689 KB	1.94 MB
Day 13	8.71 kbit/s	2.22 kbit/s	3.74 MB	0.95 MB	4.69 MB
Day 14	56 bit/s	0 bit/s	25.4 KB	2.67 KB	28.1 KB

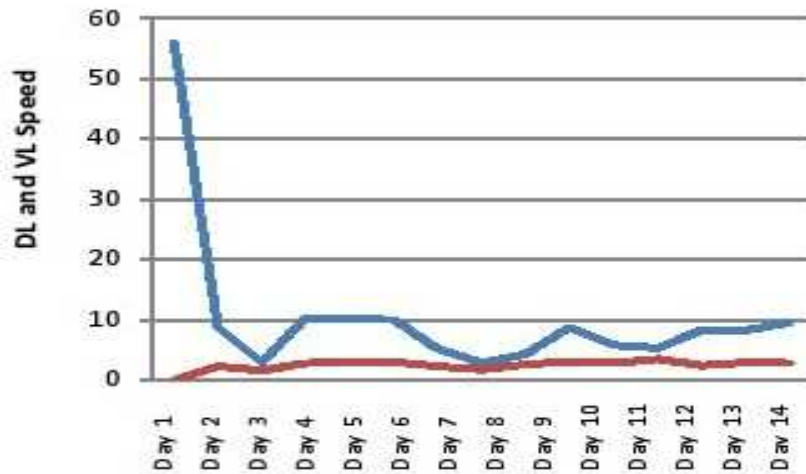


Figure 2a: GLO Upload and Download Rate (Normal Climate)

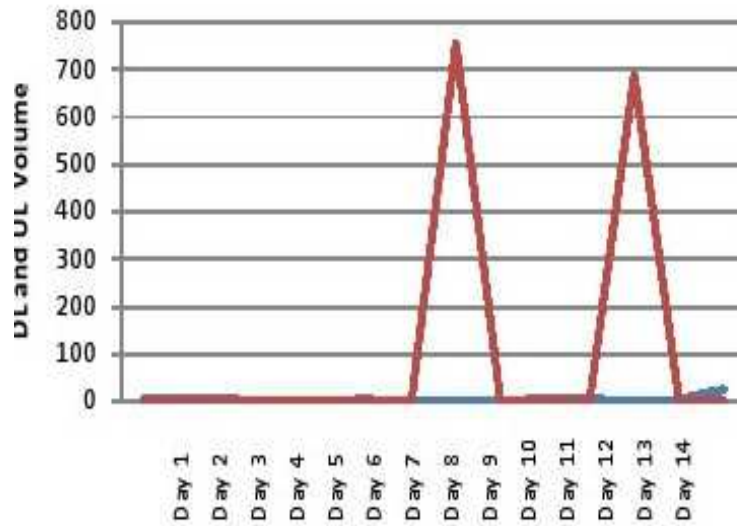


Figure 2b: GLO Upload and Download Volume (Normal Climate)

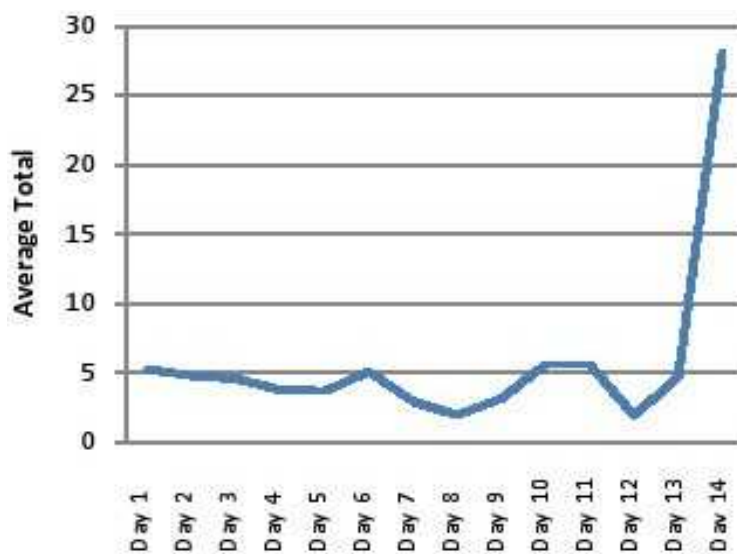


Figure 2c: GLO Average Volume (Normal Climate)

Table 3: AIRTEL Reading of Speed during Normal Climate

Date	Average DL Rate	Average UL Rate	DL Volume	UL Volume	Average Total Data Volume
Day 1	152 bit/s	40 bit/s	66.9 KB	17.9 KB	84.8 KB
Day 2	4.96 kbit/s	1.71 kbit/s	2.13 MB	755 KB	2.87 MB
Day 3	7.54 kbit/s	2.79 kbit/s	3.24 MB	1.20 MB	4.44 MB
Day 4	2.85 kbit/s	1.29 kbit/s	1.22 MB	569 KB	1.78 MB
Day 5	3.10 kbit/s	2.09 kbit/s	1.33 MB	919 KB	2.23 MB
Day 6	5.27 kbit/s	3.55 kbit/s	2.26 MB	1.53 MB	3.79 MB
Day 7	1.60 kbit/s	528 bit/s	706 KB	235 KB	941 KB
Day 8	2.53 kbit/s	1.09 kbit/s	1.09 MB	479 KB	1.55 MB
Day 9	9.14 kbit/s	8.11 kbit/s	3.92 MB	3.48 MB	7.40 MB
Day 10	776 bit/s	544 bit/s	341 KB	241 KB	582 KB
Day 11	3.67 kbit/s	1.46 kbit/s	1.58 MB	645 KB	2.21 MB
Day 12	6.03 kbit/s	2.70 kbit/s	2.59 MB	1.16 MB	3.75 MB
Day 13	424 bit/s	520 bit/s	187 KB	231 KB	418 KB
Day 14	15.9 kbit/s	2.02 kbit/s	6.84 MB	887 KB	7.70 MB

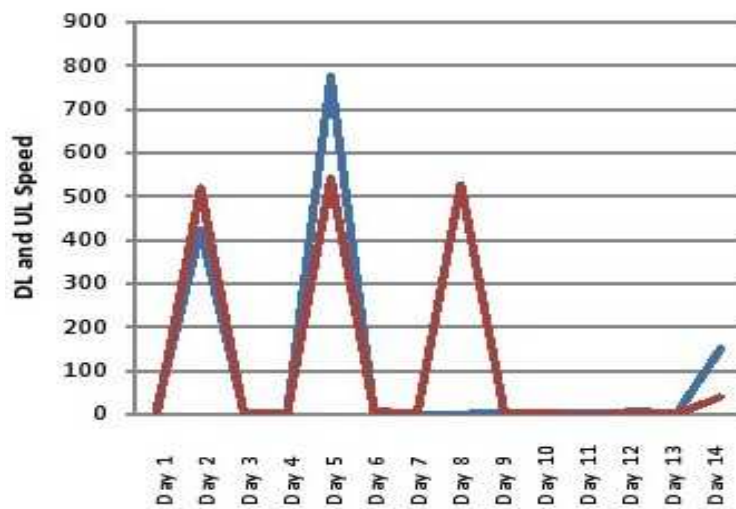


Figure 3a: AIRTEL Upload and Download Rate (Normal Climate)

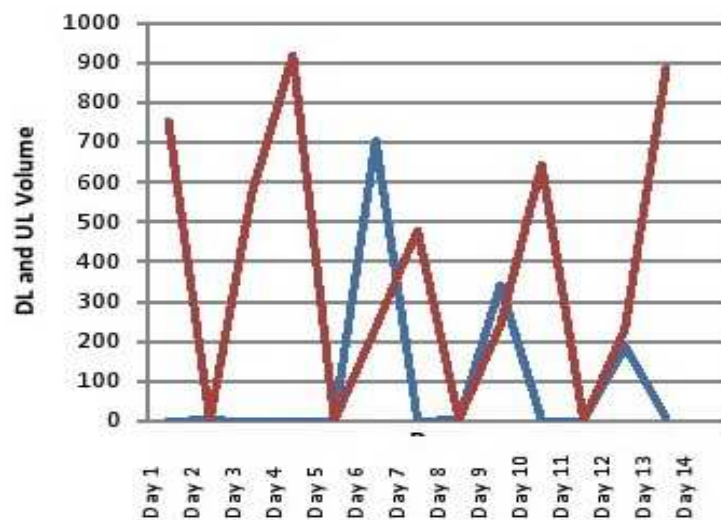


Figure 3b: AIRTEL Upload and Download Volume (Normal Climate)

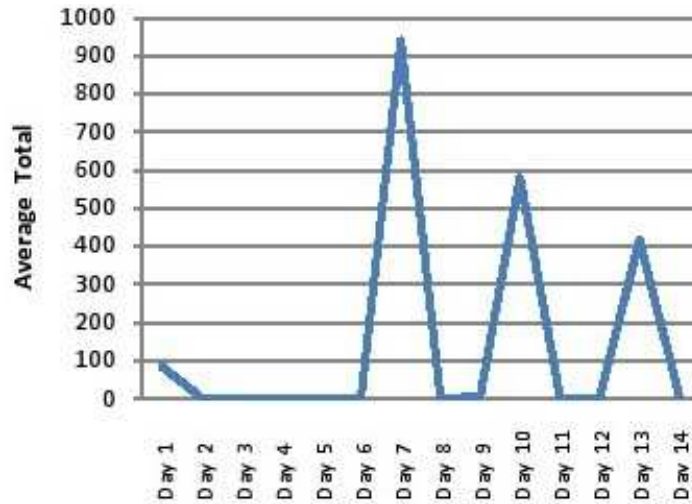


Figure 3c: AIRTEL Average Volume (Normal Climate)

Table 4: GLOBACOM Reading Speed during Rainfall

	Average DL Rate	Average UL Rate	DL Volume	UL Volume	Average Total Data Volume
Day 1	0 bit/s	0 bit/s	0 bytes	0 bytes	0 bytes
Day 2	736 bit/s	408 bit/s	326 KB	182 KB	508 KB
Day 3	0 bit/s	0 bit/s	0 bytes	0 bytes	0 bytes
Day 4	4.87 kbit/s	1.09 kbit/s	2.09 MB	481 KB	2.56 MB
Day 5	2.70 kbit/s	1.10 kbit/s	1.16 MB	486 KB	1.64 MB
Day 6	48 bit/s	200 bit/s	23.3 KB	90.2 KB	114 KB
Day 7	152 bit/s	56 bit/s	69.8 KB	25.9 KB	95.7 KB
Day 8	14.2 kbit/s	2.42 kbit/s	6.10 MB	1.04 MB	7.14 MB
Day 9	16 bit/s	0 bit/s	7.60 KB	324 bytes	7.91 KB
Day 10	402 bit/s	144 bit/s	181 KB	64.8 KB	246 KB
Day 11	10.9 kbit/s	1.44 kbit/s	4.68 MB	634 KB	5.30 MB
Day 12	4.15 kbit/s	880 bit/s	1.78 MB	387 KB	2.16 MB
Day 13	8.31 kbit/s	904 bit/s	3.57 MB	399 KB	3.96 MB
Day 14	7.47 kbit/s	1.23 kbit/s	3.21 MB	543 KB	3.74 MB

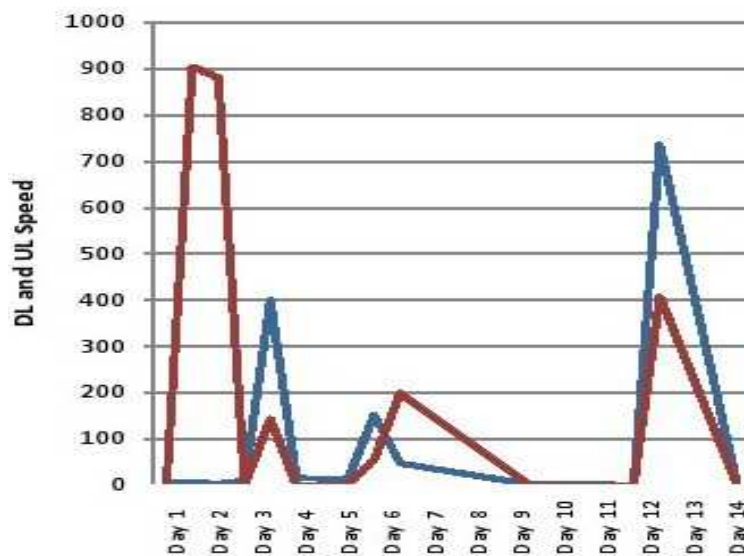


Figure 4a: GLO Upload and Download Rate (Rainfall)

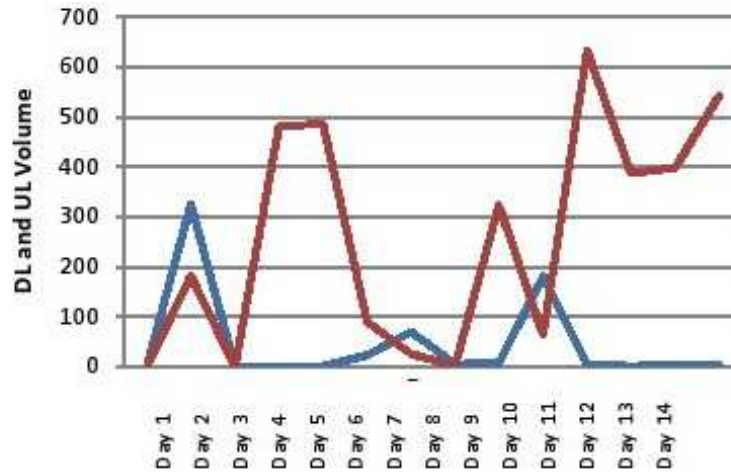


Figure 4b: GLO Upload and Download Volume (Rainfall)

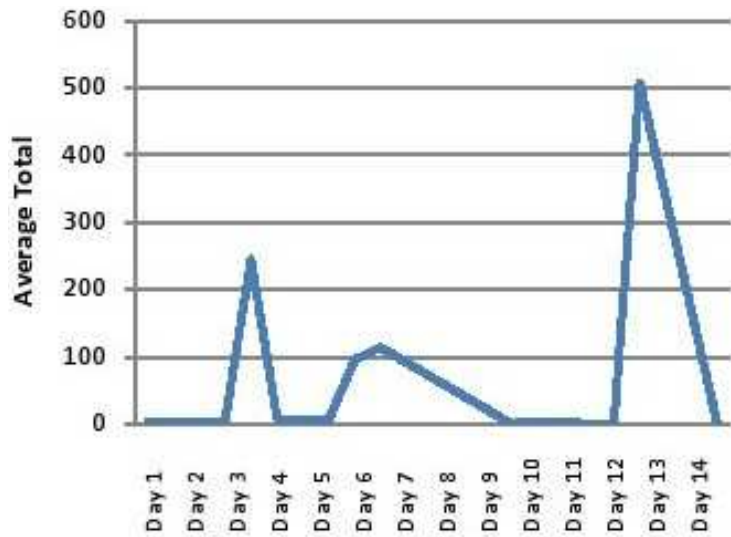


Figure 4c: GLO Average Volume (Rainfall)

Table 5: MTN Reading Speed during Rainfall

	Average DL Rate	Average UL Rate	DL Volume	UL Volume	Average Total Data Volume
Day 1	4.39 kbit/s	648 bit/s	1.89 MB	287 KB	2.17 MB
Day 2	480 bit/s	2.29 kbit/s	214 KB	369 KB	584 KB
Day 3	9.06 kbit/s	2.04 kbit/s	3.89 MB	0.98 MB	4.87 MB
Day 4	8.69 kbit/s	2.74 kbit/s	4.10 MB	899 KB	4.61 MB
Day 5	9.54 kbit/s	3.44 kbit/s	2.29 MB	1.18 MB	5.27 MB
Day 6	5.33 kbit/s	2.76 kbit/s	2.50 MB	1.48 MB	3.68 MB
Day 7	8.71 kbit/s	3.10 kbit/s	3.75 MB	1.18 MB	5.09 MB
Day 8	10.0kbit/s	2.99 kbit/s	4.31 MB	1.35 MB	5.59 MB
Day 9	10.3 kbit/s	2.77 kbit/s	4.41 MB	1.28 MB	5.60 MB
Day 10	96 bit/s	96 bit/s	4.51 KB	1.19 MB	87.8MB
Day 11	22.2 kbit/s	3.94 kbit/s	9.53 MB	42 KB	11.2 MB
Day 12	2.88 kbit/s	1.81 kbit/s	1.24 MB	1.69 MB	2.01 MB
Day 13	4.91 kbit/s	2.35 kbit/s	2.11 MB	1.01 MB	3.12 MB
Day 14	1.86 kbit/s	616 bit/s	821 kbit/s	273 KB	1.07 MB

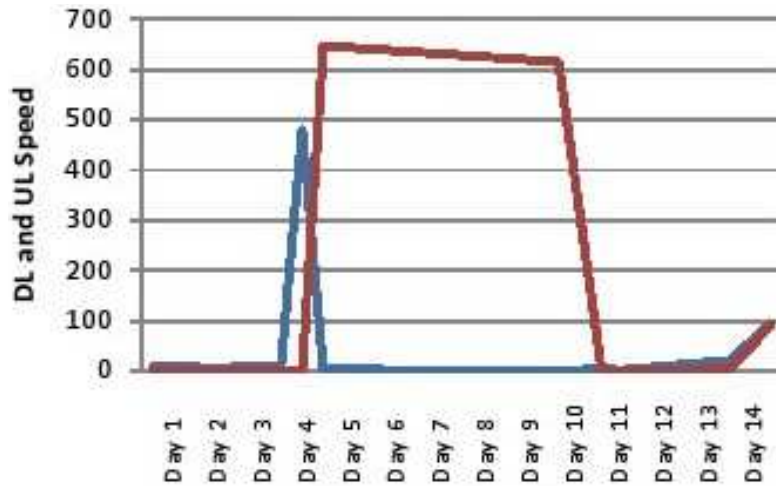


Figure 5a: MTN Upload and Download Rate (Rainfall)

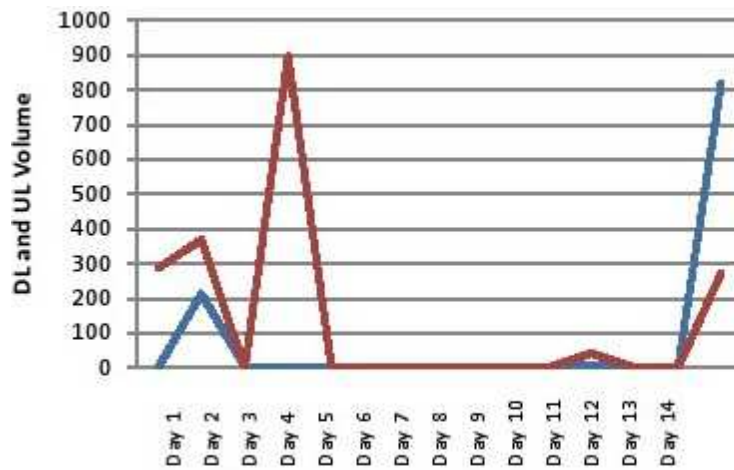


Figure 5b: MTN Upload and Download Volume (Rainfall)

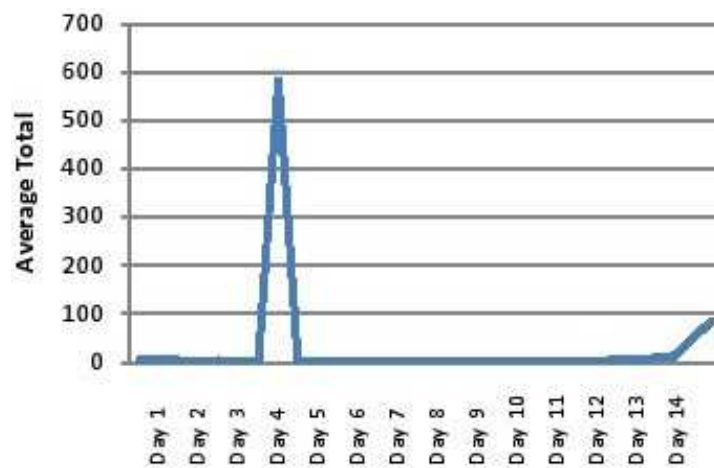


Figure 5c: MTN Average Volume (Rainfall)

Table 6: AIRTEL Reading of Speed during Rainfall

	Average DL Rate	Average UL Rate	DL Volume	UL Volume	Average Total Data Volume
Day 1	736 bit/s	408 bit/s	326 KB	182 KB	508 KB
Day 2	4.87 kbit/s	1.09 kbit/s	2.09 MB	481 KB	2.56 MB
Day 3	2.70 kbit/s	1.10 kbit/s	1.16 MB	486 KB	1.64 MB
Day 4	1.98 kbit/s	1.98 kbit/s	874 KB	874 KB	1.71 MB
Day 5	3.82 kbit/s	2.76 kbit/s	1.64 MB	1.19 MB	2.82 MB
Day 6	64 kbit/s	240 kbit/s	288.3 KB	107 KB	135 KB
Day 7	1.46 kbit/s	552 bits	642 KB	243 KB	885 KB
Day 8	8 bit/s	8 bit/s	4.00 KB	4.73 KB	8.73 KB
Day 9	15.9 kbit/s	904 bit/s	6.83 MB	400 KB	7.22 MB
Day 10	17.7 kbit/s	968 bit/s	7.61 MB	426 KB	8.03 MB
Day 11	48 bit/s	200 bit/s	23.3 KB	90.2 KB	114 KB
Day 12	152 bit/s	56 bit/s	69.8 KB	25.9 KB	95.7 KB
Day 13	14.2 kbit/s	2.42 kbit/s	6.10 MB	1.04 MB	7.14 MB
Day 14	408 bit/s	144 kbit/s	181 KB	64.8 KB	246 KB

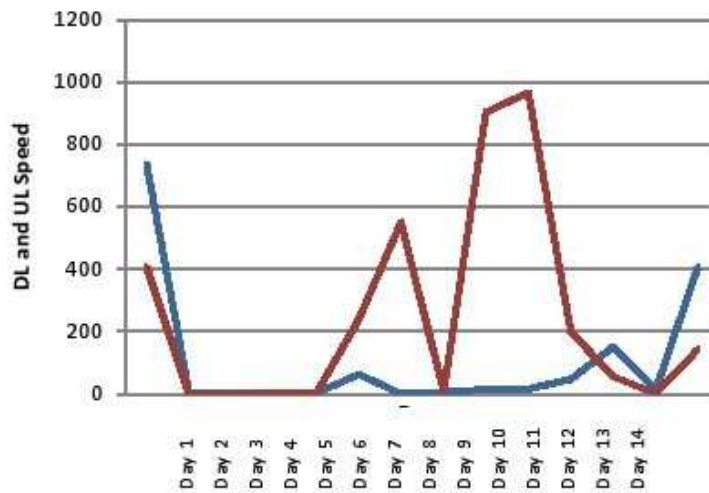


Figure 6a: AIRTEL Upload and Download Rate (Rainfall)

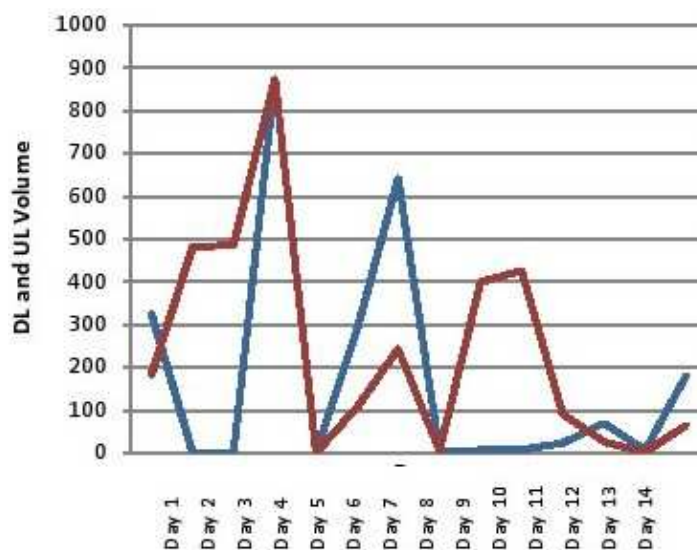


Figure 6b: AIRTEL Upload and Download Volume (Rainfall)

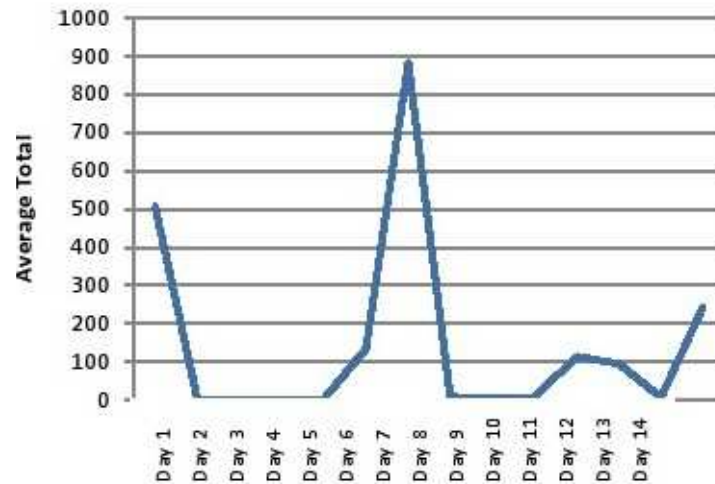


Figure 6c: AIRTEL Average Volume (Rainfall)

DISCUSSIONS OF RESULTS

The following shows the analysis of the average download/upload rate and volume of each networks in Okada for a period of 14 days.

Figure 3a showed that AIRTEL had the highest download speed of 776kbps, followed by MTN with download speed of 240kbps Figure 1a and GLO with download speed of 56kbps Figure 2a during normal condition.

Figure 1a showed that MTN had the highest upload speed of 616kbps, followed by AIRTEL with upload speed of 544kbps Figure 3a and GLO with upload speed of 3.44kbps Figure 2a during normal condition.

Figure 1b showed that MTN had the highest download volume of 821kbpv, followed by GLO with download volume of 25.4kbpv Figure 2b and AIRTEL with download volume of 706kbpv Figure 3b during normal condition.

Figure 3b showed that AIRTEL had the highest upload volume of 919kbpv, followed by MTN with upload volume of 894kbps Figure 1b and GLO with upload volume of 756kbps Figure 2b during normal condition.

Figure 1c showed that MTN had the highest average total data volume of 157kbpv, followed by AIRTEL with average total data volume of 94.1kbpv Figure 3c and GLO with average total data volume of 28.1kbpv Figure 2c during normal condition.

Figure 4a and Figure 6a showed that both MTN and AIRTEL had the highest download speed of 736kbps, and MTN with download speed of 480kbps Figure 5a during rain fall.

Figure 6a Showed that AIRTEL had the highest upload speed of 968kbps, followed by GLO with upload speed of 904kbps Figure 4a and MTN with upload speed of 648kbps Figure 5a during rain fall.

Figure 4b Showed that AIRTEL had the highest download volume of 874kbpv, followed by MTN with download volume of 821kbpv Figure 5b and GLO with download volume of 326kbpv Figure 4b during normal condition.

Figure 5b Showed that MTN had the highest upload volume of 899kbpv, followed by AIRTEL with upload volume of 874kbps Figure 6b and GLO with upload volume of 634kbps Figure 4b during rain fall.

Figure 6c Showed that AIRTEL had the highest average total data volume of 885kbph, followed by MTN with average total data volume of 584kbph Figure 5c and GLO with average total data volume of 508kbph Figure 4c during rain fall.

CONCLUSIONS

The study of the GSM broadband service providers of which GLO, MTN and AIRTEL are important was successfully carried out. The work involved carrying out speed test for these network services for a period of time. The test was conducted using appropriate software to sample speeds for both upload and download and these results were analyzed.

The test result shows that they all had their peaks and lows for different days and so on the average the differences were not much but one or two MTN and GLO were more consistent than AIRTEL.

The test result shows that MTN network service was more consistent during the rain fall and had higher download speed peaks compared to the others (GLO and AIRTEL) while GLO was consistent during the normal climate condition and had higher download and upload speed compared to MTN and AIRTEL.

Conclusively, MTN and GLO Networks would be more profitable than AIRTEL based on the studies carried out in Okada.

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