



NATIONAL COMMUNICATIONS AUTHORITY

3G Coverage Assessment of Cellular Mobile Services- Ashanti Region

[September 2016]

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[Communications for Development]

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Background

In pursuance of obligations of the 3G Cellular Mobile Licence of Telecommunication Operators, the consumer perspective of the 3G Coverage status are tested to ensure the compliance of Operators to the obligations on 3G Coverage to the user.

The report is based on findings on 3G verification campaign in the Ashanti Region from 5th to 22nd September 2016 for all Operators except Expresso due to technical challenges.

What we measure

As per the 3G Cellular Mobile licence obligations, 3G-locked mode coverage samples are collected to obtain on the average a signal strength measurement which is representative of the coverage situation in each of the District Capital that was driven.

The 3G Signal Strength and their respective threshold for compliance considering the user’s perspective are categorised as follows;

Rating	3G Signal Strength Range (dBm)
No 3G Coverage	-105>RSCP
Poor	-105≤ RSCP < -95
Fair	-95≤ RSCP< -85
Good	-85 ≤RSCP < -20

Findings

The results for the district capitals within Ashanti Region tested during the period are as below:

Table 1: Coverage Signal strength, September, 2016

DISTRICT CAPITAL	MTN	VODAFONE	TIGO	AIRTEL	GLO
Agogo	Good	Good	No 3G Coverage	Fair	No 3G Coverage
Agona	Good	Good	Fair	Good	No 3G Coverage
Akumadan	Fair	Good	Good	Fair	No 3G Coverage
Asiwa	Good	Good	No 3G Coverage	Good	No 3G Coverage
Asokore Mampong	Good	Good	Good	Good	Good

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DISTRICT CAPITAL	MTN	VODAFONE	TIGO	AIRTEL	GLO
Bekwai	Fair	Good	Good	Good	Good
Drobonso	No 3G Coverage	No 3G Coverage	No 3G Coverage	No 3G Coverage	No 3G Coverage
Ejisu	Good	Fair	Fair	Good	Good
Ejura	Fair	Good	Poor	Fair	No 3G Coverage
Foase	Fair	Good	Poor	No 3G Coverage	No 3G Coverage
Fomena	Fair	Good	Good	Poor	No 3G Coverage
Jacobi	Good	Fair	Good	Fair	No 3G Coverage
Juaso	Fair	Good	Fair	Poor	Fair
Kodie	Poor	Fair	Poor	Poor	No 3G Coverage
Konongo	Good	Fair	Fair	Fair	Fair
Kumasi	Good	Good	Good	Good	Good
Kumawu	Good	Good	Fair	Fair	No 3G Coverage
Kuntanase	Good	Good	Fair	Good	Good
Mampong	Fair	Good	Poor	Fair	Fair
Mamponteng	Fair	Fair	Good	Fair	Poor
Mankranso	Fair	Good	Good	Fair	No 3G Coverage
Manso Nkwanta	Fair	Fair	No 3G Coverage	Fair	No 3G Coverage
New Edubiase	Fair	Good	Fair	Fair	No 3G Coverage
Nkawie	Fair	Good	Fair	Good	No 3G Coverage
Nsuta	Fair	Fair	Fair	Fair	No 3G Coverage
Nyinahin	Fair	Good	Good	Good	No 3G Coverage
Obuasi	Good	Good	Good	Fair	Good
Offinso	Fair	Fair	Good	Fair	Good
Tepa	Good	Good	Fair	Fair	No 3G Coverage

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REMARKS:

- ❖ All Operators had no 3G network coverage at Drobonso.
- ❖ All Operators had good 3G coverage at Asokore Mampong and Kumasi.
- ❖ MTN had good 3G coverage at Agogo, Agona, Asiwa, Asokore Mampong, Ejisu, Jacobu, Konongo, Kumasi, Kumawu, Kuntanase, Obuasi and Tepa.
- ❖ MTN had fair 3G coverage at Akumadan, Bekwai, Ejura, Foase, Fomena, Juaso, Mampong, Mamponteng, Mankranso, Manso Nkwanta, New Edubiase, Nkawie, Nsuta, Nyinahin and Offinso.
- ❖ MTN had poor 3G coverage at Kodie.
- ❖ Vodafone had good 3G coverage in all the covered District Capitals except Ejisu, Jacobu, Kodie, Konongo, Mamponteng, Manso Nkwanta, Nsuta and Offinso which had “fair” 3G network coverage.
- ❖ Tigo had good 3G coverage at Akumadan, Asokore Mampong, Bekwai, Fomena, Jacobu, Kumasi, Mamponteng, Mankranso, Nyinahin, Obuasi and Offinso.
- ❖ Tigo had fair 3G network coverage at Agona, Ejisu, Juaso, Konongo, Kumawu, Kuntanase, New Edubiase, Nkawie, Nsuta and Tepa.
- ❖ Tigo had poor 3G coverage at Ejura, Foase, Kodie and Mampong.
- ❖ Tigo had no 3G coverage at Agogo, Asiwa, Drobonso and Manso Nkwanta.
- ❖ Airtel had good 3G coverage at Agona, Asiwa, Asokore Mampong, Bekwai, Ejisu, Kumasi, Kuntanase, Nkawie and Nyinahin.
- ❖ Airtel had fair 3G coverage at Agogo, Akumadan, Ejura, Jacobu, Konongo, Kumawu, Mampong, Mamponteng, Mankranso, Manso Nkwanta, New Edubiase, Nsuta, Obuasi, Offinso and Tepa.
- ❖ Airtel had poor 3G coverage at Fomena, Juaso and Kodie.
- ❖ Airtel had no 3G coverage at Drobonso and Foase.
- ❖ Glo had good 3G coverage at Asokore Mampong, Bekwai, Ejisu, Kumasi, Kuntanase, Obuasi and Offinso.
- ❖ Glo had fair coverage at Juaso, Konongo and Mampong.
- ❖ Glo however had a poor 3G coverage at Mamponteng.
- ❖ Glo however failed to provide 3G coverage in the remaining District Capitals which are: Agogo, Agona, Akumadan, Asiwa, Drobonso, Ejura, Foase, Fomena, Jacobu, Kodie,

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Kumawu, Mankranso, Manso Nkwanta, New Edubiase, Nkawie, Nsuta, Nyinahin and Tapa.

Remedies

- ❖ The NCA has notified Operators of these findings and has directed all Operators to improve their coverage in some localities by December, 2016.
- ❖ All Operators who failed to provide 3G coverage at Drobonso and Agogo have been directed to extend 3G coverage to the mentioned areas by December 31, 2016.
- ❖ Tigo has been sanctioned for failing to provide 3G coverage at Asiwa.
- ❖ Tigo had been sanctioned in our previous assessment for failing to cover Manso Nkwanta and is not liable to an additional penalty as per Clause 6.4 of Annex A of the 3G licence.
- ❖ Airtel has been sanctioned for failing to provide 3G coverage at Foase.
- ❖ Glo has been granted moratorium till December 31, 2016 to cover all the failed District Capitals in the Ashanti Region.

APPENDICES

Coverage Signal Strength

The Maps below show the coverage level in District Capitals of the Northern Region where monitoring was performed. The coverage map is based on the 3G network signal strength when tested in an idle mode. In each plot is a legend to indicate the signal strength and quality range attained by Operators during measurement.

Coverage levels in green falls in the range of -85dBm and above, and are considered good. Those between -85 and -95dBm are considered average or fair and are indicated in yellow. The red samples represent worse or poor coverage in the range of -95 to -105dBm. The black samples represent areas with no 3G coverage.

Coverage Legend

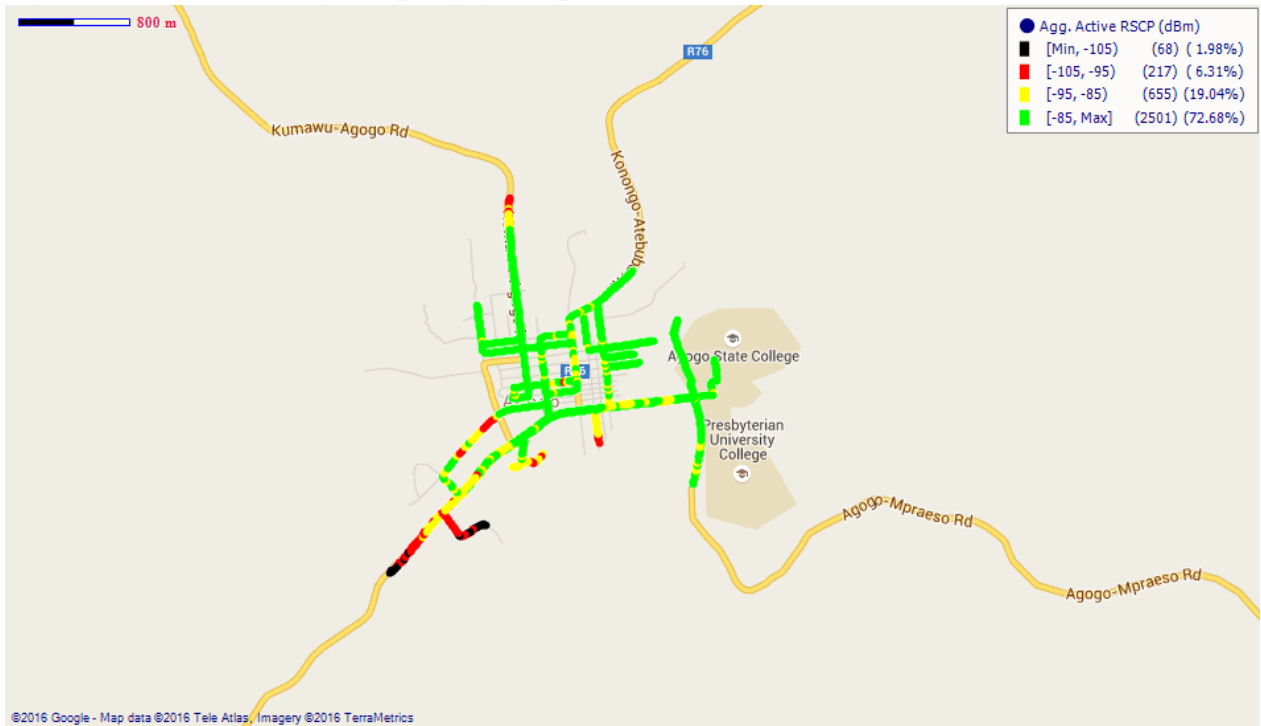
<i>Colour</i>	<i>Area Coverage Rating</i>
	Good Coverage Areas
	Fair Coverage Areas
	Poor Coverage Areas
	Non-Existent Coverage Areas

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APPENDIX I

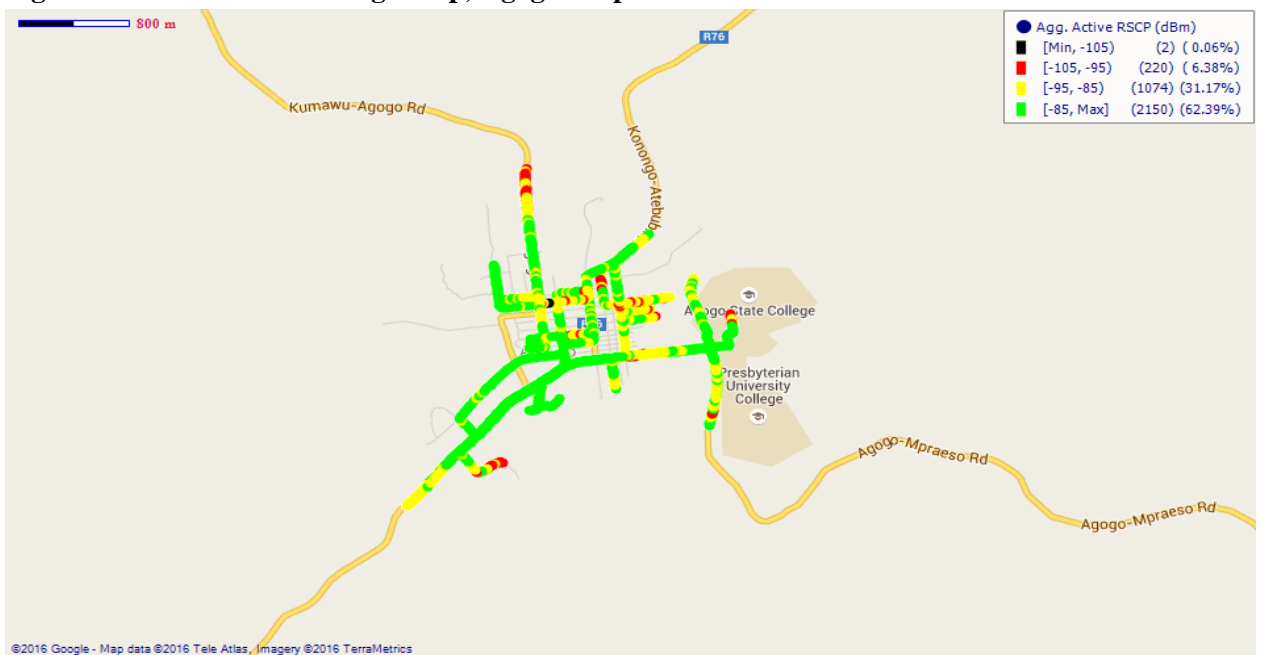
COVERAGE AT AGOGO

Fig. 1 - MTN 3G Coverage Map, Agogo– September 2016



Remarks: Good 3G coverage in Agogo.

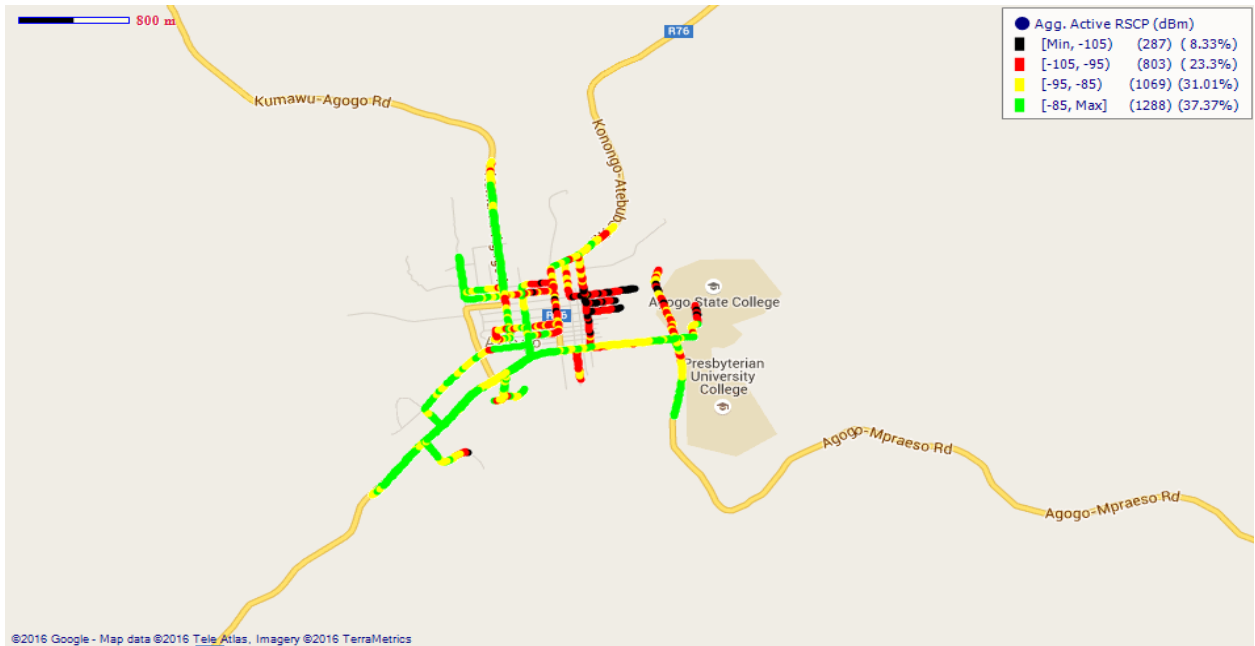
Fig. 2 - Vodafone 3G Coverage Map, Agogo - September 2016



Remarks: Good 3G coverage in Agogo with poor spots around Agogo State College which require improvement.

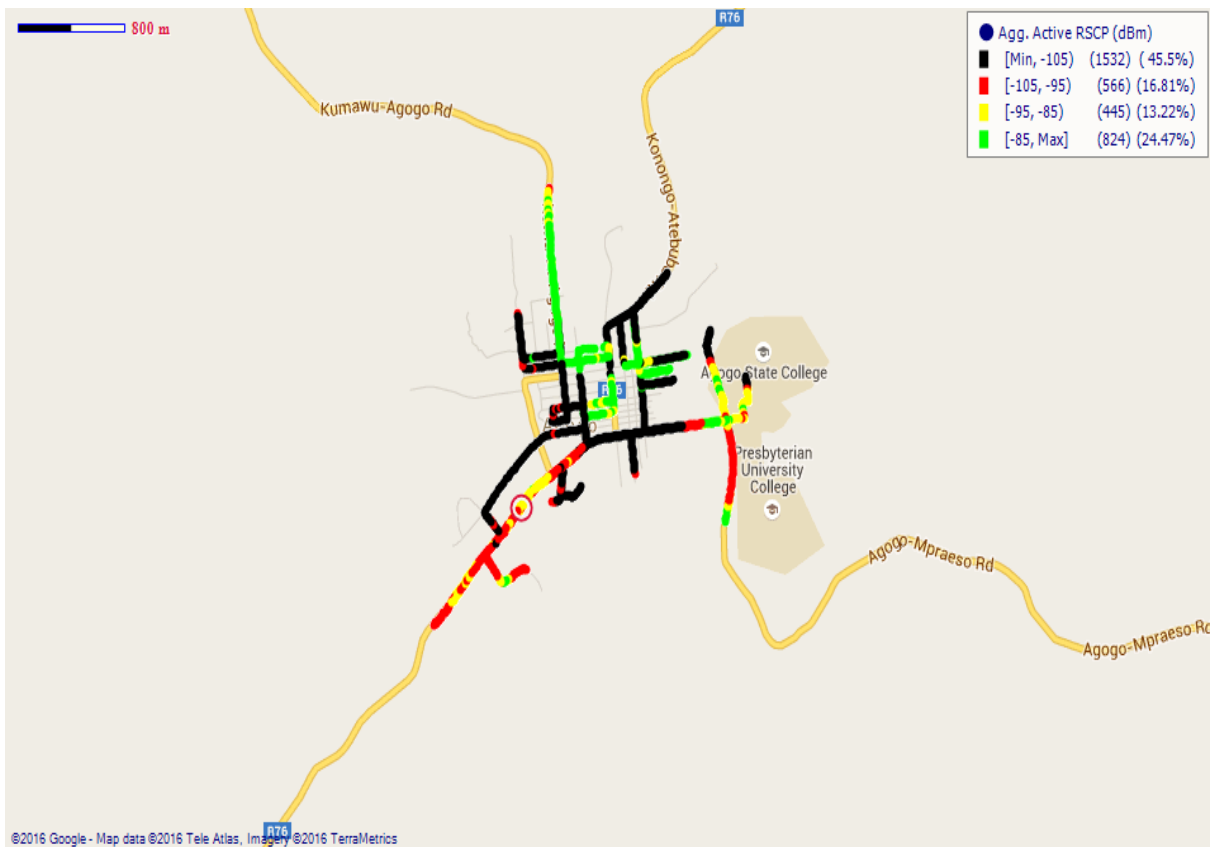
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Fig. 3 - Airtel 3G Coverage Map, Agogo - September 2016



Remarks: Fair 3G coverage in and around Agogo that needs improvement especially around Abuakwa State College.

Fig. 4 – Glo 3G Coverage Map, Agogo - September 2016

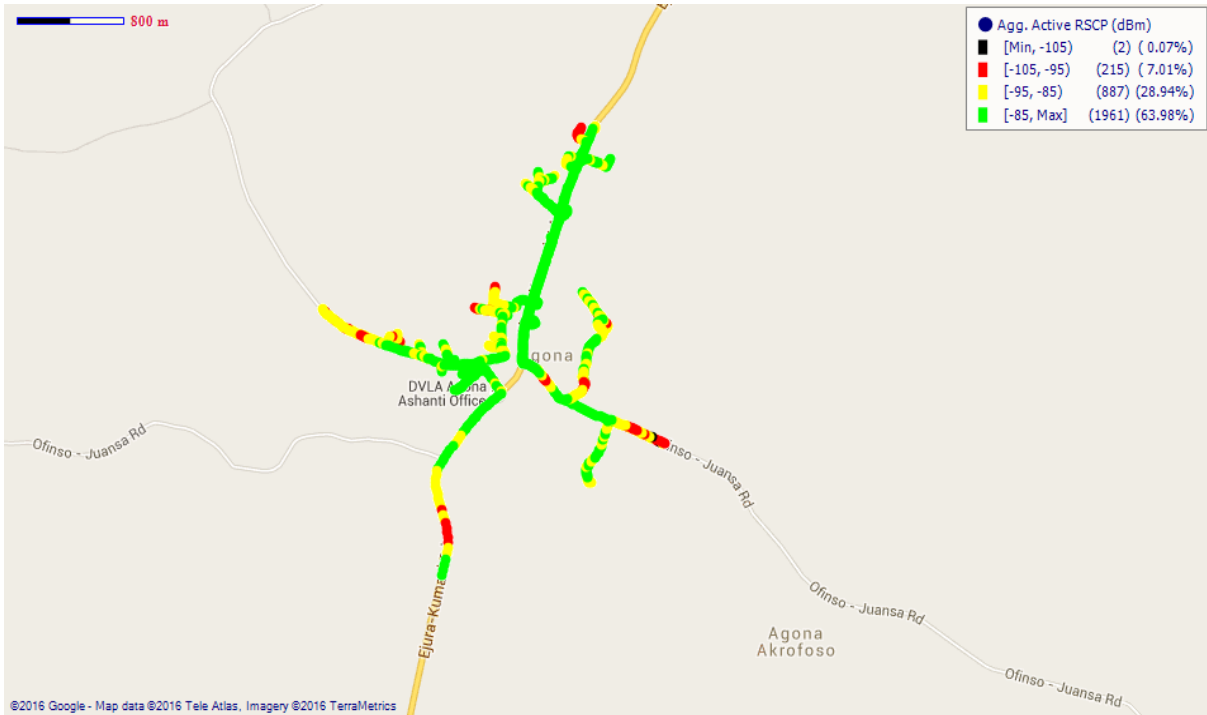


Remarks: Poor 3G coverage in and around Agogo that requires a major improvement.

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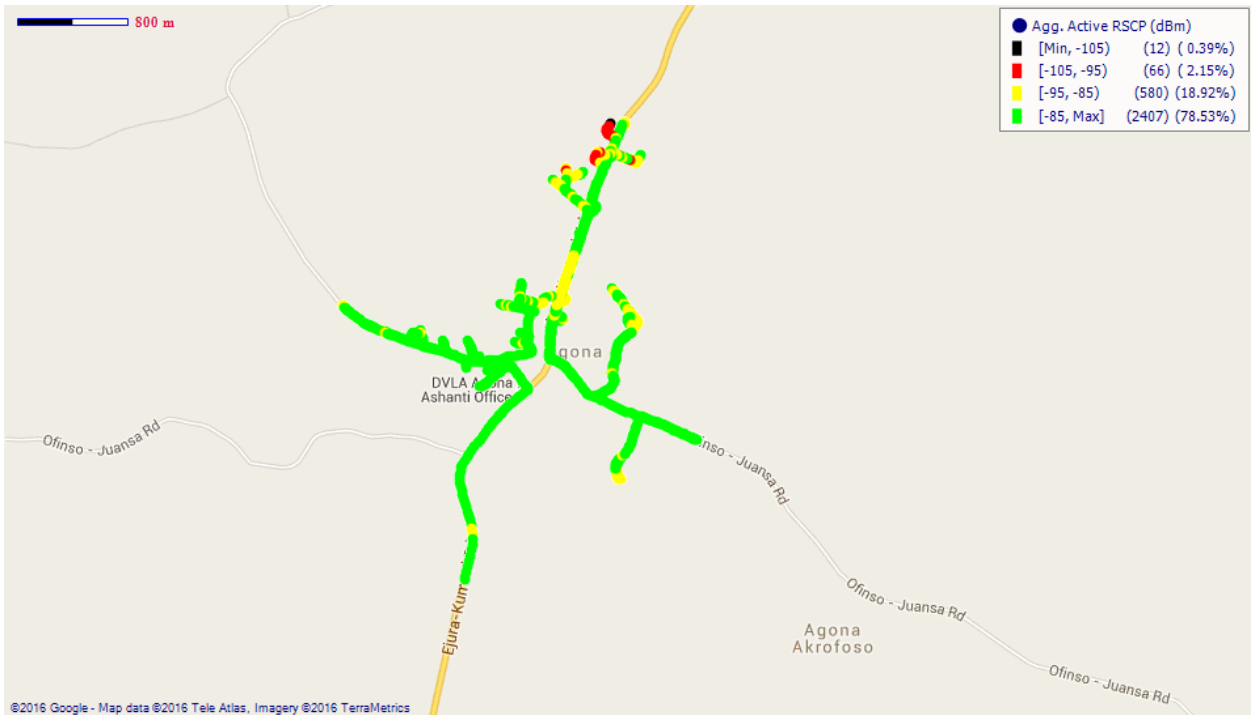
COVERAGE AT AGONA

Fig. 5 - MTN 3G Coverage Map, Agona - September 2016



Remarks: Good 3G coverage in Agona except the outskirts that require some improvement.

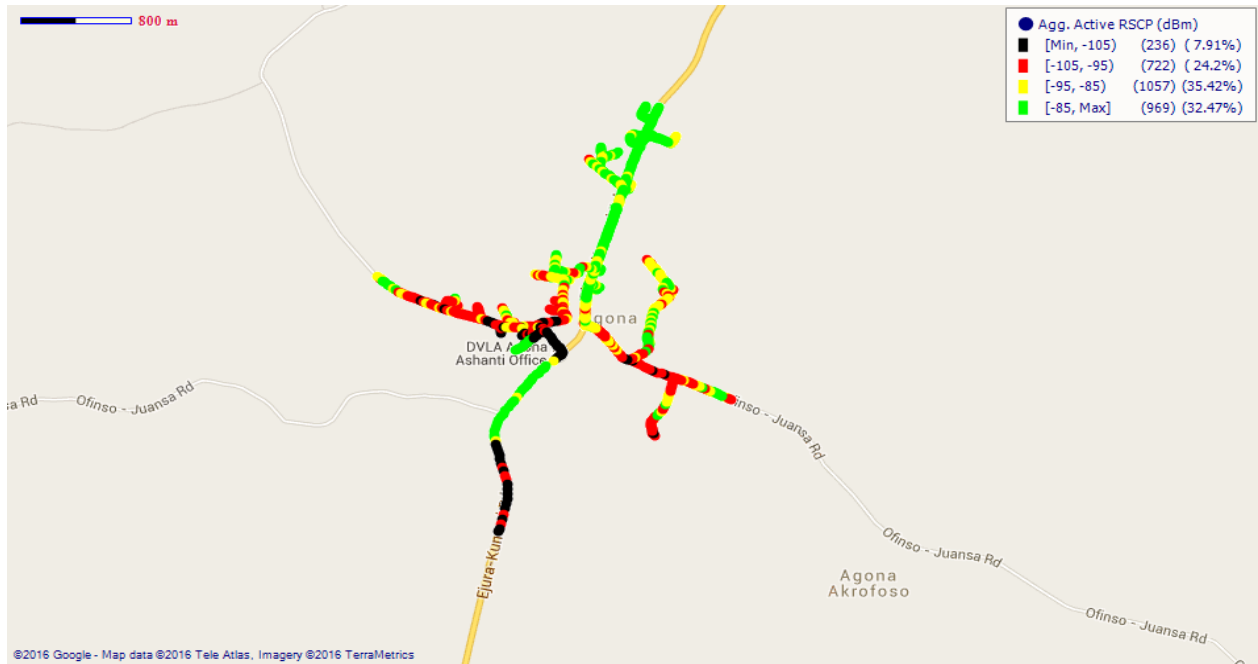
Fig. 6 - Vodafone 3G Coverage Map, Agona - September 2016



Remarks: Good 3G network coverage in Agona.

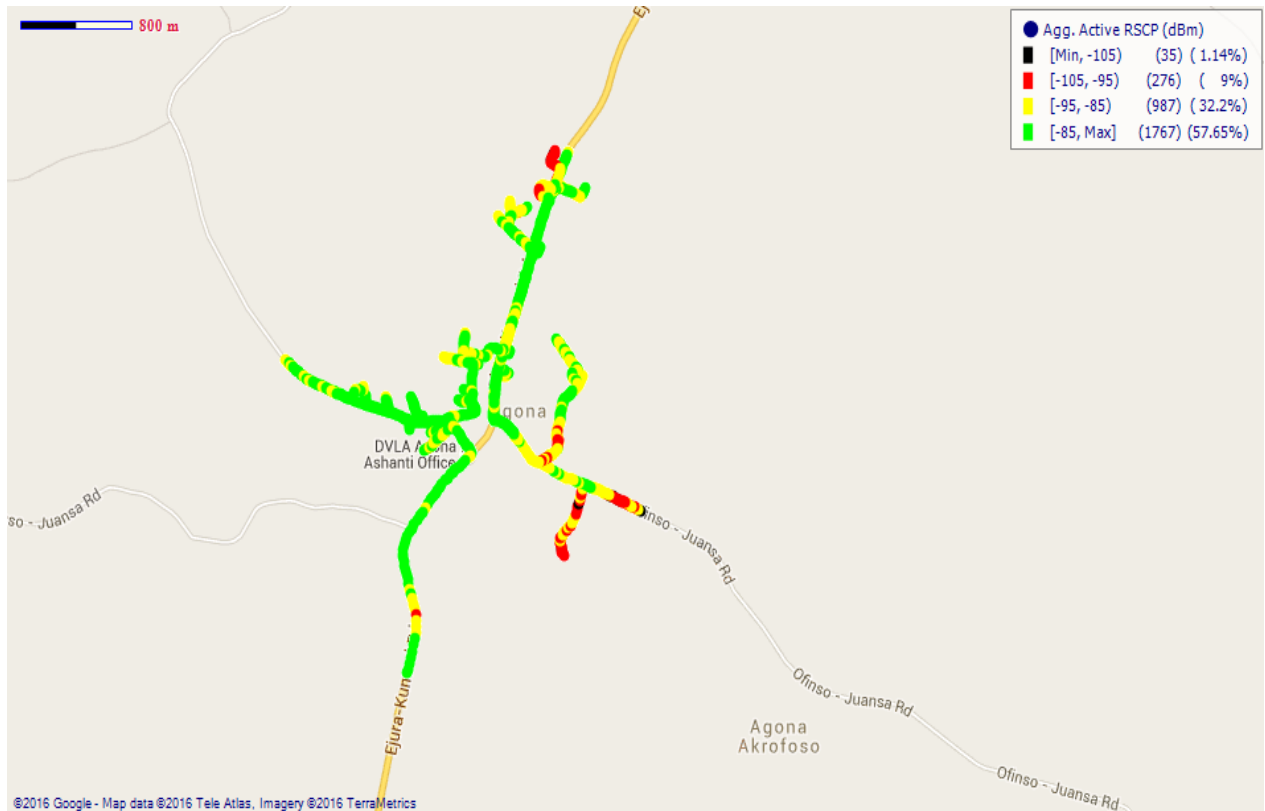
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Fig. 7 - Tigo 3G Coverage Map, Agona - September 2016



Remarks: Fair 3G coverage in Agona with poor coverage around the DVLA office area and along the Offinso road. Improvement is required.

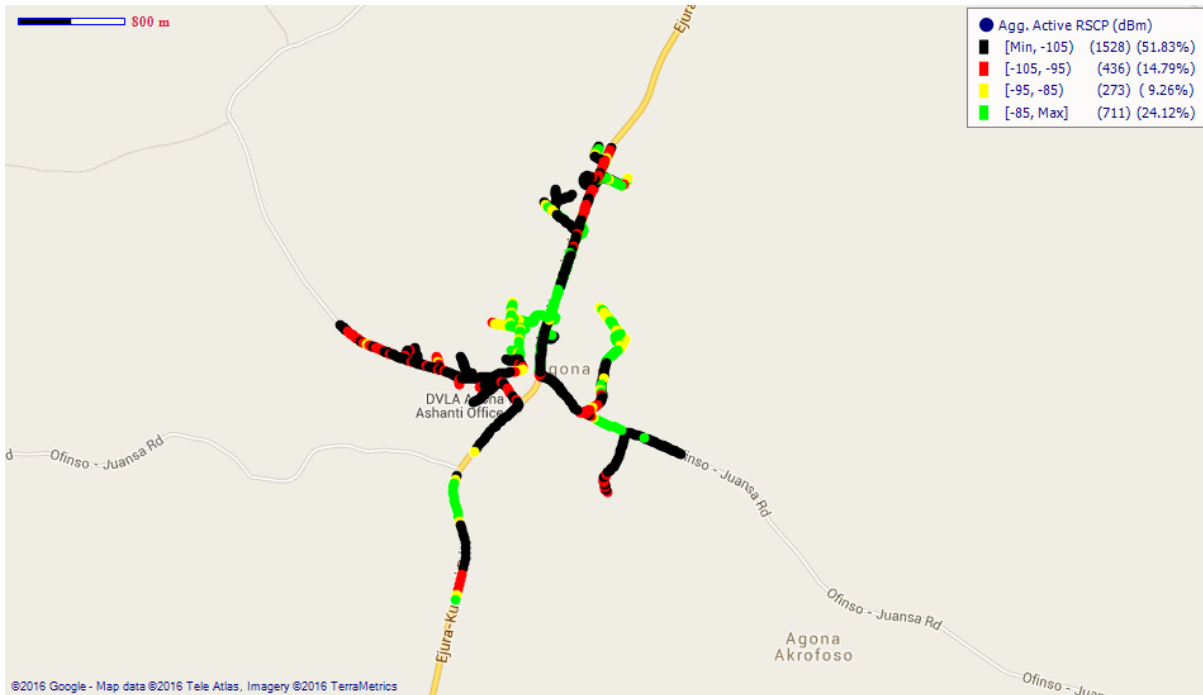
Fig. 8 -Airtel 3G Coverage Map, Agona – September 2016



Remarks: Good 3G coverage in Agona with improvement needed on the Agona-Juansa Road.

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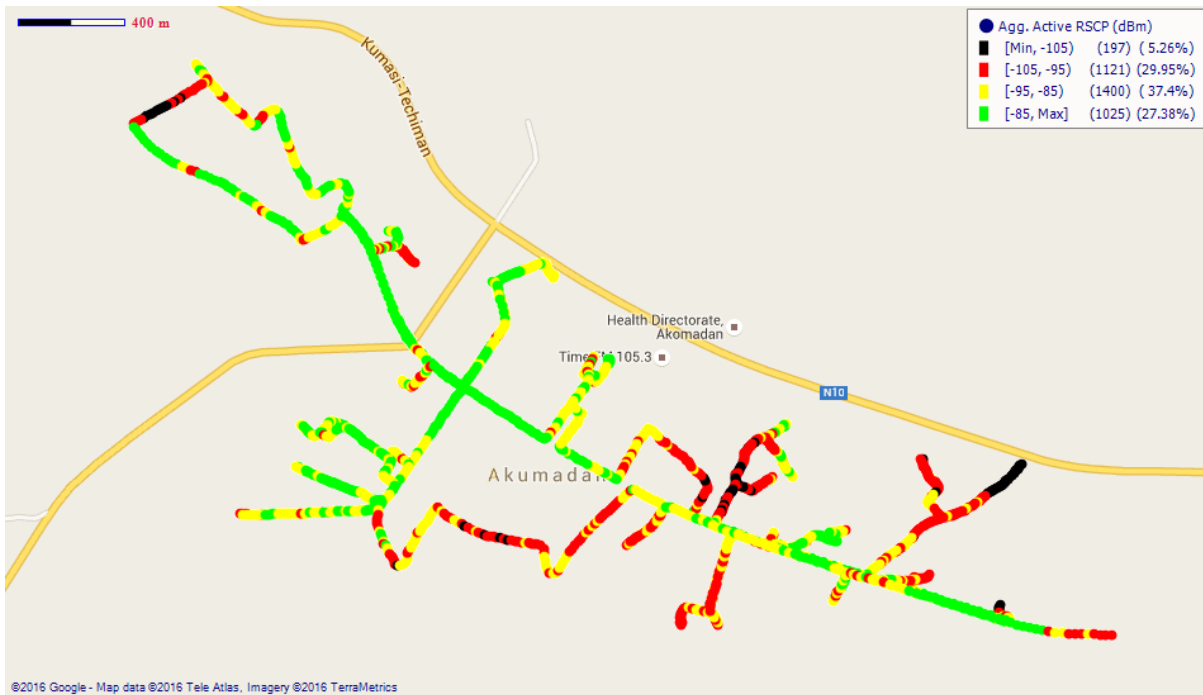
Fig. 9 Glo 3G Coverage Map, Agona – September 2016



Remarks: Poor 3G coverage in Agona. Major improvement is required.

COVERAGE AKUMADAN

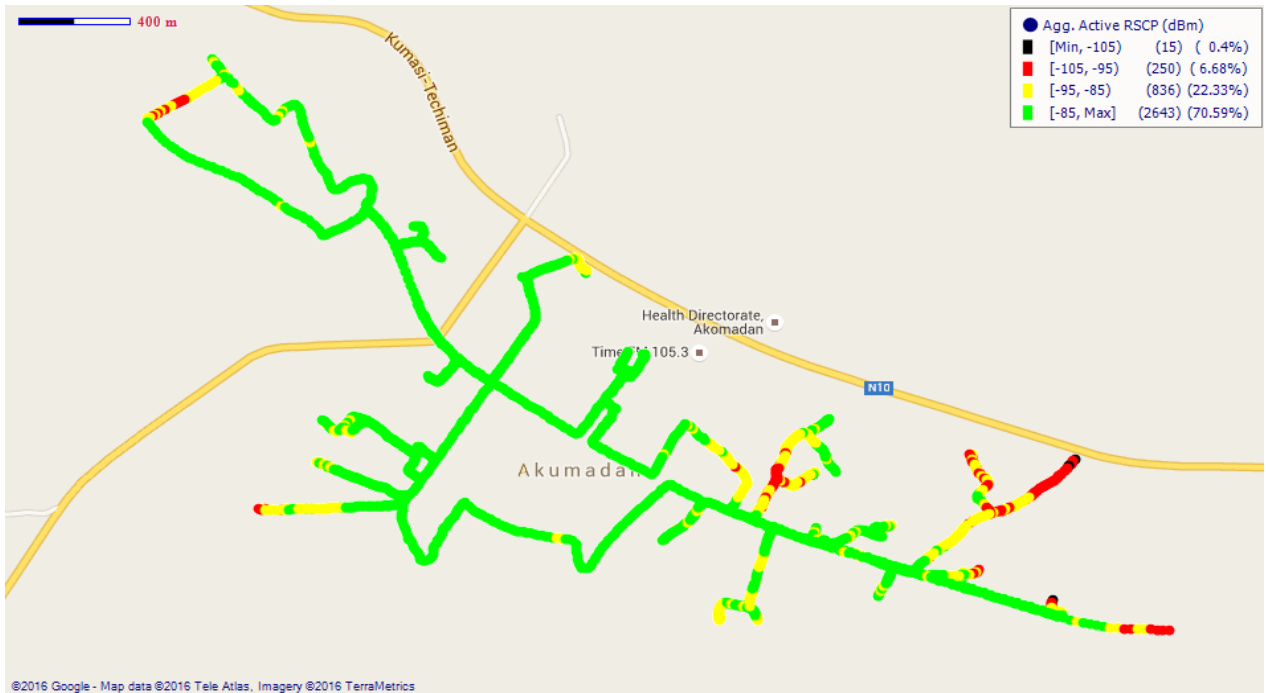
Fig. 10 – MTN 3G Coverage Map, Akumadan– September 2016



Remarks: Fair 3G network coverage across Akumadan. Major improvement is required around Akumadan Health Directorate and behind the district assembly.

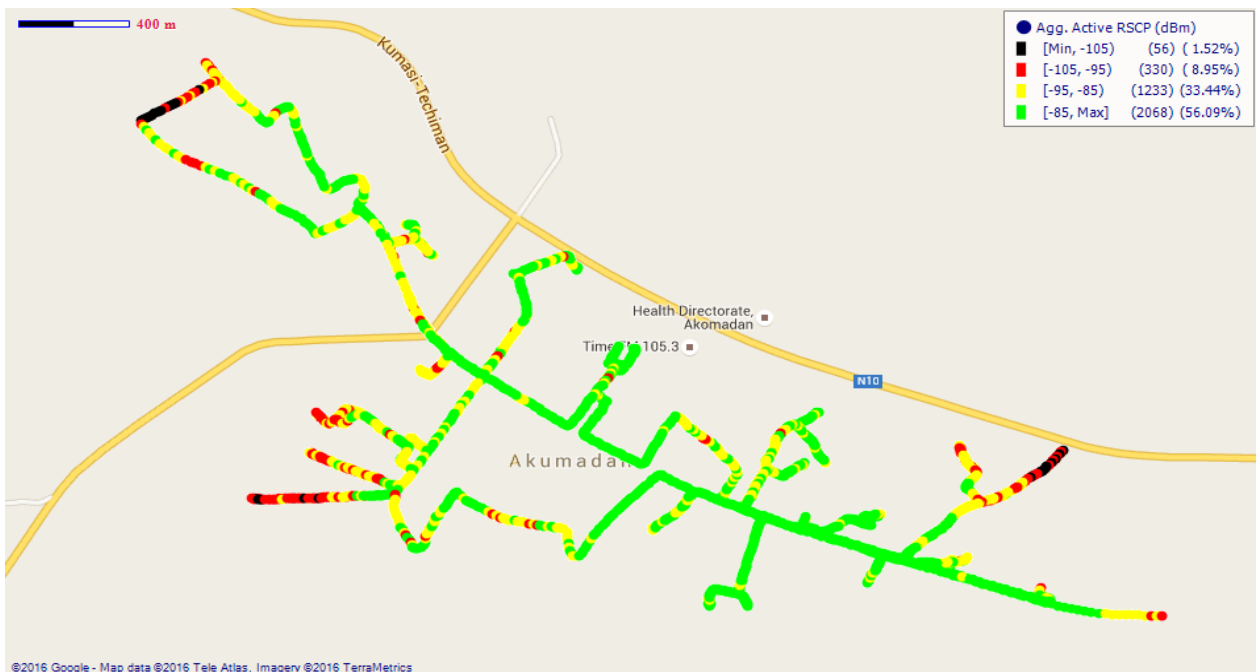
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Fig. 11- Vodafone 3G Coverage Map, Akumadan –September 2016



Remarks: Good 3G network coverage across Akumadan.

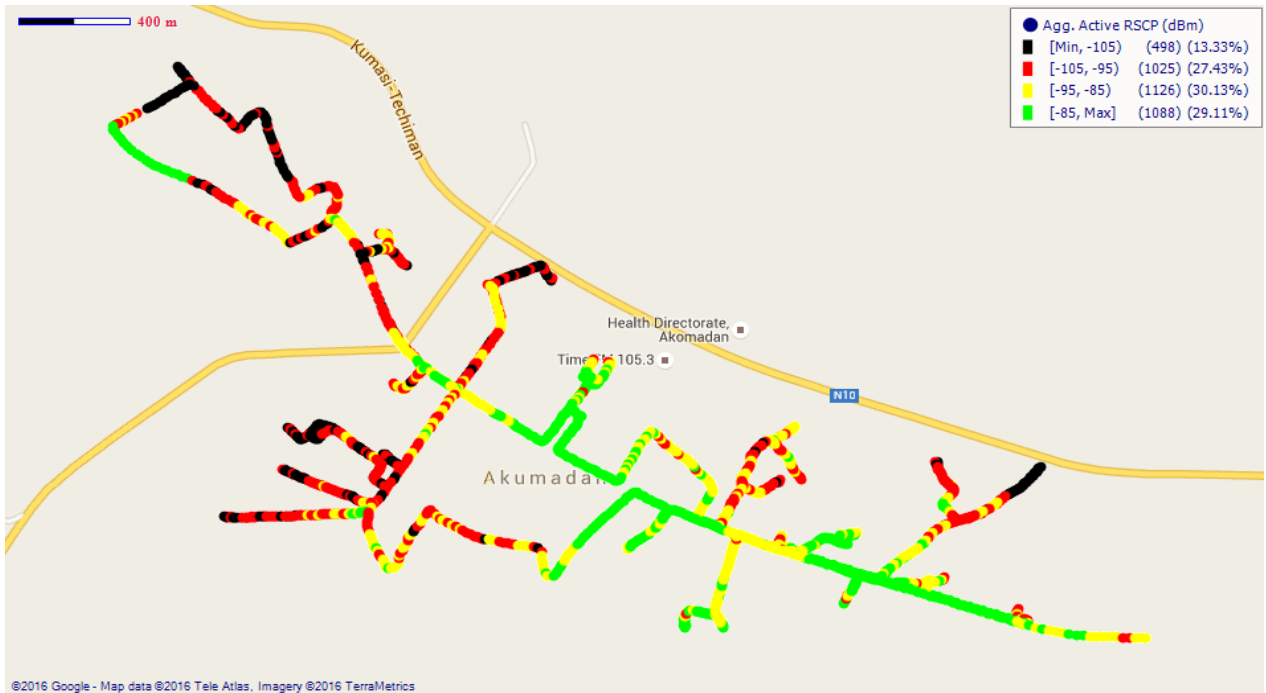
Fig. 12- Tigo 3G Coverage Map, Akumadan –September 2016



Remarks: Good 3G network coverage across Akumadan with some fair coverage spots recorded.

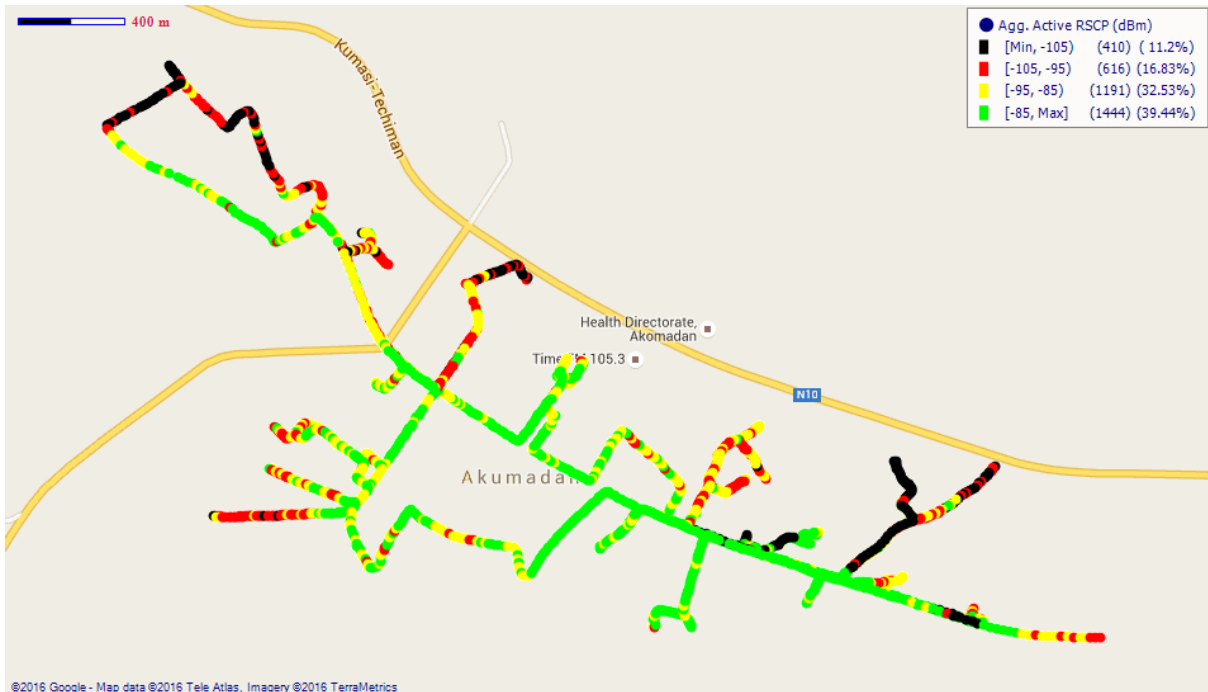
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Fig. 13 - Airtel 3G Coverage Map, Akumadan– September 2016



Remarks: Fair 3G network coverage in Akumadan which requires a major improvement especially on Akumadan-Nkenkaasu road.

Fig. 14 – Glo 3G Coverage Map, Akumadan– September 2016

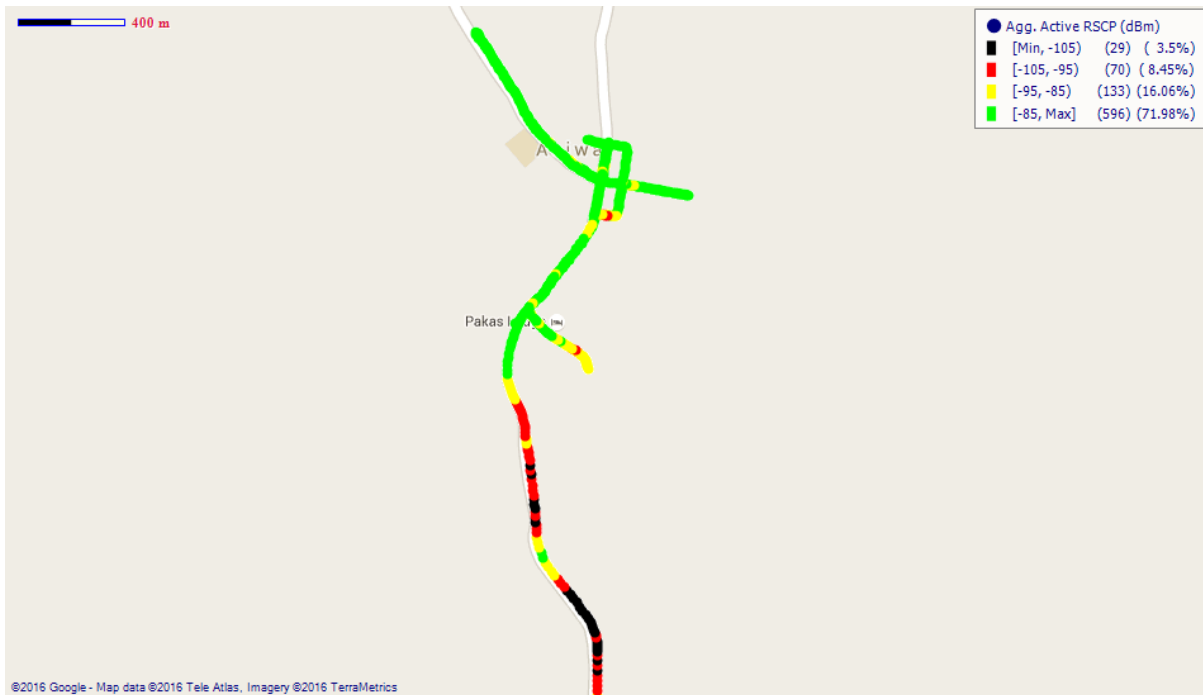


Remarks: Poor 3G coverage in Akumadan. Major improvement is required on Akumadan – Afrancho Rd. and behind the District Assembly.

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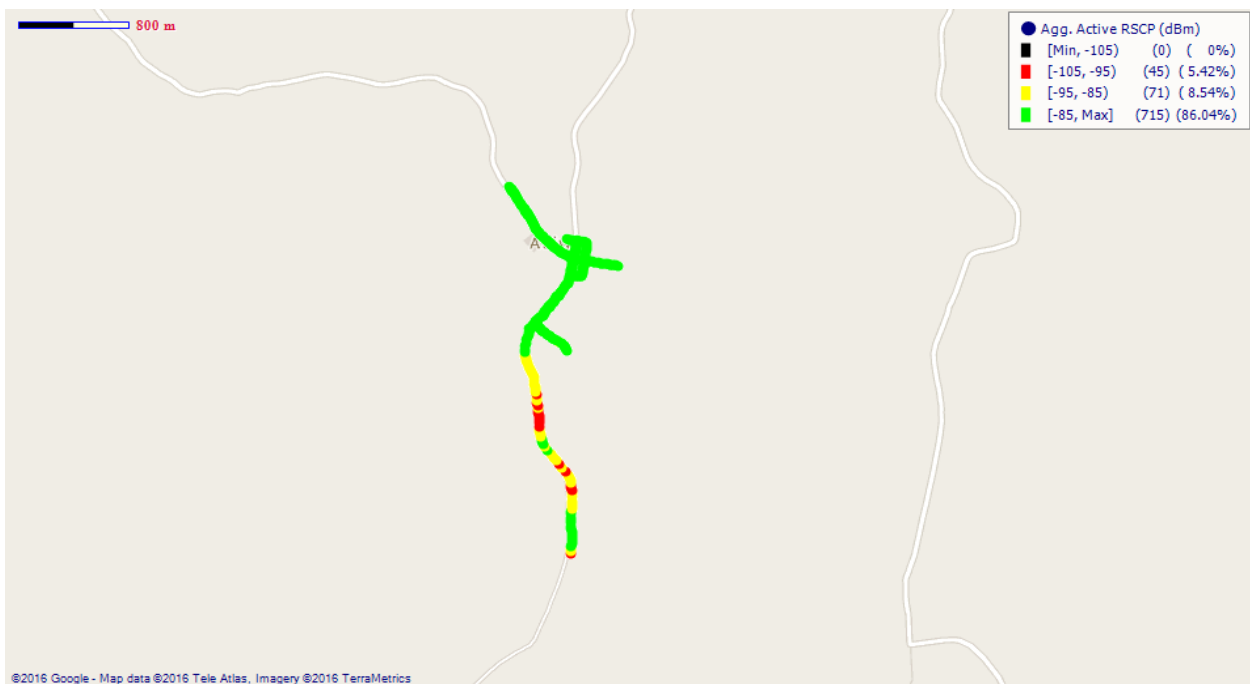
COVERAGE AT ASIWA

Fig. 15 - MTN 3G Coverage Map, Asiwa - September 2016



Remarks: Good 3G network coverage in Asiwa. However the road that joins Ejisu- Konongo requires improvement

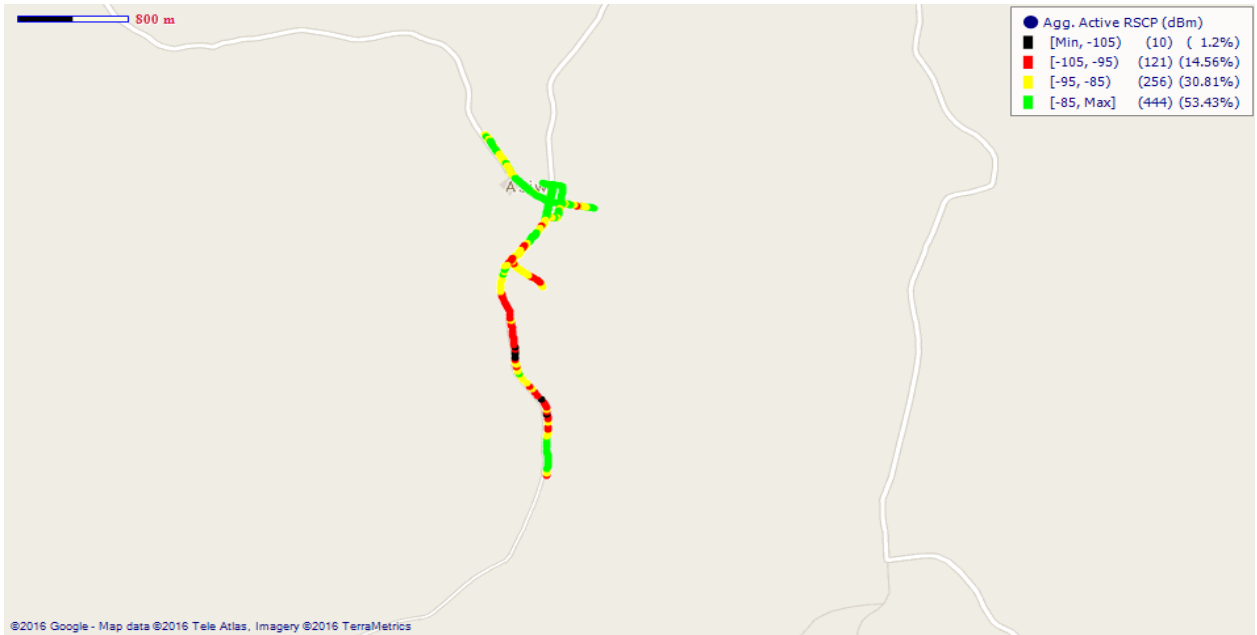
Fig. 16- Vodafone 3G Coverage Map, Asiwa - September 2016



Remarks: Good 3G network coverage in and around Asiwa.

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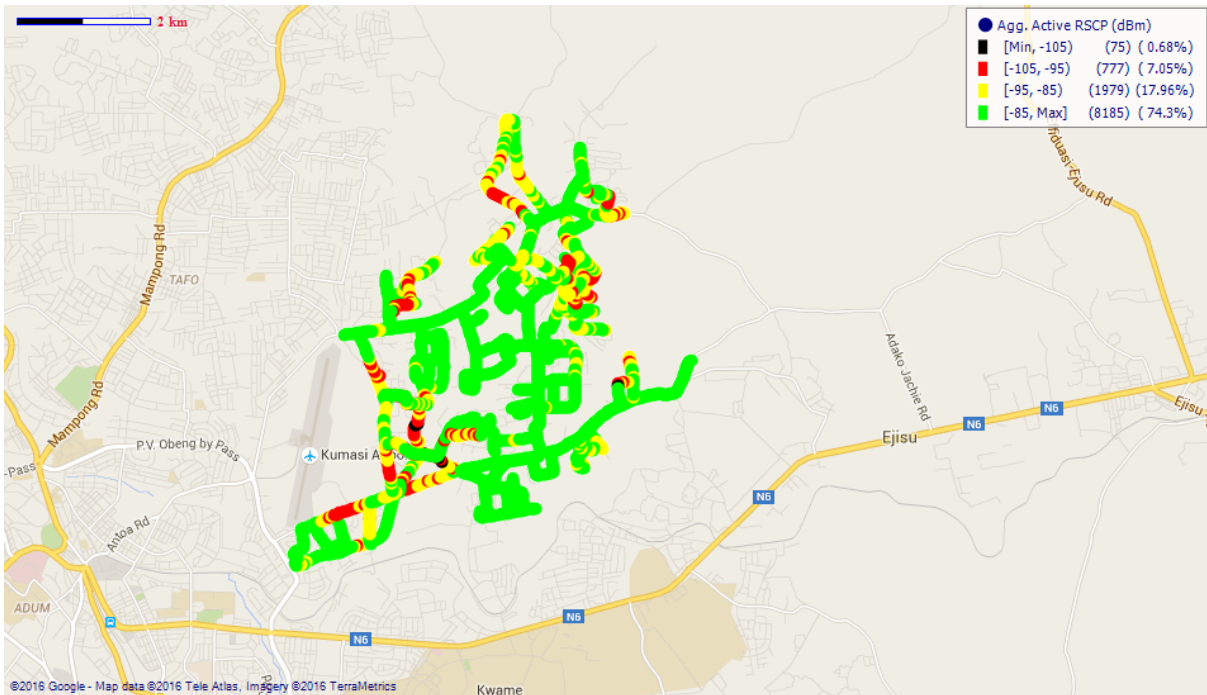
Fig. 17 – Airtel 3G Coverage Plot- Asiwa September 2016



Remarks: Good 3G network coverage in and around Asiwa. However, improvement is needed at the District Assembly office and inside Bosome Freho SHS.

COVERAGE AT ASOKORE MAMPONG

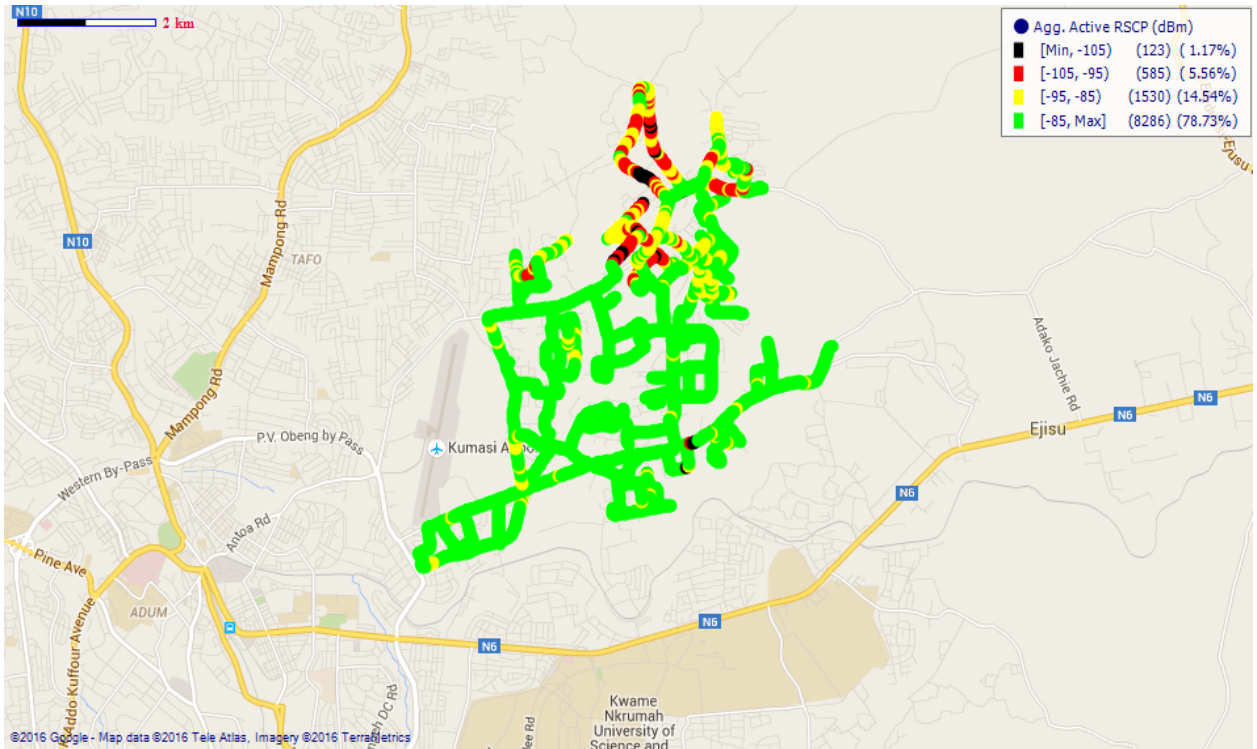
Fig. 18 – MTN 3G Coverage Map, Asokore Mampong – September 2016



Remarks: Good 3G network coverage across Asokore Mampong with few scattered fair coverage that requires improvement.

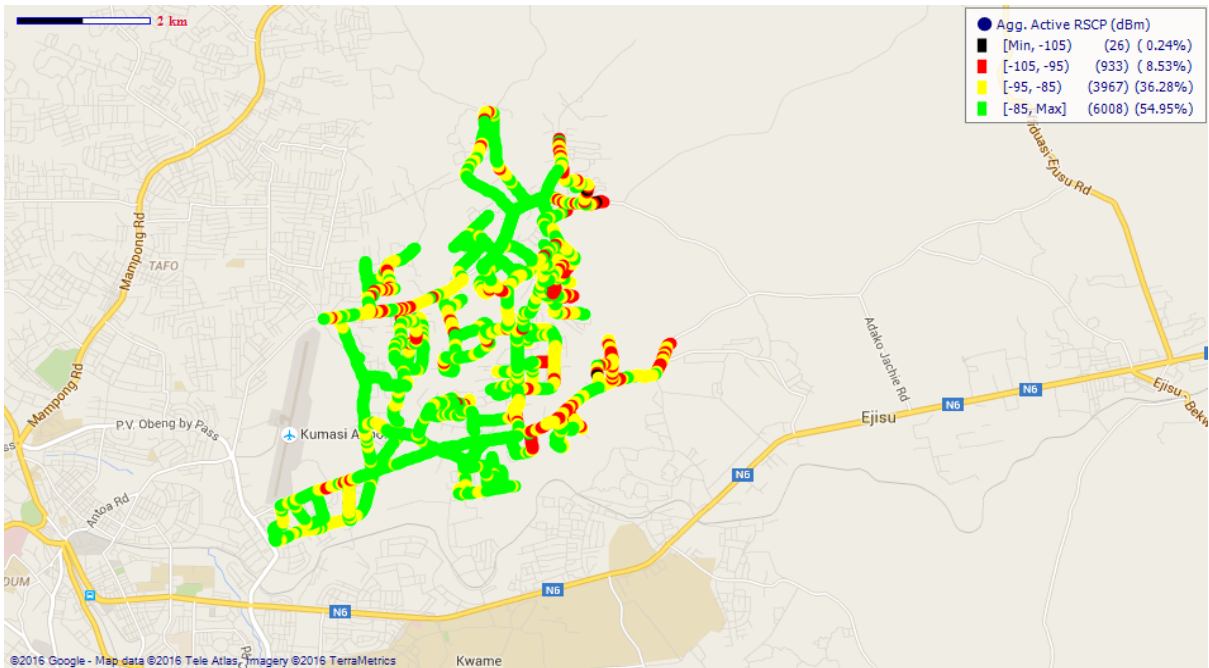
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Fig. 19 –Vodafone 3G Coverage Plot- Asokore Mampong – September 2016



Remarks: Generally good 3G coverage at Asokore Mampong.

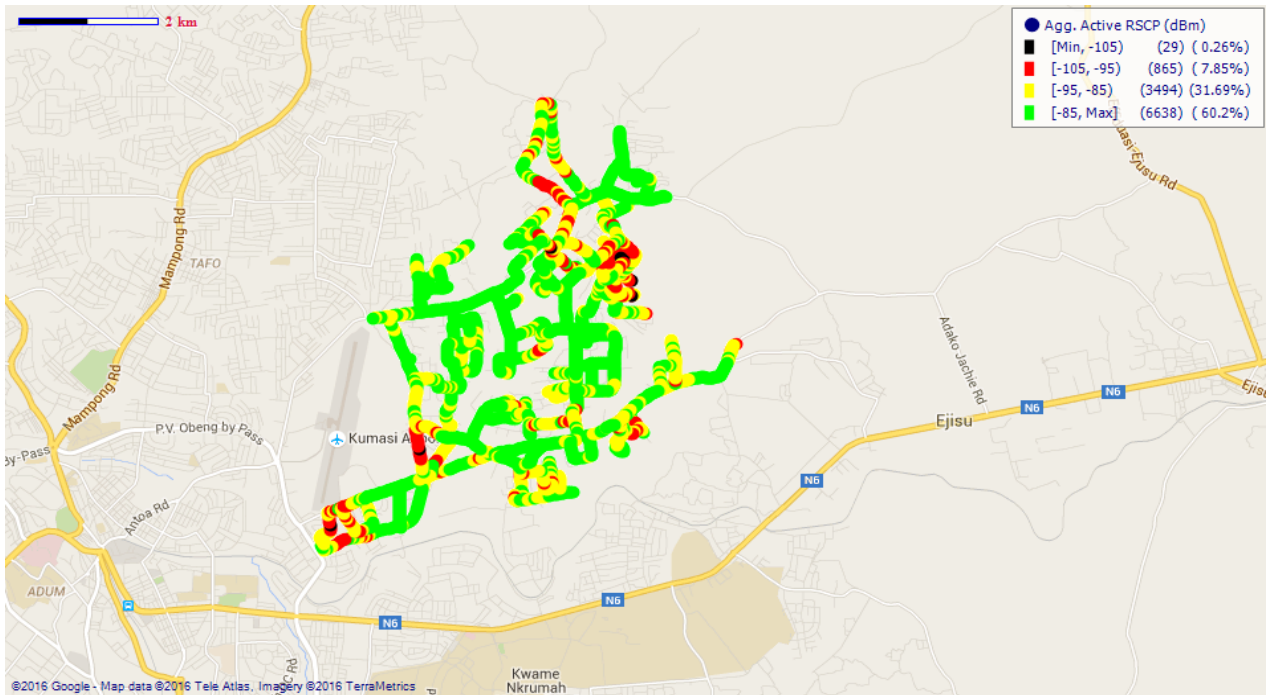
Fig. 20 – Tigo 3G Coverage Plot- Asokore Mampong –September 2016



Remarks: Good network coverage with score of bad spots scattered throughout Asokore Mampong which require improvement.

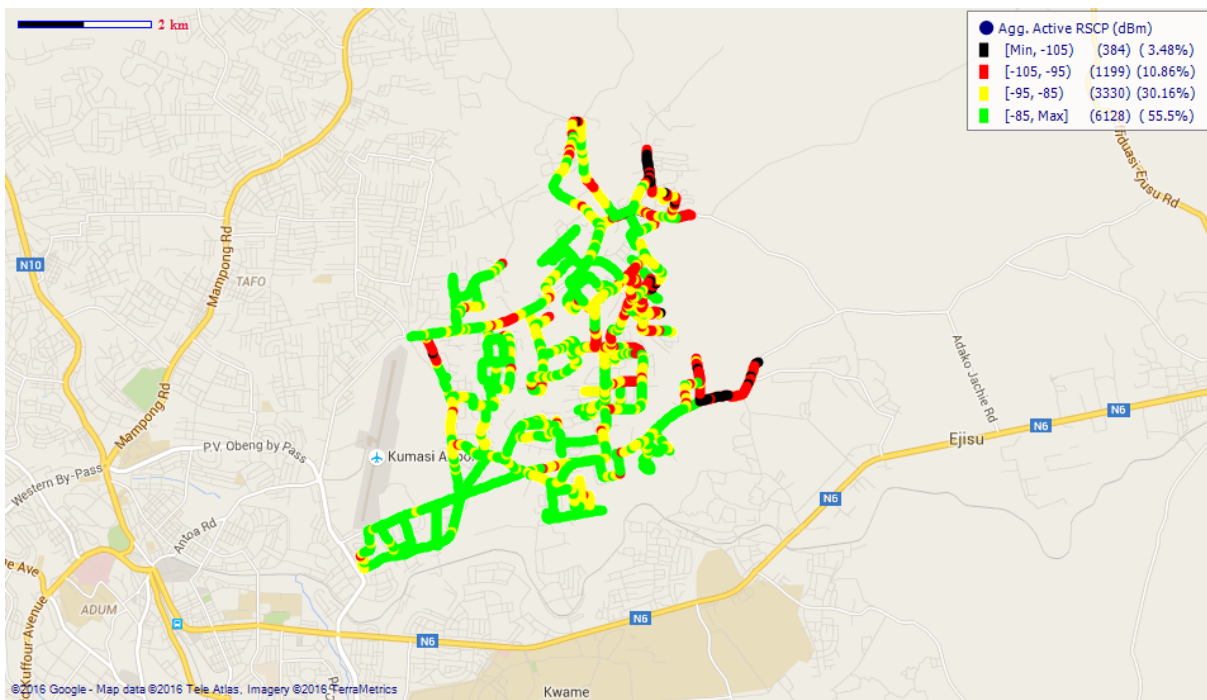
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Fig. 21 – Airtel 3G Coverage Plot- Asokore Mampong –September 2016



Remarks: Generally good 3G network coverage in and around Asokore Mampong.

Fig. 22 – Glo 3G Coverage Plot- Asokore Mampong –September 2016

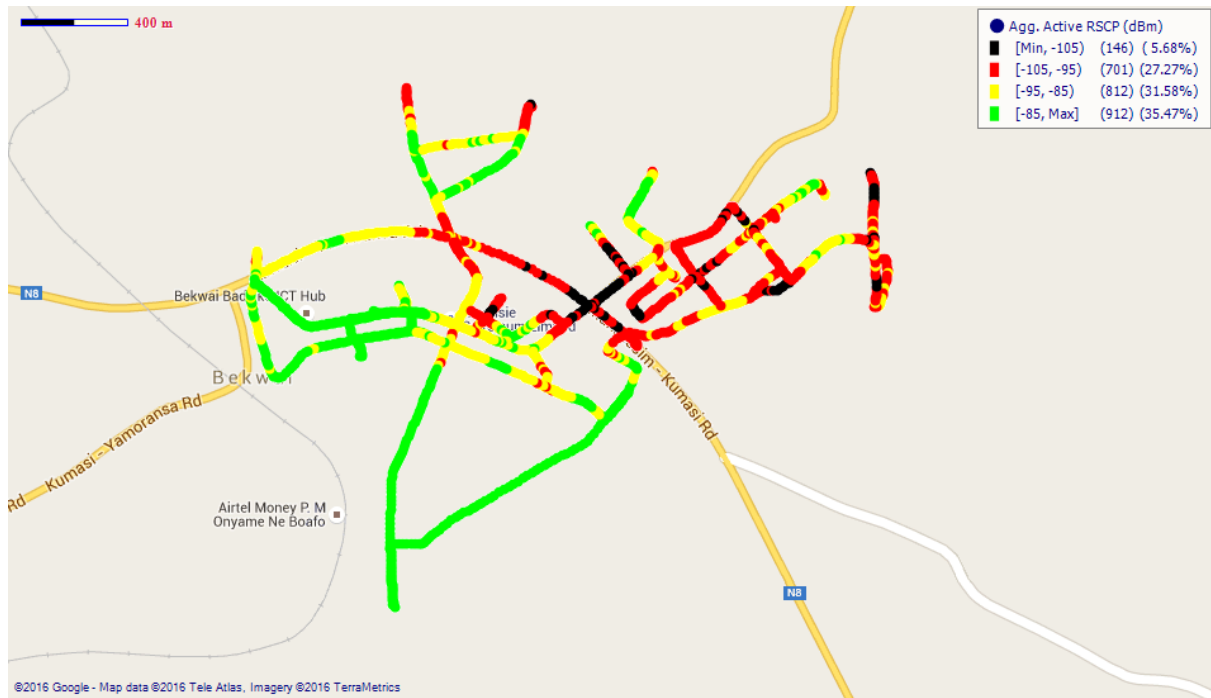


Remarks: Good 3G coverage at Asokore Mampong.

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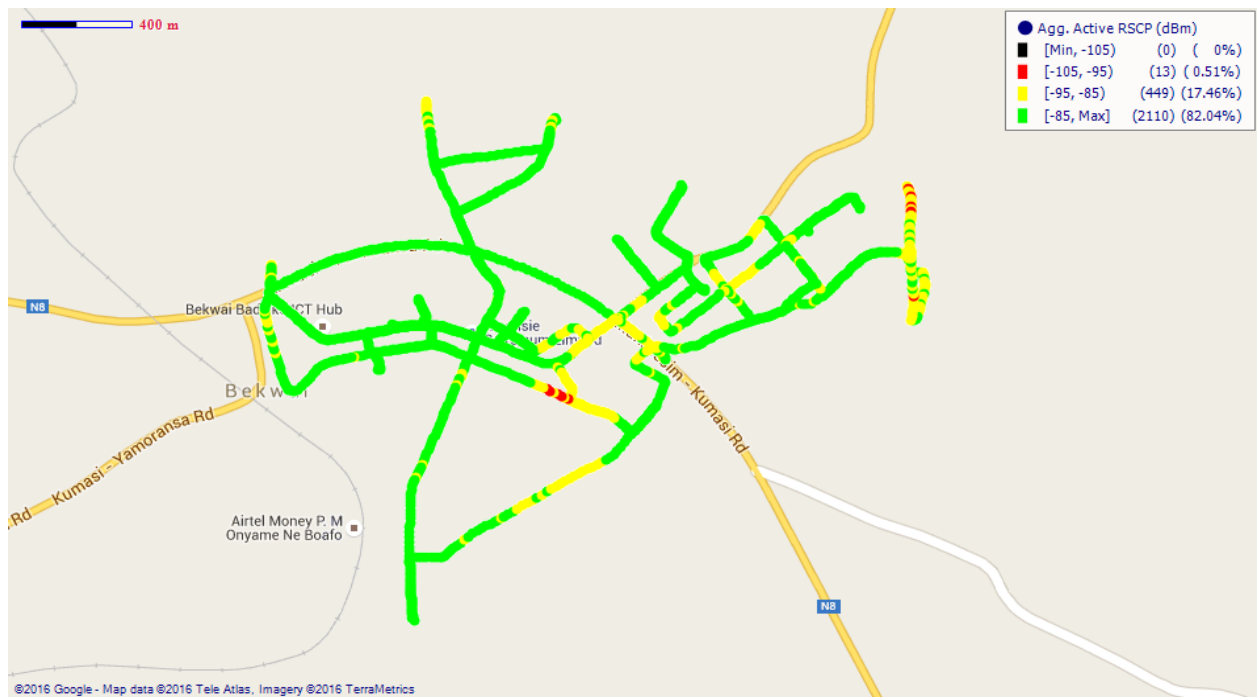
COVERAGE AT BEKWAI

Fig. 23 – MTN 3G Coverage Plot- Bekwai – September 2016



Remarks: Fair 3G coverage at Bekwai with equal percentage of bad coverage around Bekwai SDA SHS, new constructed Bekwai hospital and the central business spot which require major improvement.

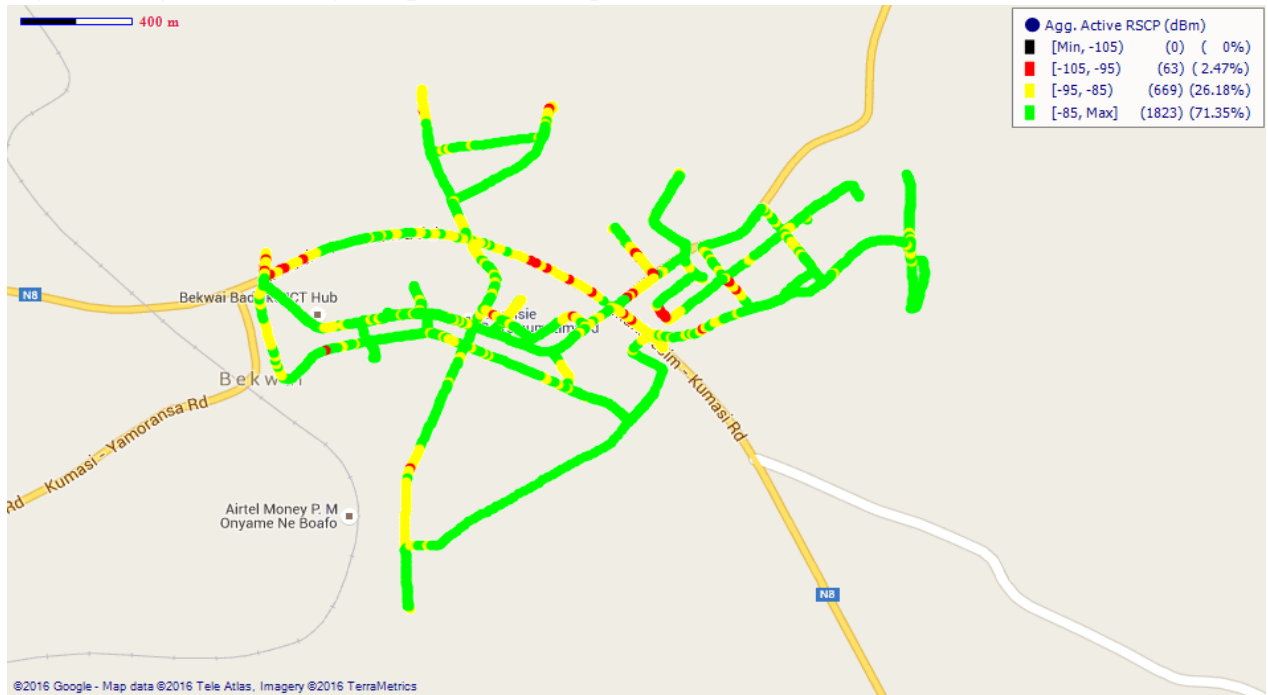
Fig. 24 – Vodafone 3G Coverage Map, Bekwai –September 2016



Remarks: Generally good 3G coverage at Bekwai.

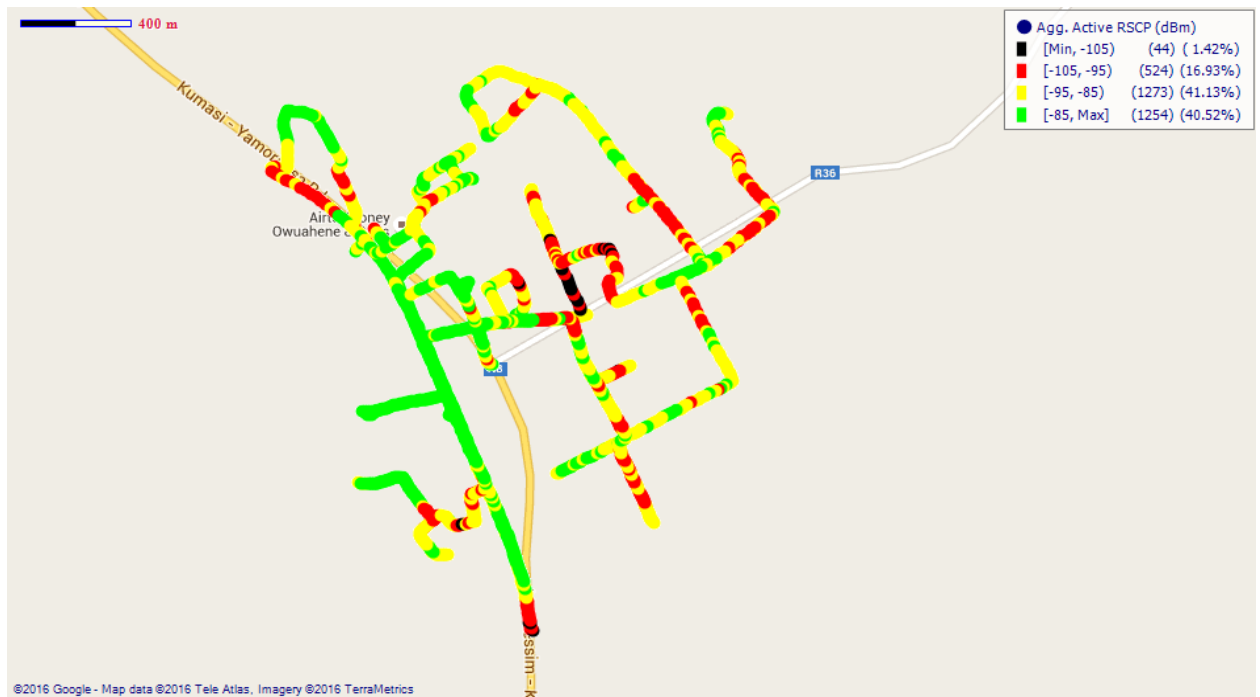
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Fig. 25 – Tigo 3G Coverage Map, Bekwai – September -2016



Remarks: Good 3G network coverage in Bekwai.

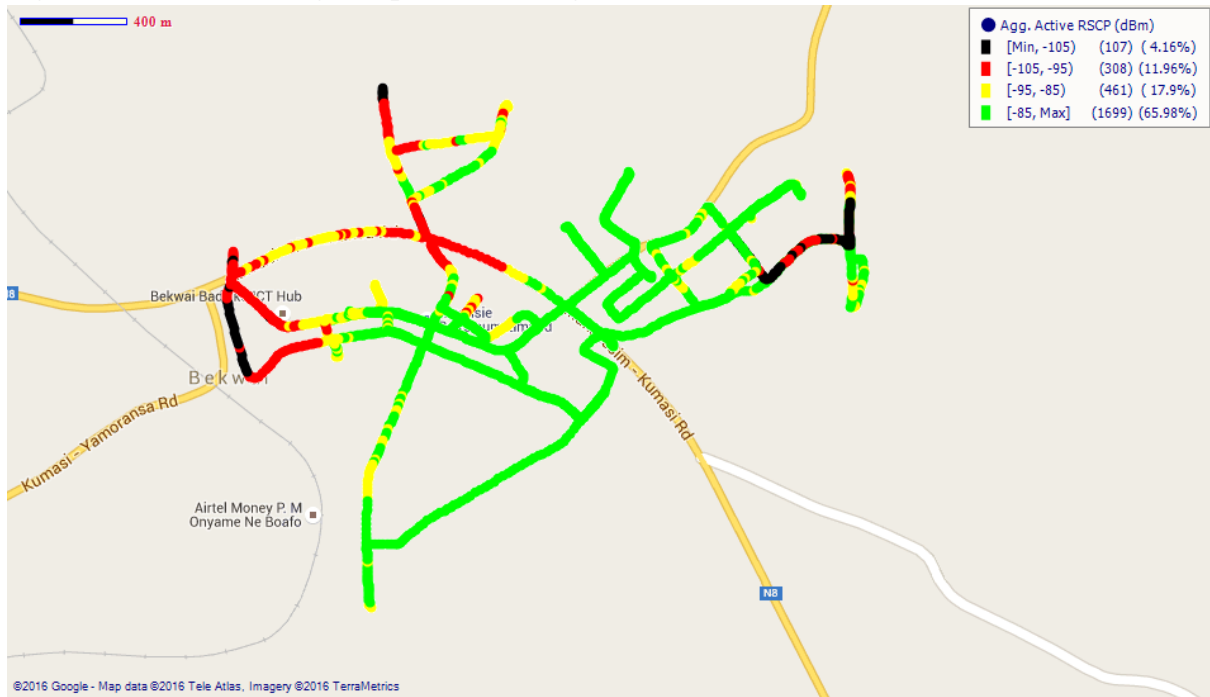
Fig. 26 - Airtel 3G Coverage Map, Bekwai -September 2016



Remarks: Generally good 3G coverage at Bekwai. Improvement is however needed at the main station.

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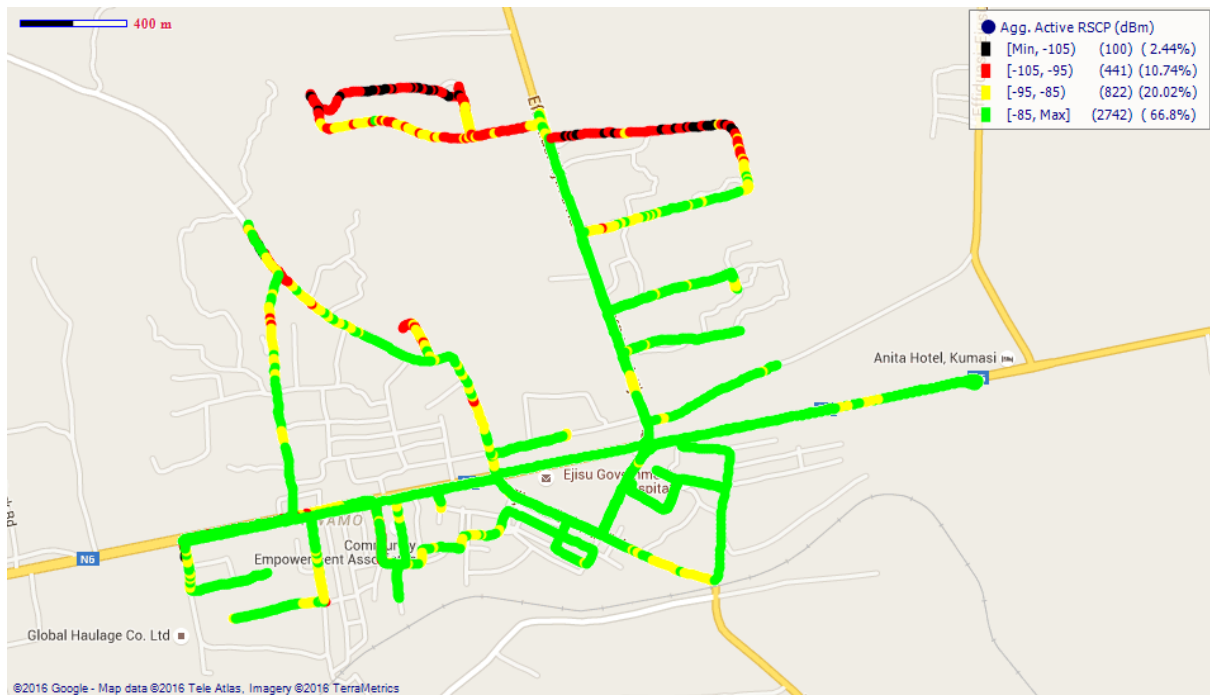
Fig. 27 - Glo 3G Coverage Map, Bekwai -August 2016



Remarks: Good 3G coverage at Bekwai. However, improvement is required around Bekwai ICT hub.

COVERAGE AT EJISU

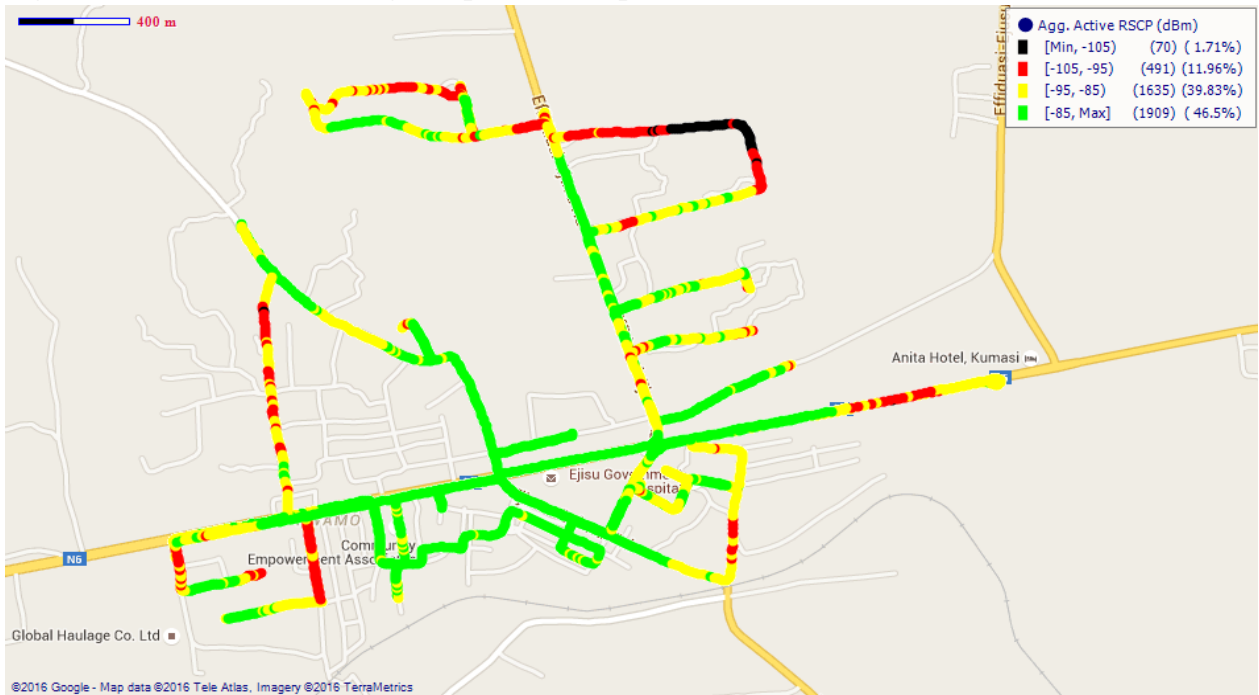
Fig. 28 – MTN 3G Coverage Map, Ejisu - September 2016



Remarks: Good 3G coverage at Ejisu. However, areas within and around Spiritan University College require improvement.

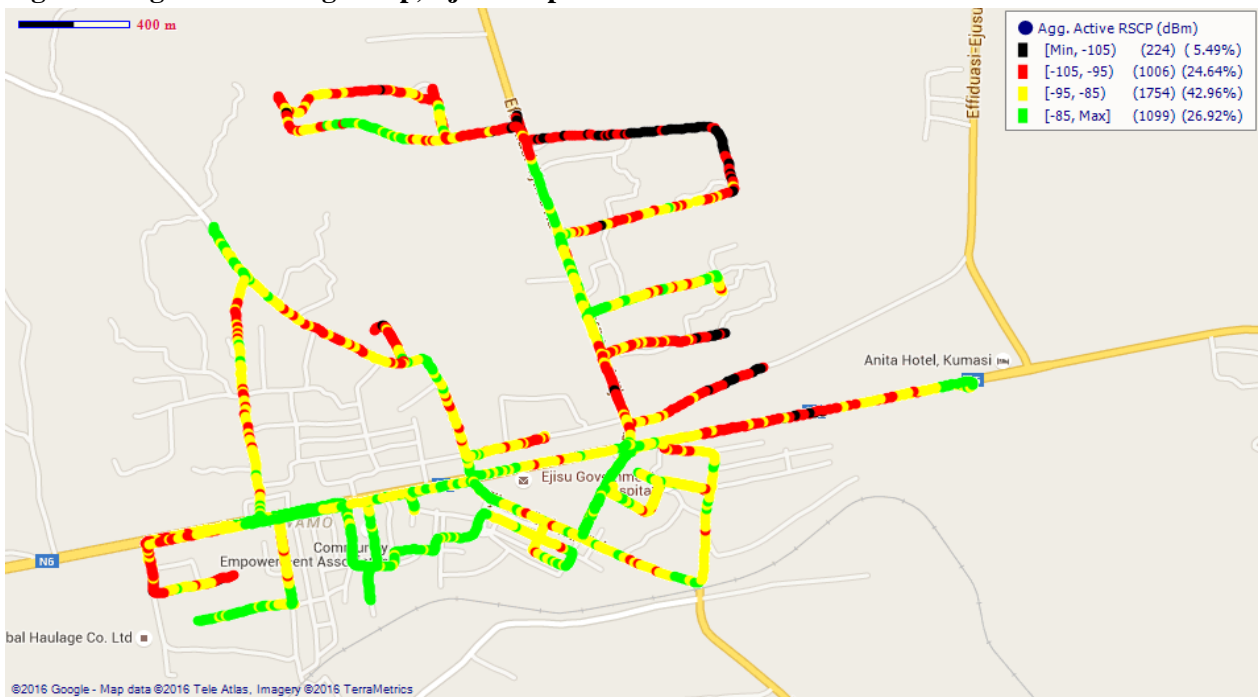
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Fig. 29 - Vodafone 3G Coverage Map, Ejisu – September 2016



Remarks: Fair 3G coverage with scattered poor spots around Ejisu. A major improvement is needed.

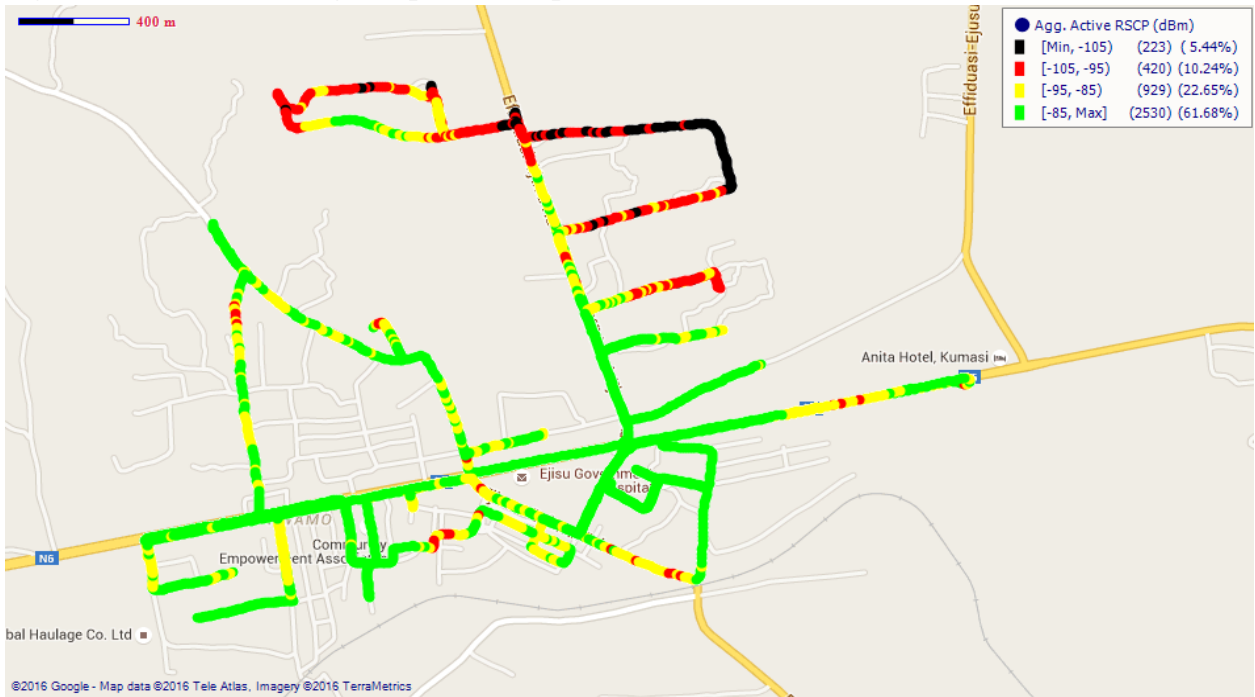
Fig. 30 - Tigo 3G Coverage Map, Ejisu –September -2016



Remarks: Fair 3G coverage in and around Ejisu. Major improvement is required around Spiritan University, on Ejisu-Juabeng Rd., on Ejisu – Konogo Rd. and behind the District Municipal Office.

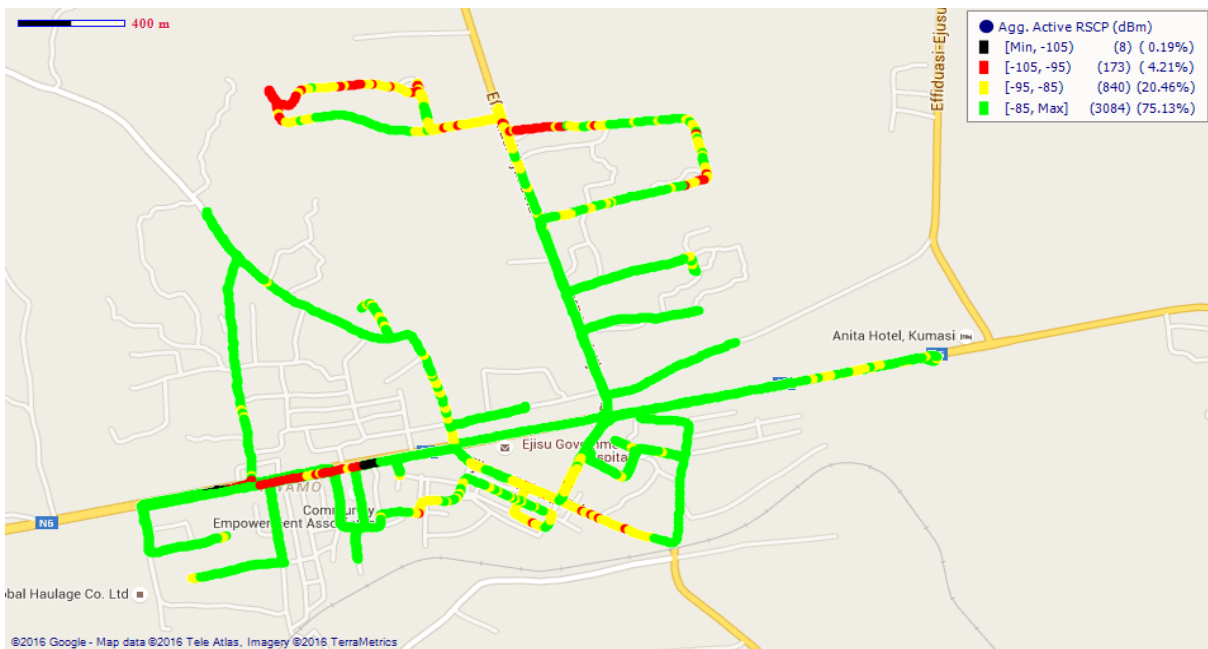
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Fig. 31 - Airtel 3G Coverage Map, Ejisu -September 2016



Remarks: Good 3G coverage at Ejisu; however areas around Spiritan University College require improvement.

Fig. 32 - Glo 3G Coverage Map, Ejisu - September 2016

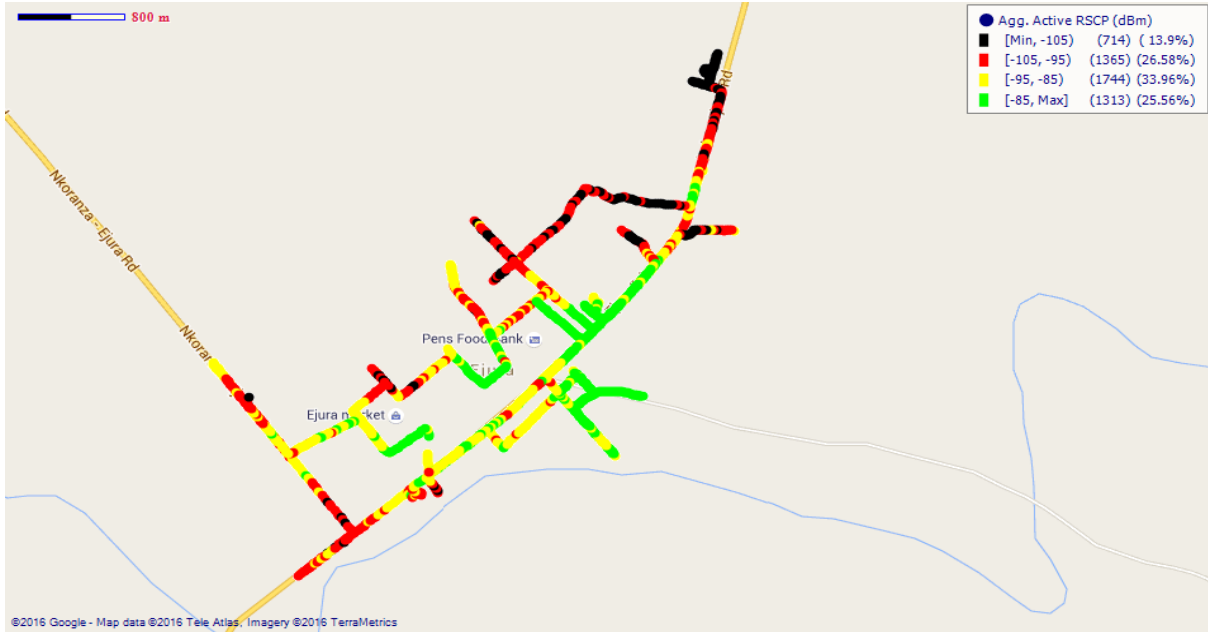


Remarks: Good 3G coverage across Ejisu; however areas around Spiritan University College requires improvement.

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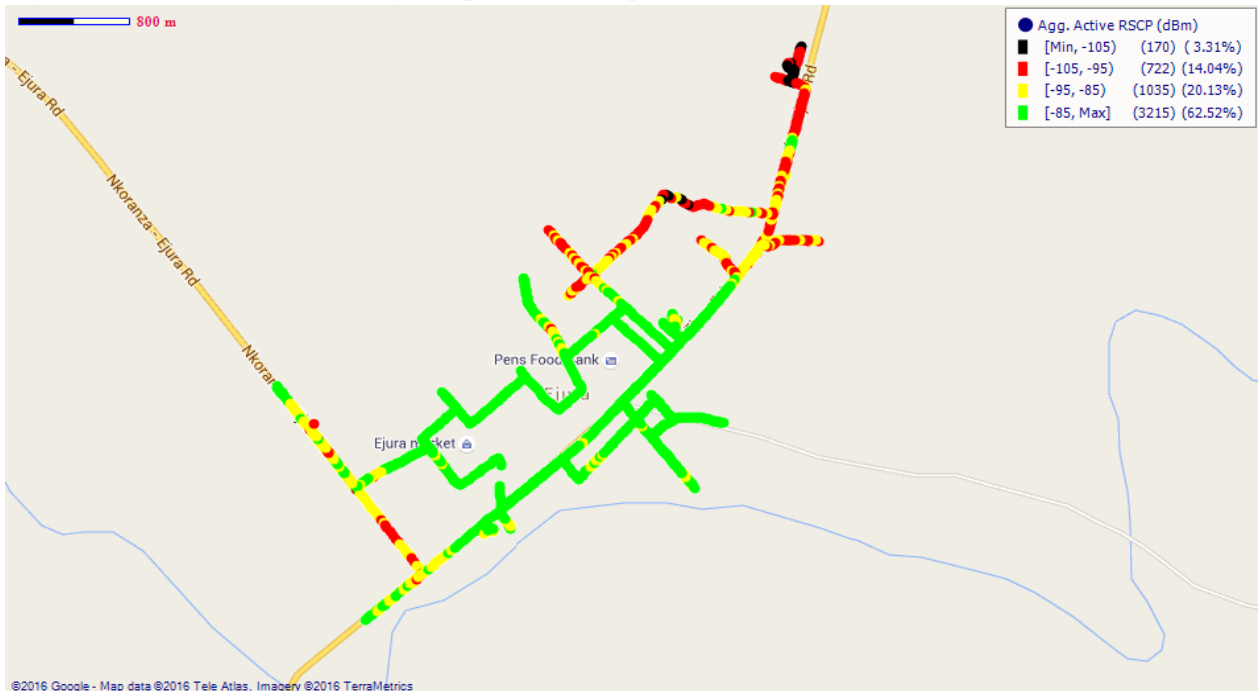
COVERAGE AT EJURA

Fig. 33 - MTN 3G Coverage Map Ejura – September 2016



Remarks: Generally fair 3G coverage in Ejura with some bad spots around the Ejura market area, Fuel Stop, on Nkoranza road, and around Data Superhighway Internet Café which require improvement.

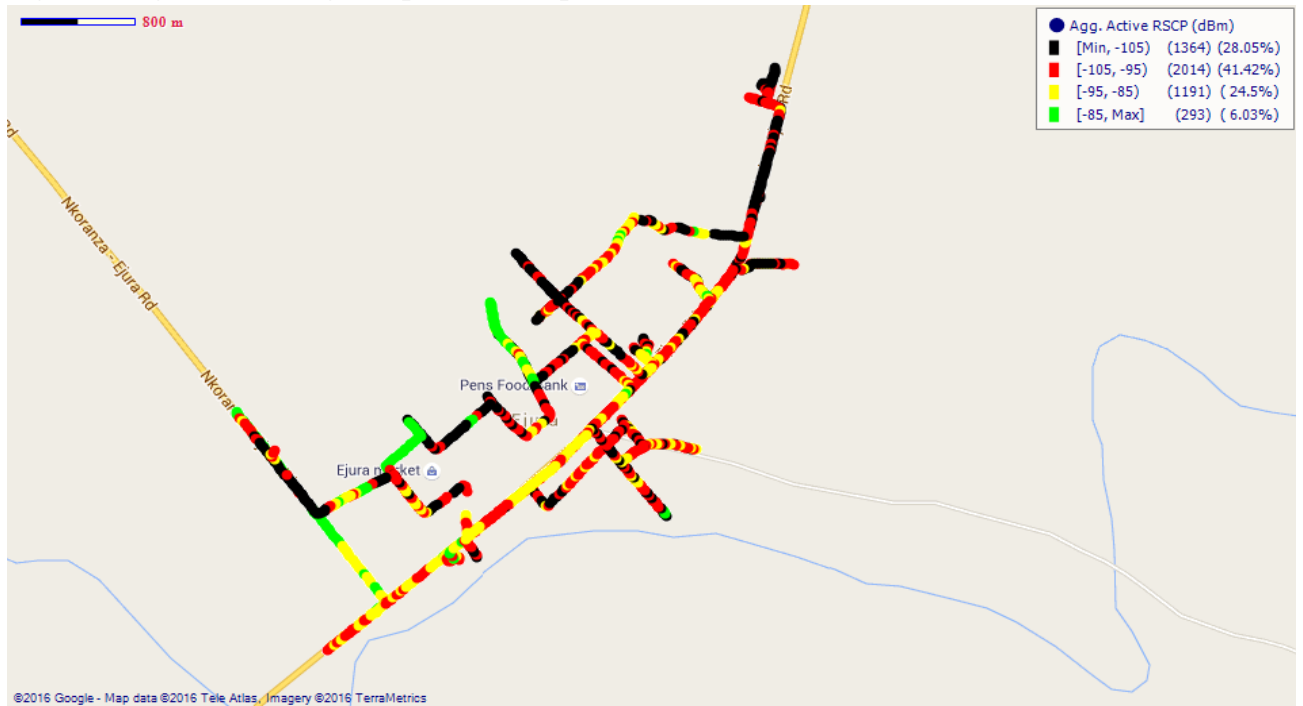
Fig. 34 - Vodafone 3G Coverage Map, Ejura – September 2016



Remarks: Good 3G coverage in and around Ejura with some fair spots on the Ejura-Atebubu Rd and Ejura Agric College which require improvement.

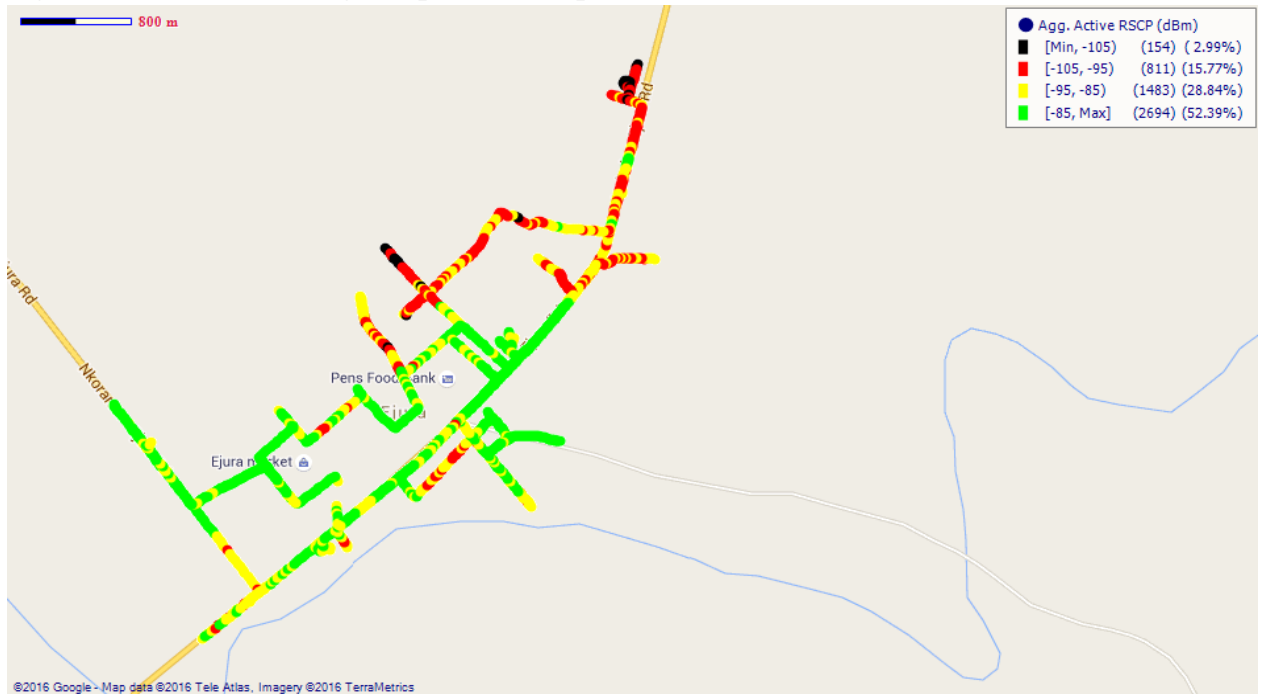
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Fig. 35 - Tigo 3G Coverage Map, Ejura - September 2016



Remarks: Poor 3G coverage in and around Ejura which requires a major improvement.

Fig. 36 - Airtel 3G Coverage Map, Ejura - September 2016

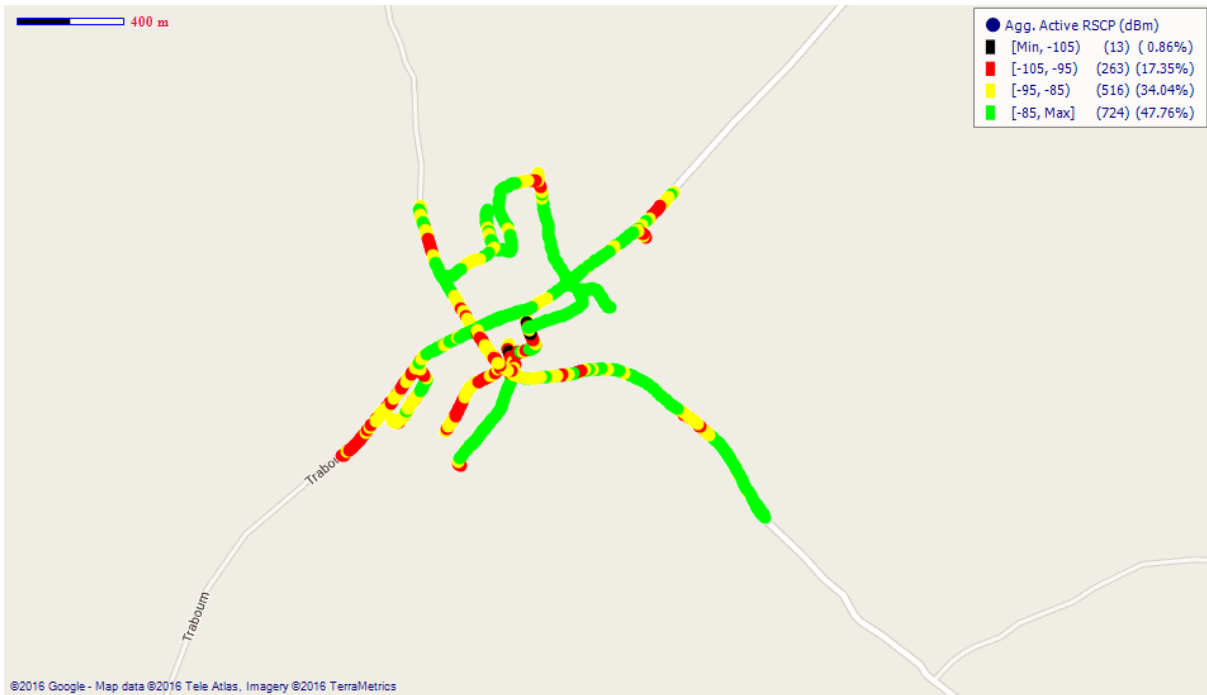


Remarks: Fair 3G coverage in and around Ejura which requires improvement on the Ejura-Atebubu road.

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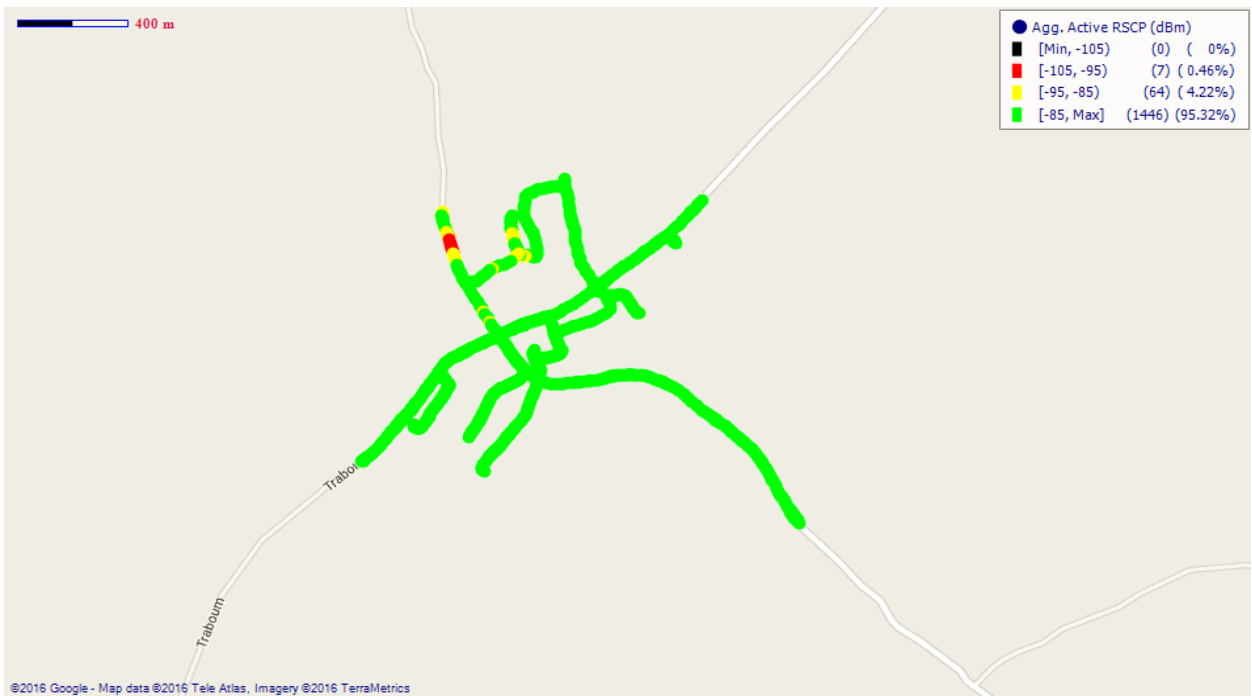
COVERAGE AT FOASE

Fig. 37 - MTN 3G Coverage Map, Foase - September 2016



Remarks: Fair 3G network coverage at Foase. Improvement is required.

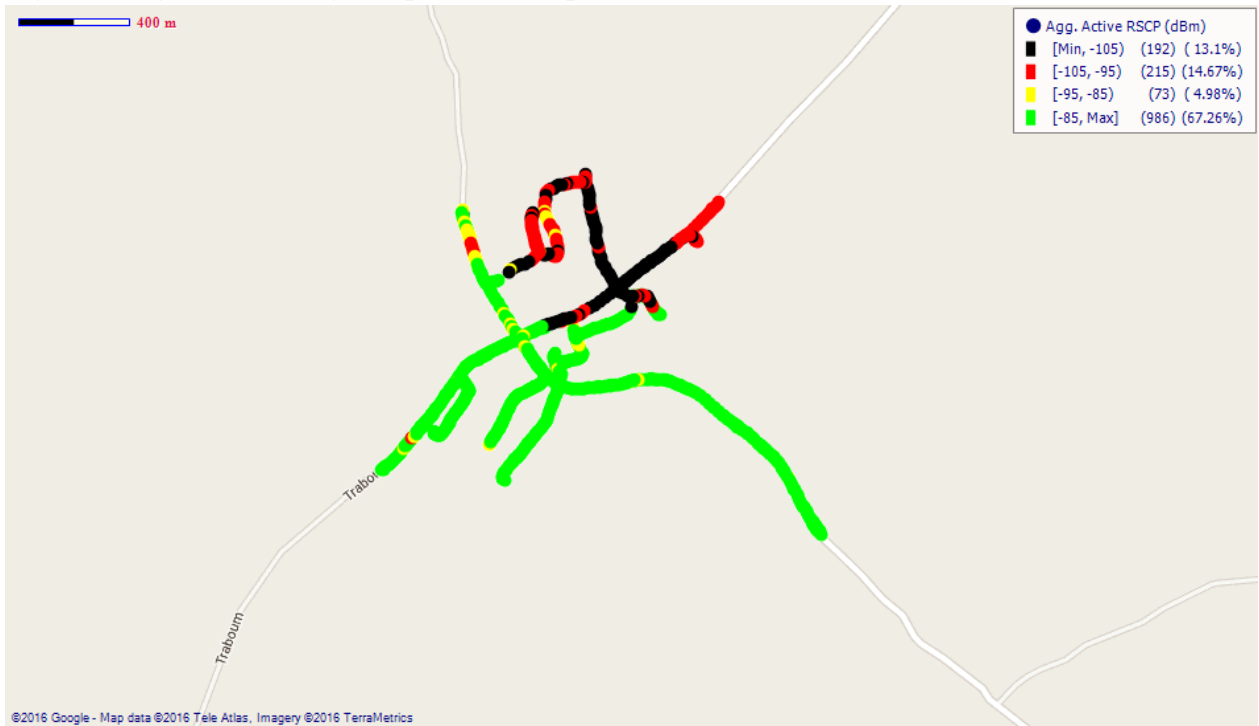
Fig. 38 - Vodafone 3G Coverage Map, Foase - September 2016



Remarks: Good 3G network coverage at Foase.

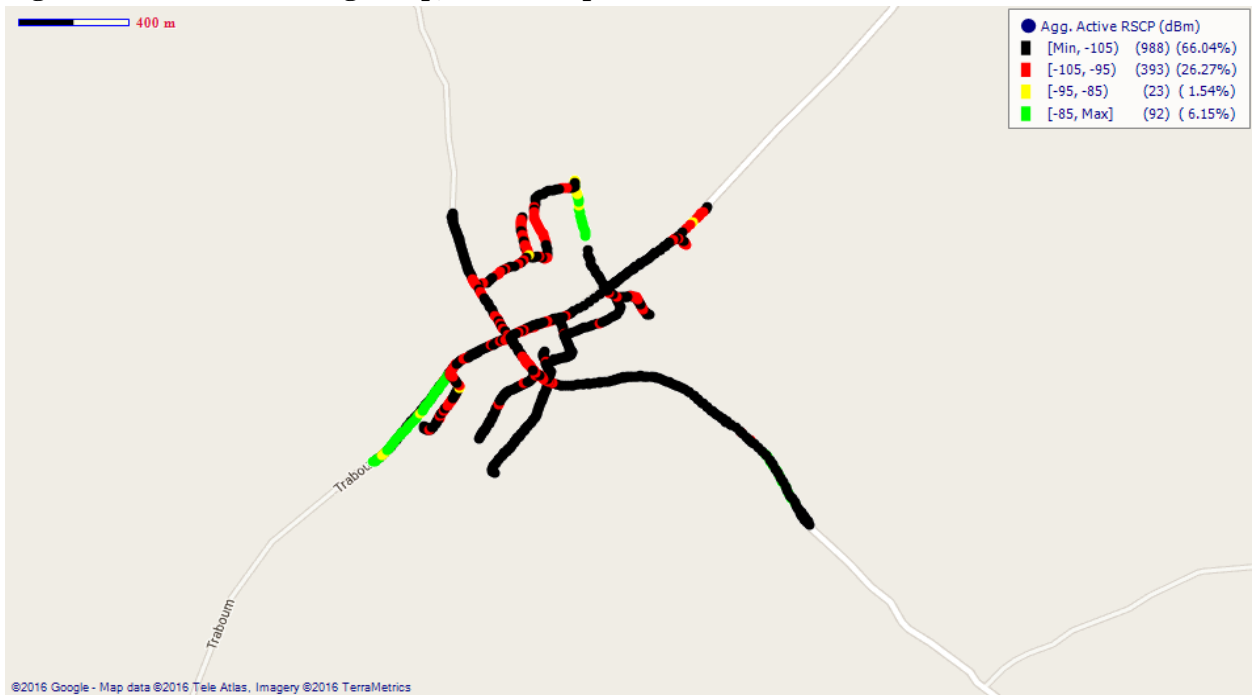
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Fig. 39 – Tigo 3G Coverage Map, Foase – September 2016



Remarks: Good 3G coverage in Foase. However, improvement is required on Atwima Boko Rd.

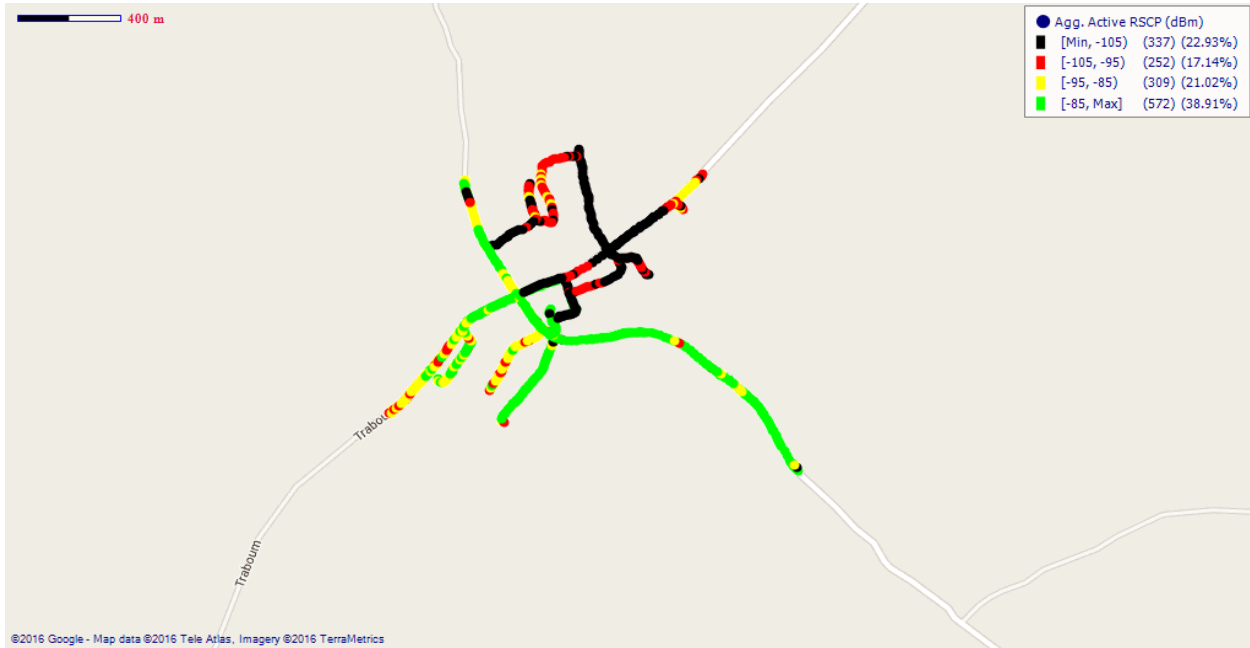
Fig. 40 – Airtel 3G Coverage Map, Foase – September 2016



Remarks: 3G coverage at Foase is non-existent. Airtel needs to extend its 3G coverage to Foase.

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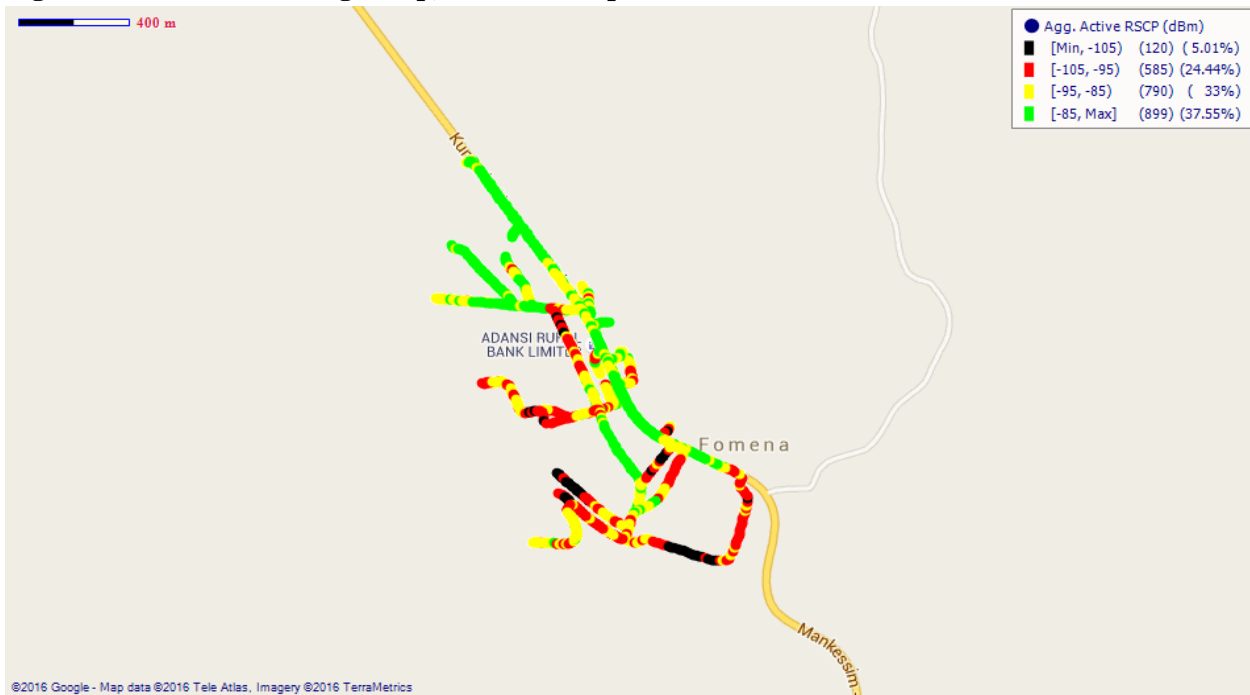
Fig. 41 – Glo 3G Coverage Map, Foase – September 2016



Remarks: Poor 3G coverage in Foase which requires a major improvement.

COVERAGE AT FOMENA

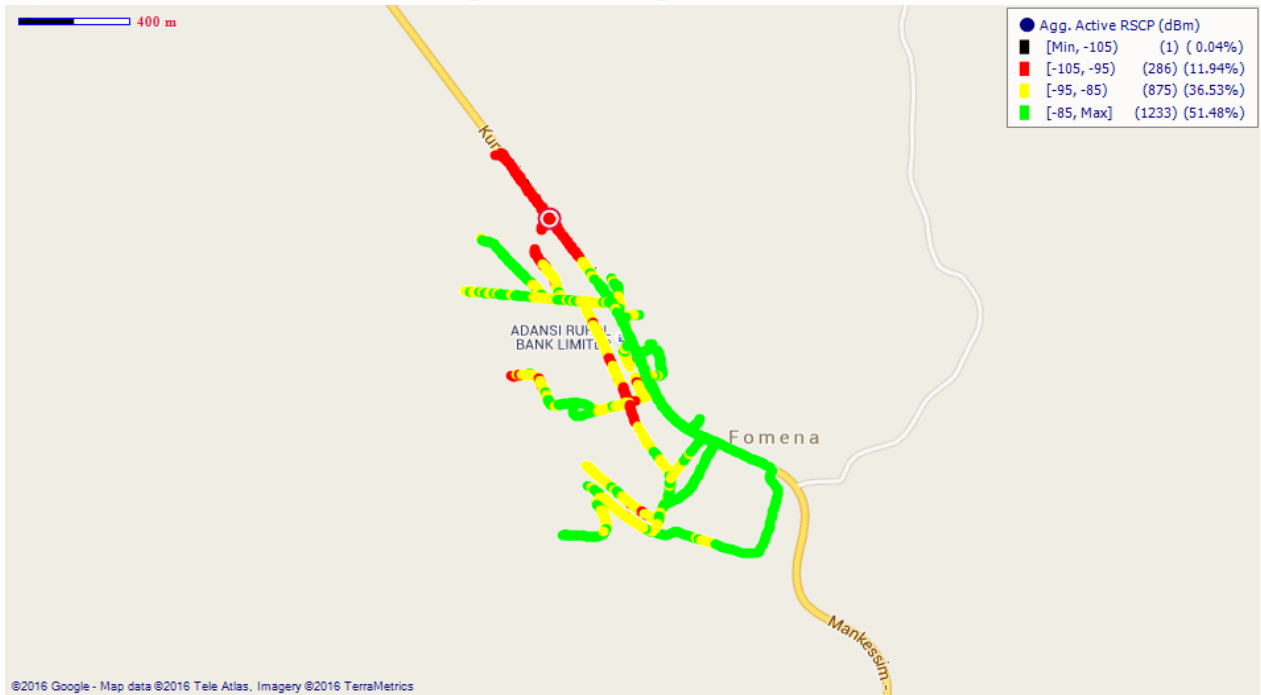
Fig. 42 – MTN 3G Coverage Map, Fomena – September 2016



Remarks: Fair 3G network coverage in Fomena which needs improvement.

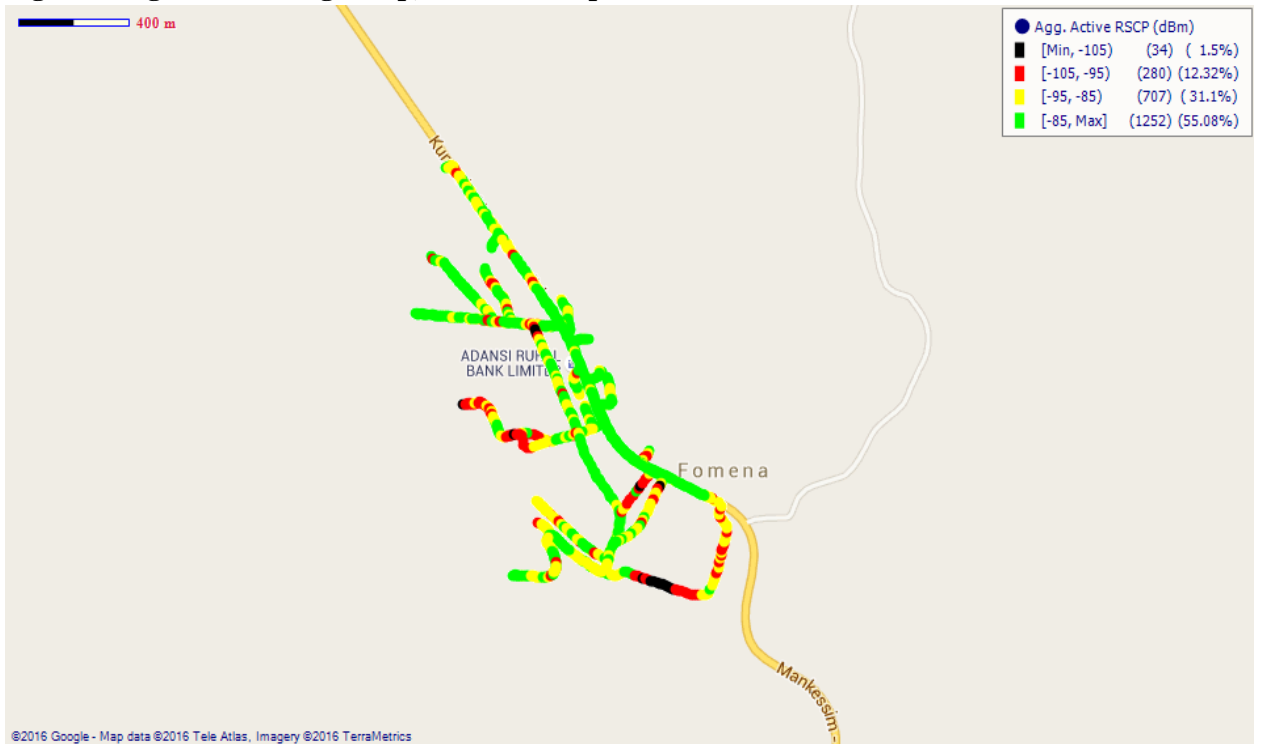
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Fig. 43 – Vodafone 3G Coverage Map, Fomena – September 2016



Remarks: Good 3G network coverage at Fomena. However, improvement is needed on Fomena-Edubiase Rd.

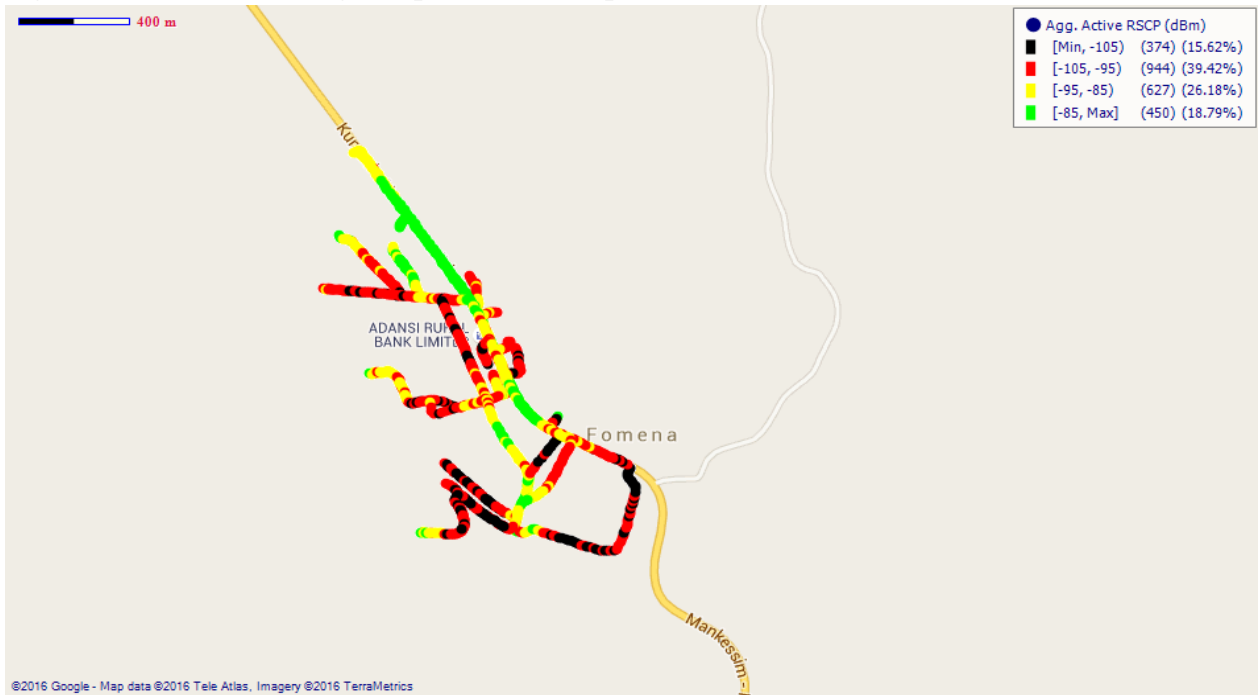
Fig. 44 – Tigo 3G Coverage Map, Fomena – September 2016



Remarks: Good 3G network coverage at Fomena but the pockets of fair coverage needs improvement.

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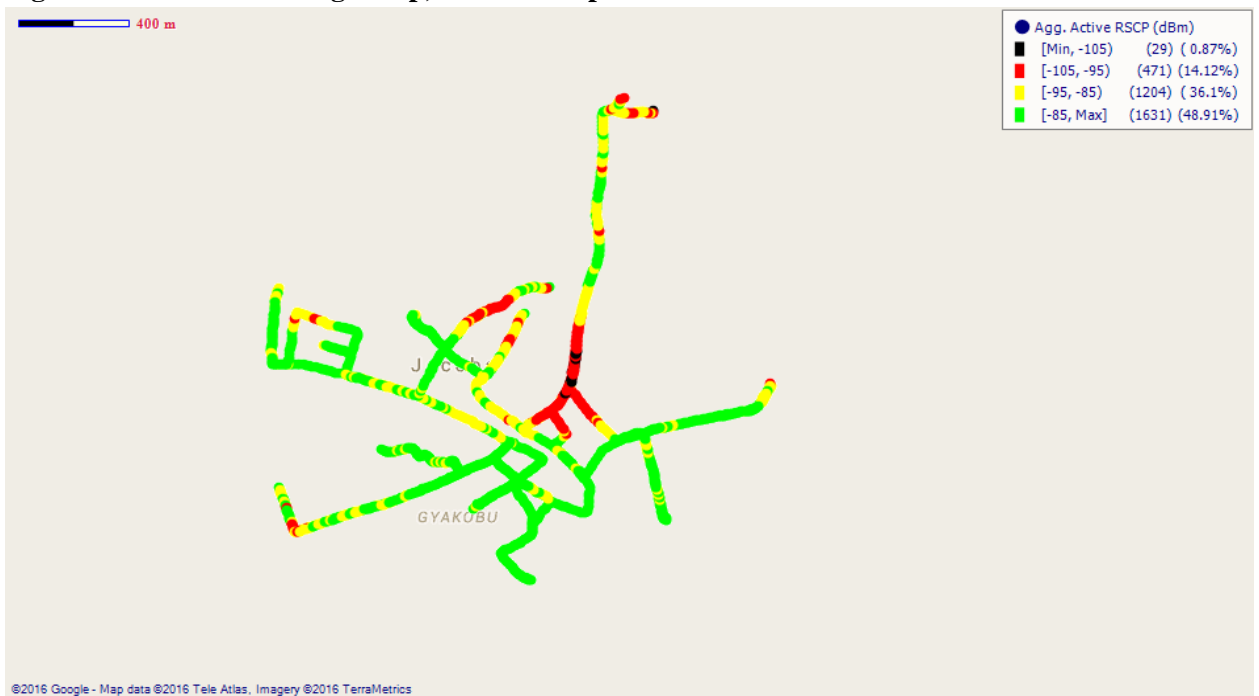
Fig. 45 – Airtel 3G Coverage Map, Fomena – September 2016



Remarks: Poor 3G network coverage at Fomena. A major improvement is required.

COVERAGE AT JACOBU

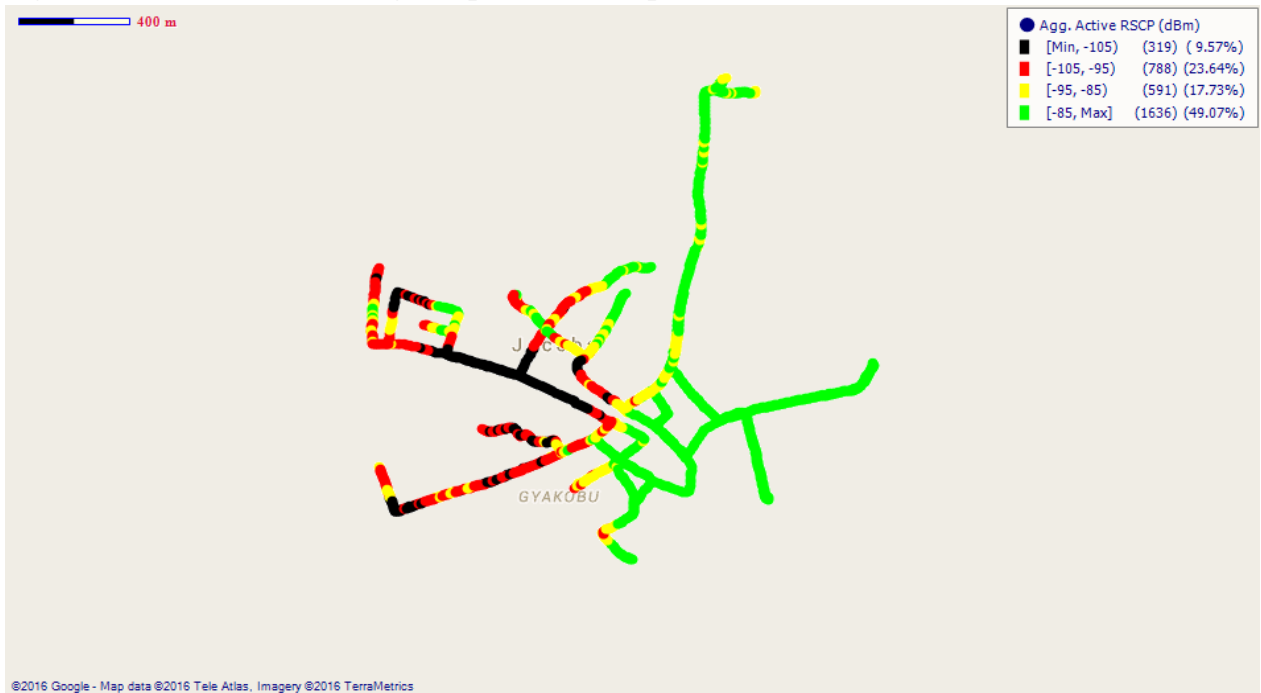
Fig. 46 –MTN 3G Coverage Map, Jacobu – September 2016



Remarks: Good 3G network coverage with equal percentage of bad coverage that requires improvement.

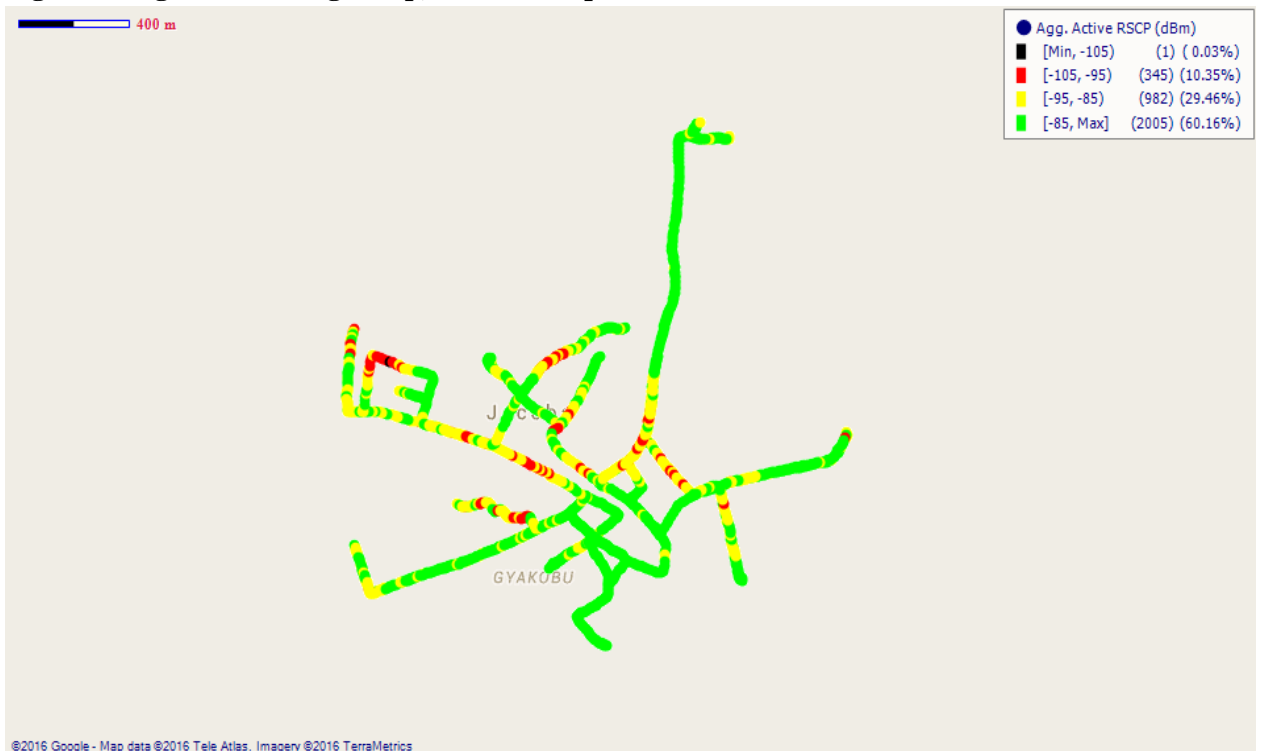
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Fig. 47 – Vodafone 3G Coverage Map, Jacobu – September 2016



Remarks: Fair 3G network coverage at Jacobu which requires a major improvement.

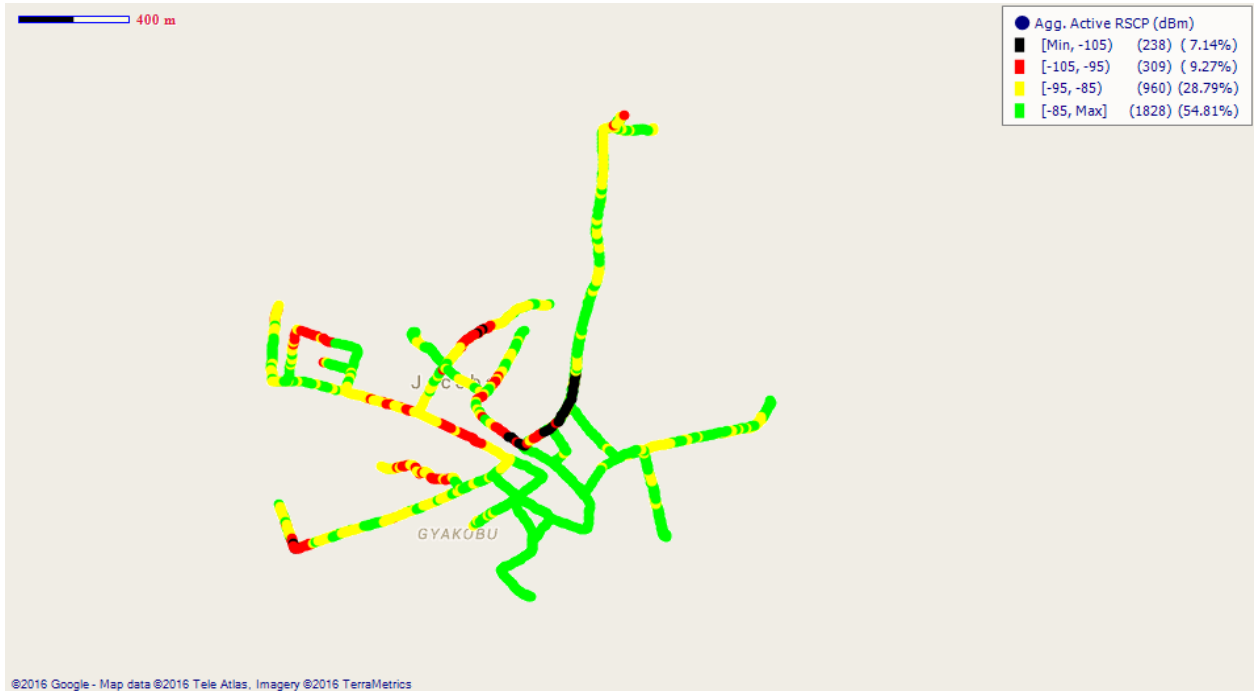
Fig. 48 – Tigo 3G Coverage Map, Jacobu – September 2016



Remarks: Good 3G network coverage at Jacobu with spots of fair signals which require improvement.

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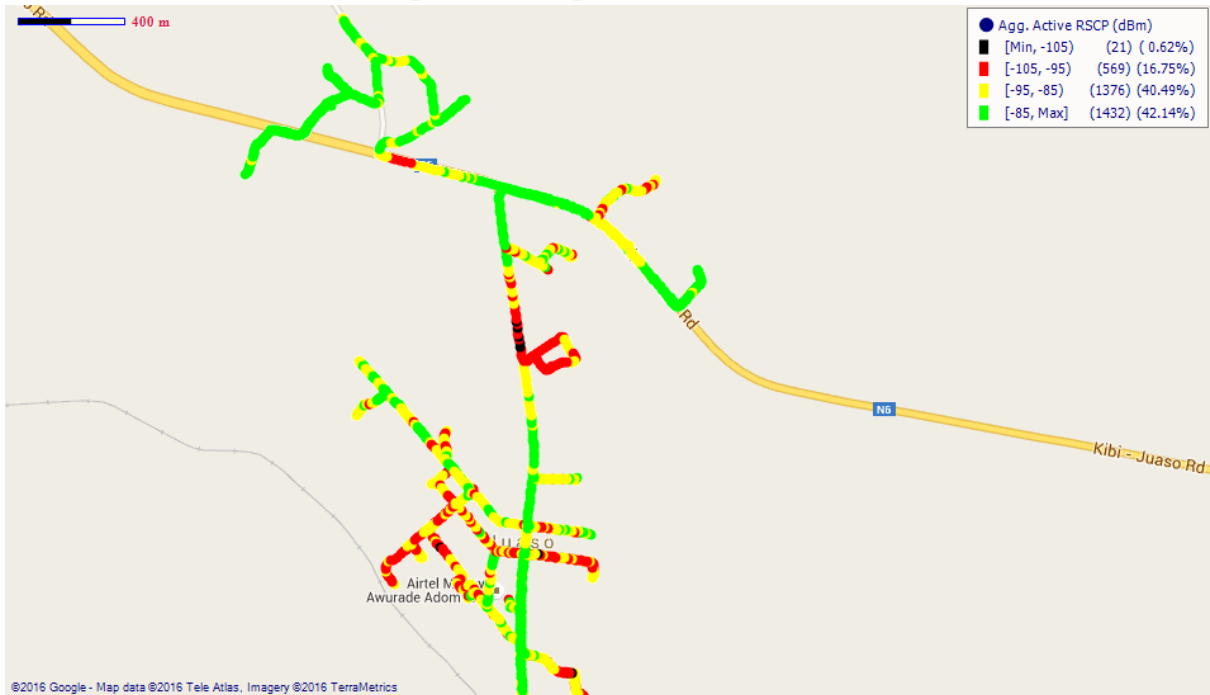
Fig. 49 – Airtel 3G Coverage Map, Jacobu –September 2016



Remarks: Fair 3G network coverage at Jacobu with poor spots around Krofrom. Improvement is needed.

COVERAGE AT JUASO

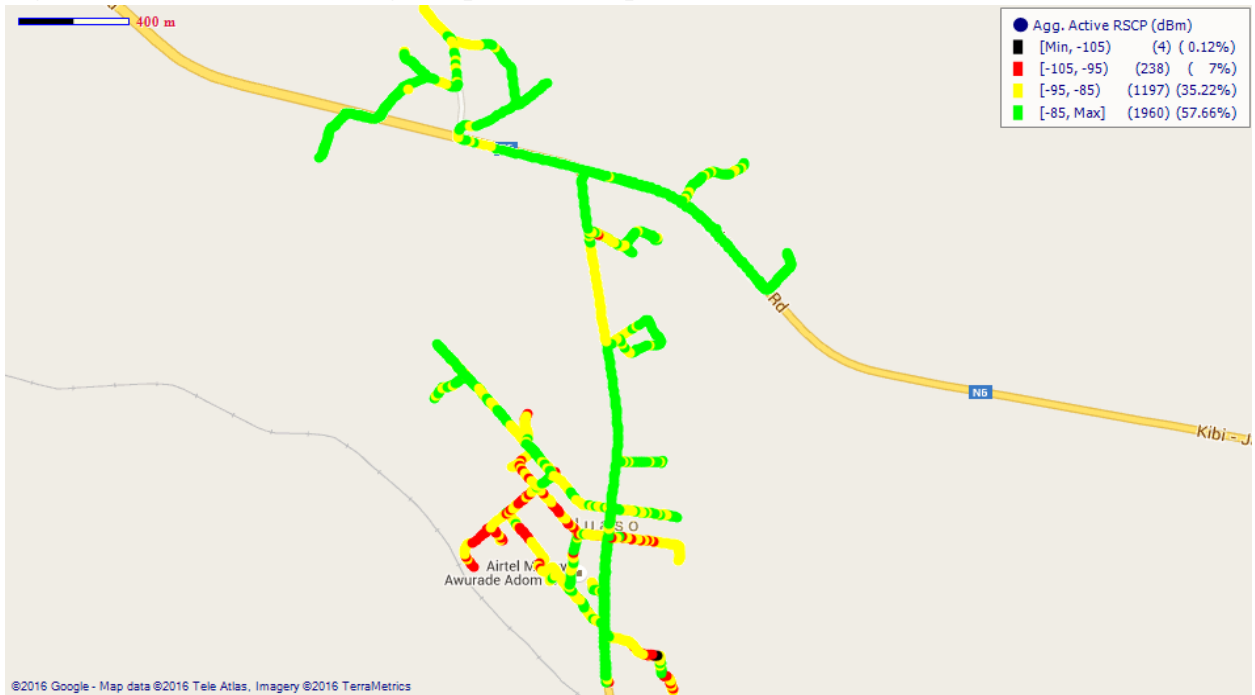
Fig. 50 - MTN 3G Coverage Map, Juaso – September 2016



Remarks: Fair 3G coverage with almost equal percentage of bad spots. Improvement is required around Awurade Adom Airtel Money Ventures, around GCB Bank and around Asante Akyem Rural Bank.

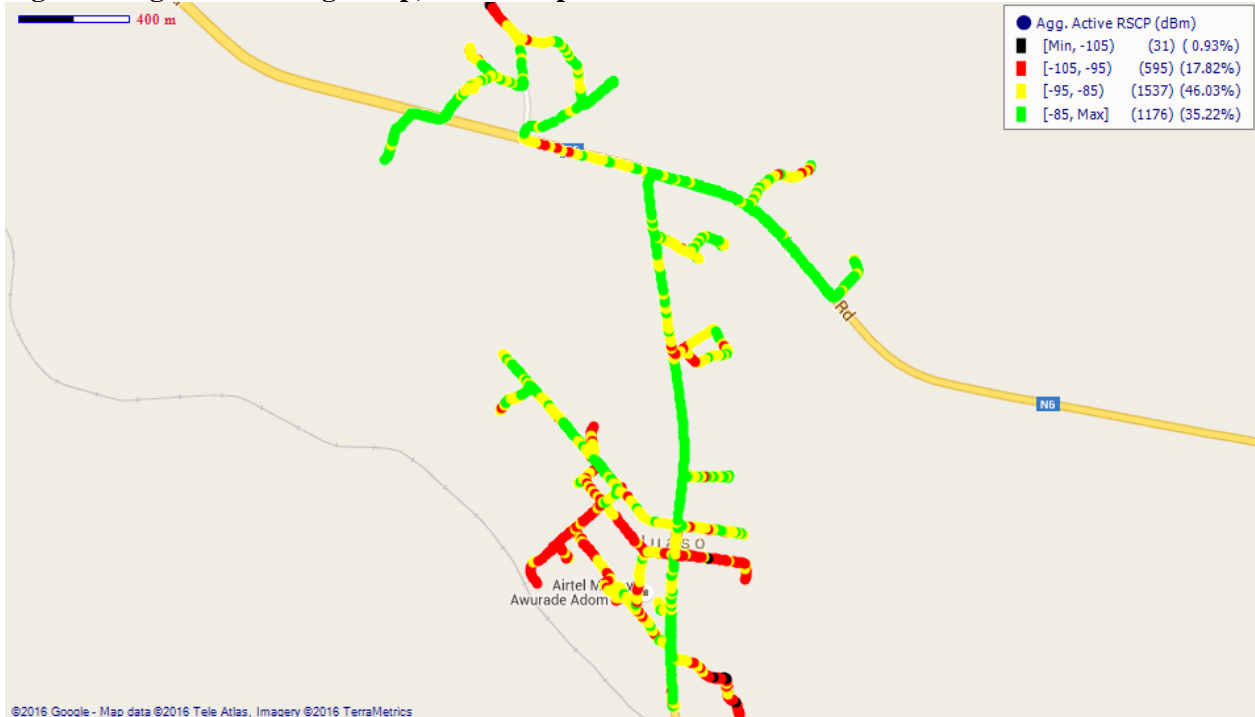
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Fig. 51 - Vodafone 3G Coverage Map, Juaso – September 2016



Remarks: Good 3G coverage at Juaso with fair spots around Awurade Adom Enterprise requiring improvement.

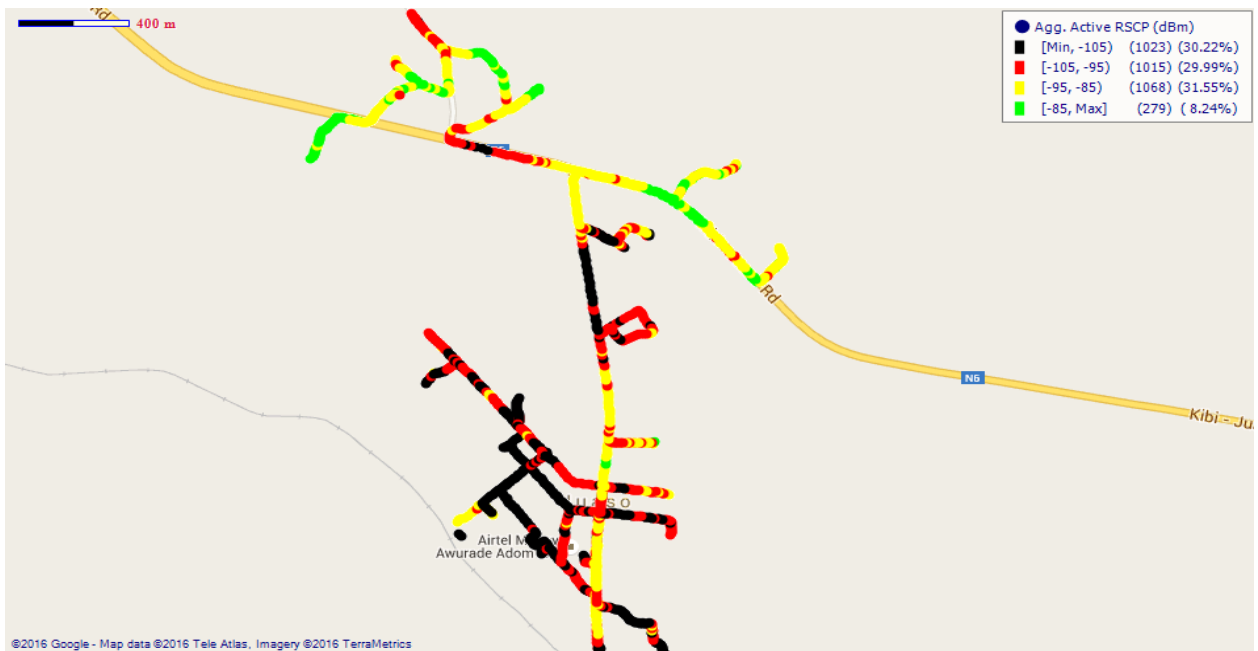
Fig. 52 - Tigo 3G Coverage Map, Juaso - September 2016



Remarks: Fair 3G coverage with some poor spots in Juaso. Improvement is required especially at the market area and Awurade Adom Airtel Cash vendor.

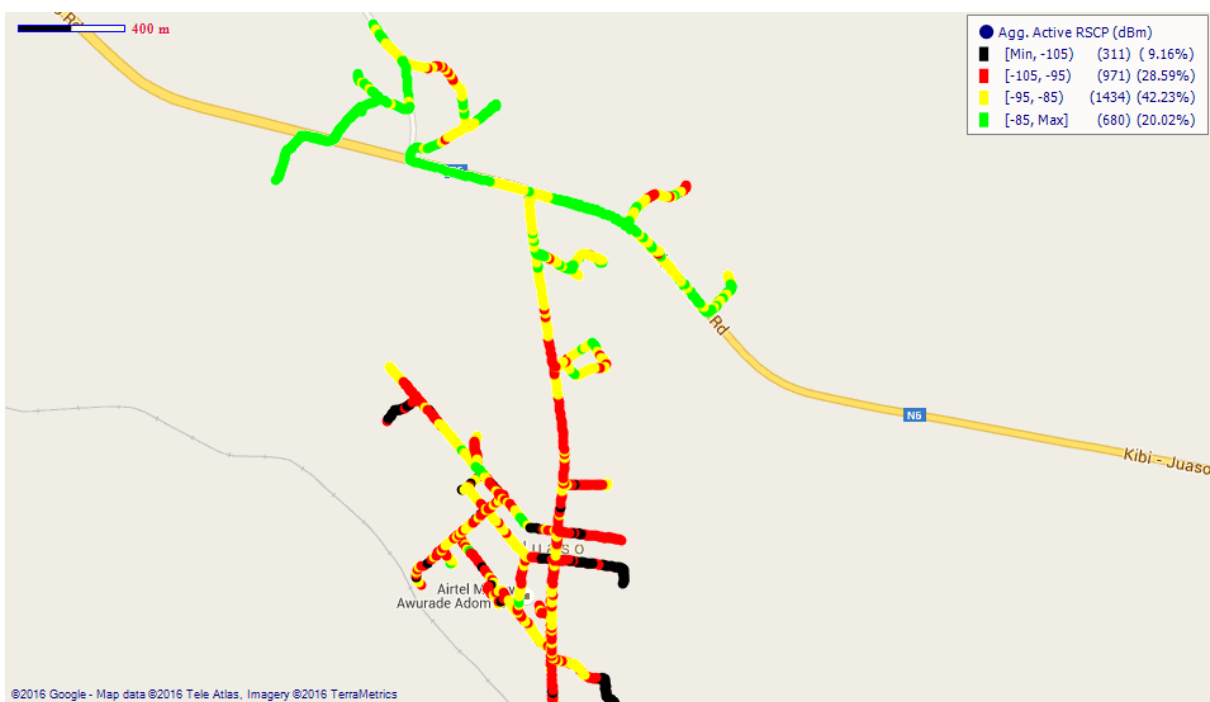
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Fig. 53 -Airtel 3G Coverage Map, Juaso – September 2016



Remarks: Poor 3G coverage in and around Juaso. A major improvement is required.

Fig. 54 – Glo 3G Coverage Map, Juaso – September 2016

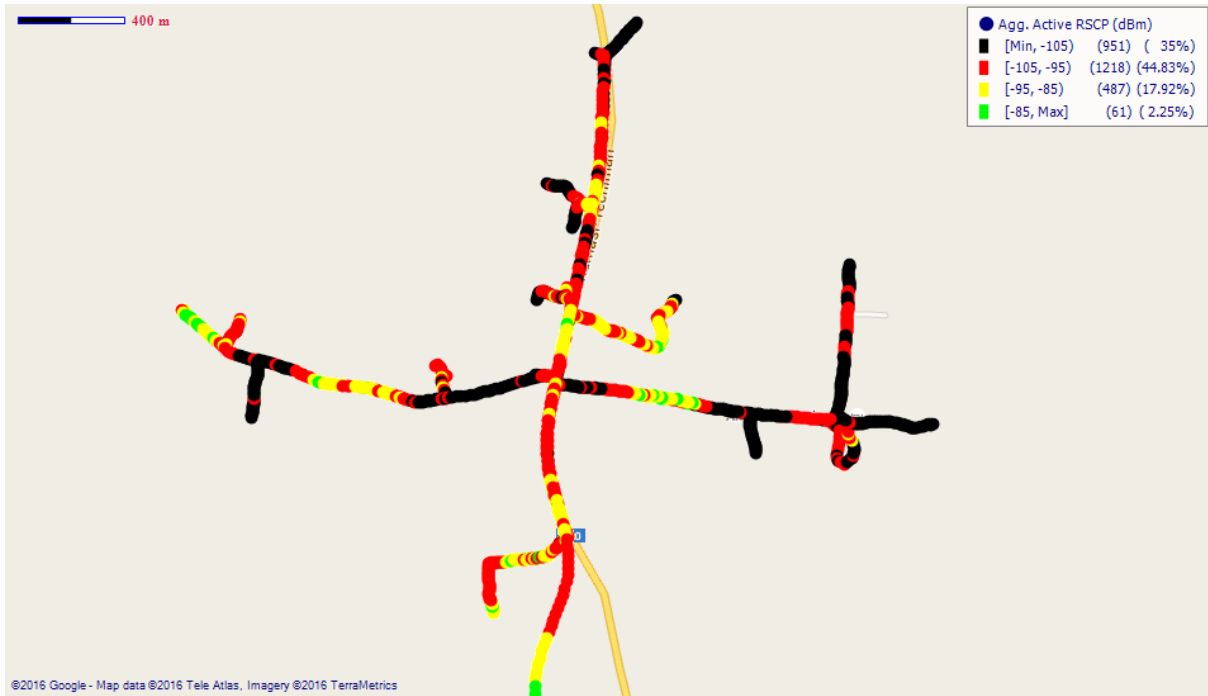


Remarks: Fair 3G coverage in Juaso that requires a major improvement.

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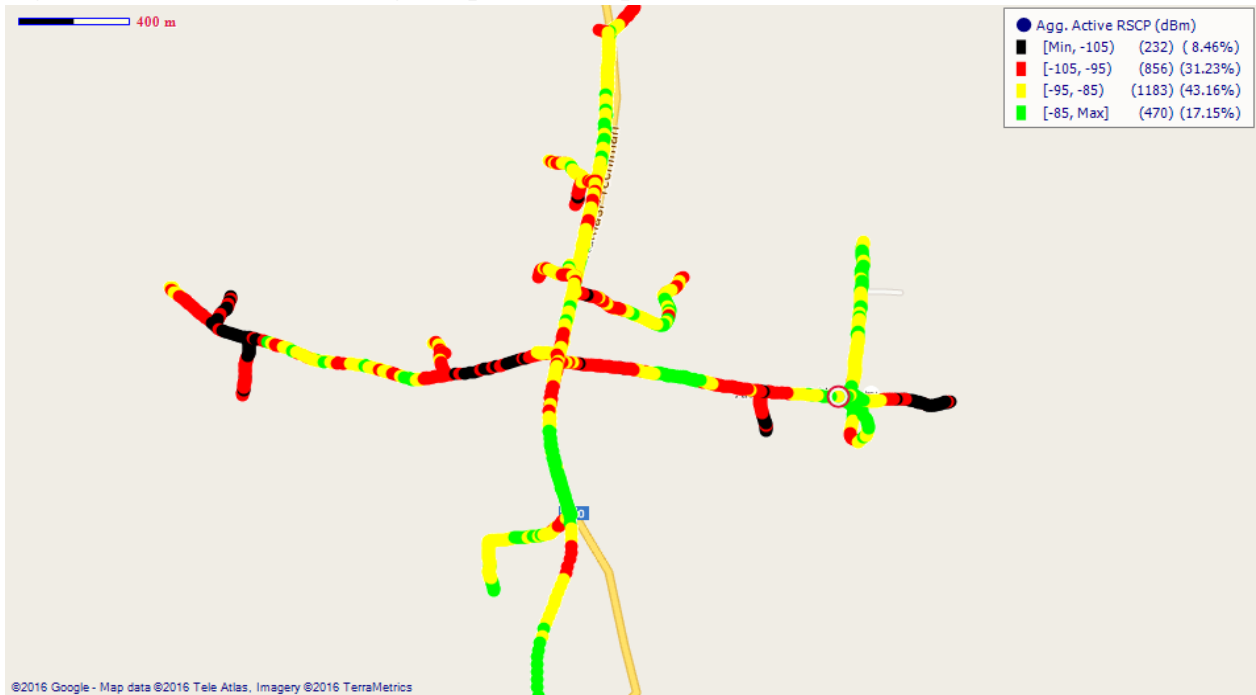
COVERAGE AT KODIE

Fig. 55 - MTN 3G Coverage Map, Kodie- September 2016



Remarks: Poor 3G coverage in Kodie that requires a major improvement.

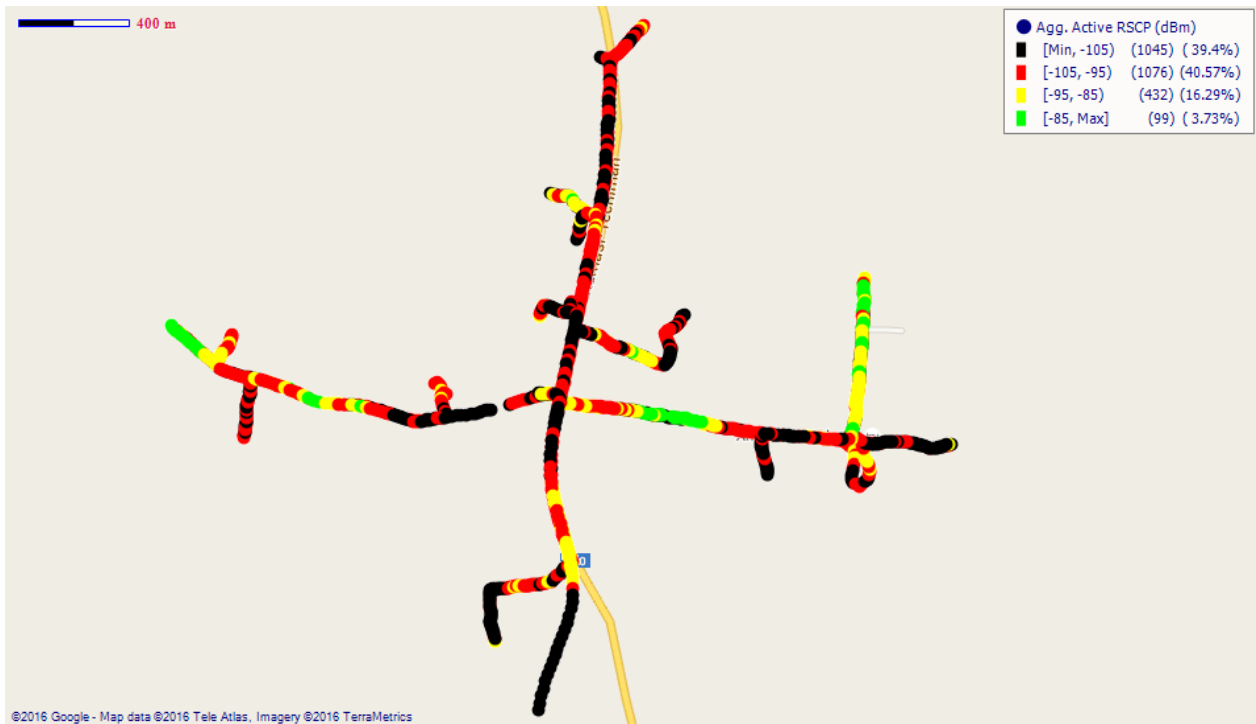
Fig. 56 – Vodafone 3G Coverage Map, Kodie- September 2016



Remarks: Fair 3G coverage in Kodie that requires major improvement.

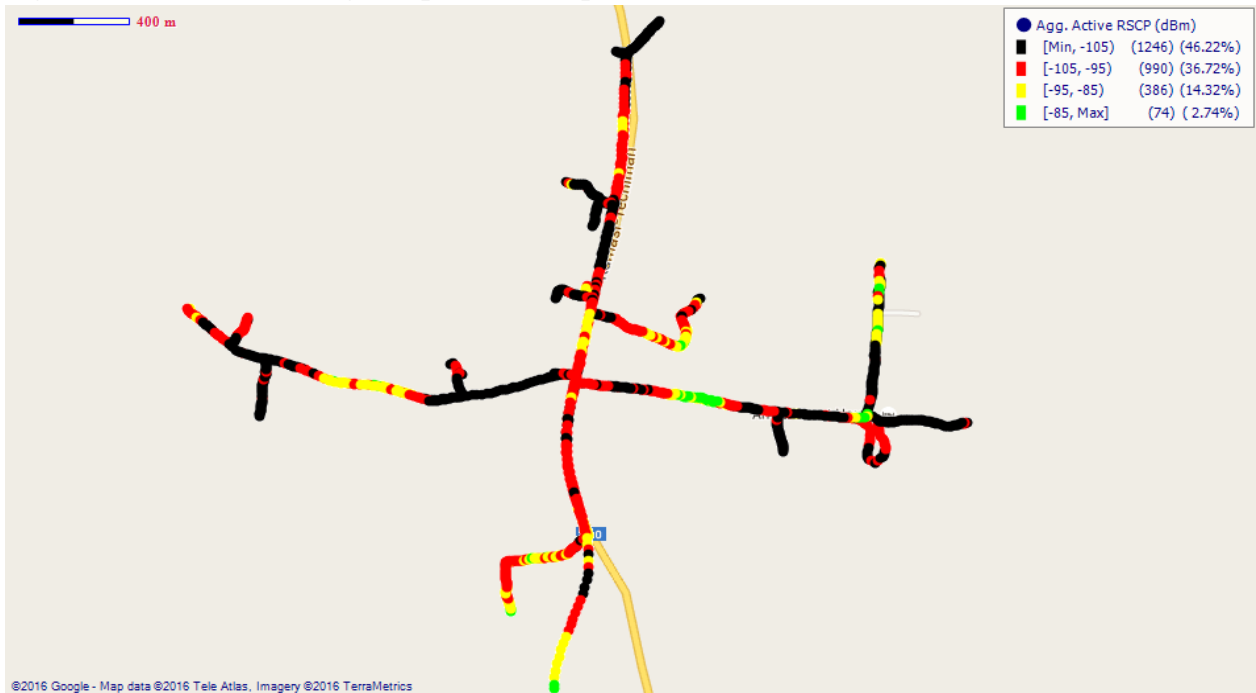
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Fig. 57 – Tigo 3G Coverage Map, Kodie - September 2016



Remarks: Poor 3G coverage in the entire District Capital. A major improvement is required.

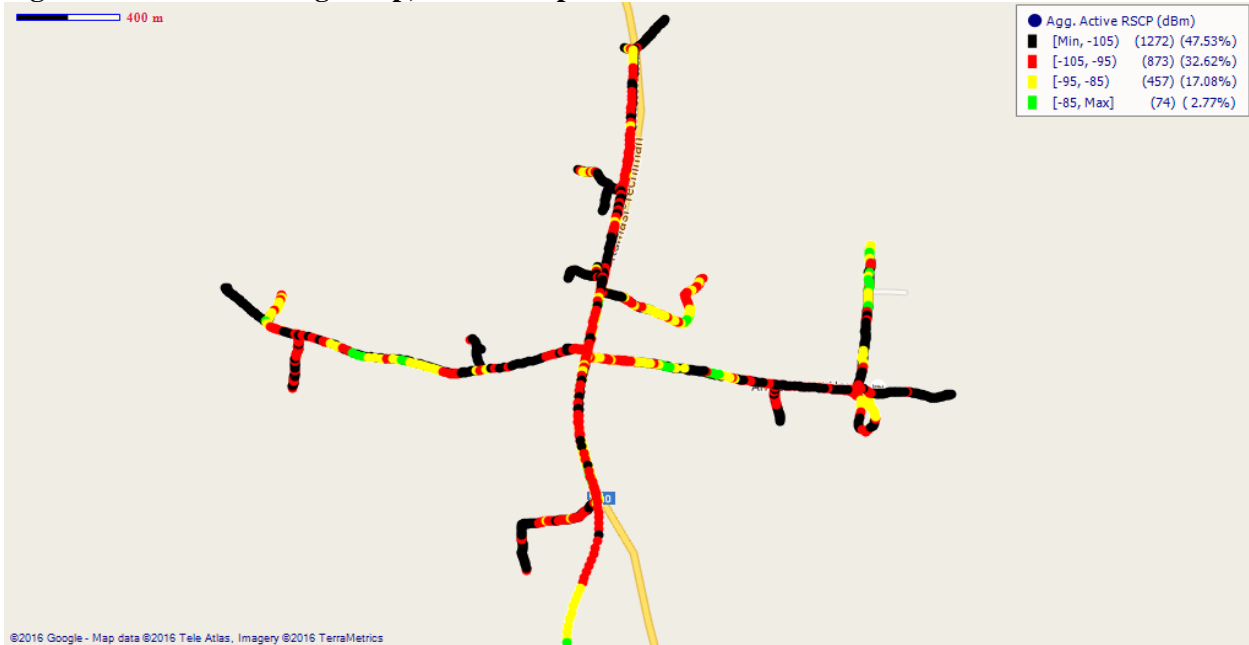
Fig. 58 – Airtel 3G Coverage Map, Kodie - September 2016



Remarks: Poor 3G coverage in Kodie that requires a major improvement.

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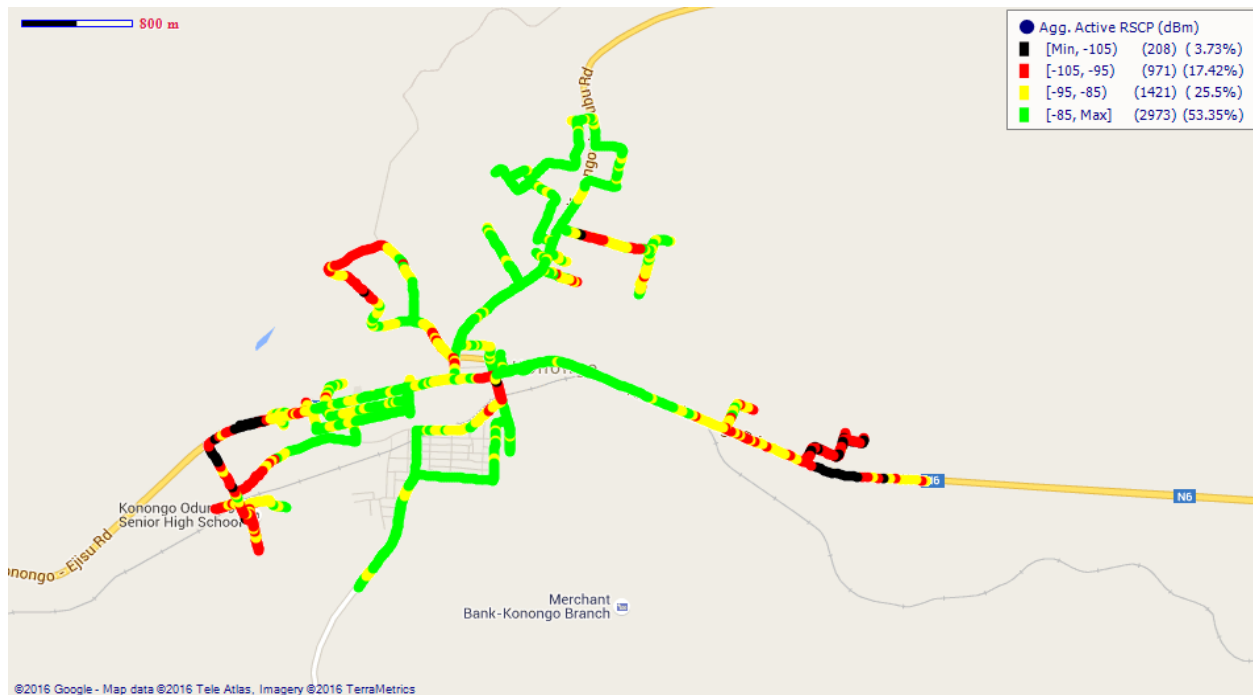
Fig. 59 – Glo 3G Coverage Map, Kodie – September 2016



Remarks: Poor 3G network coverage at Kodie which requires major improvement.

COVERAGE AT KONONGO

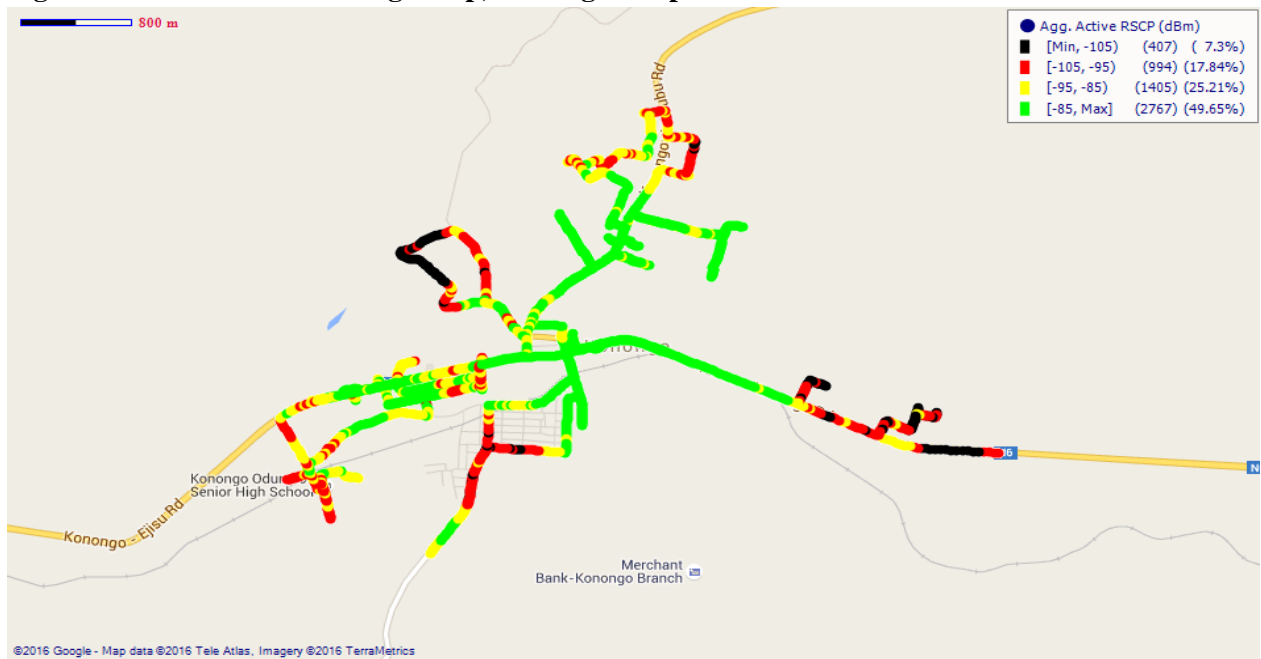
Fig. 60 -MTN 3G Coverage Map, Konongo – September 2016



Remarks: Mostly good 3G network coverage at Konongo with some fair coverage spots around the Konongo Odumase Senior High School and along the Kumasi road.

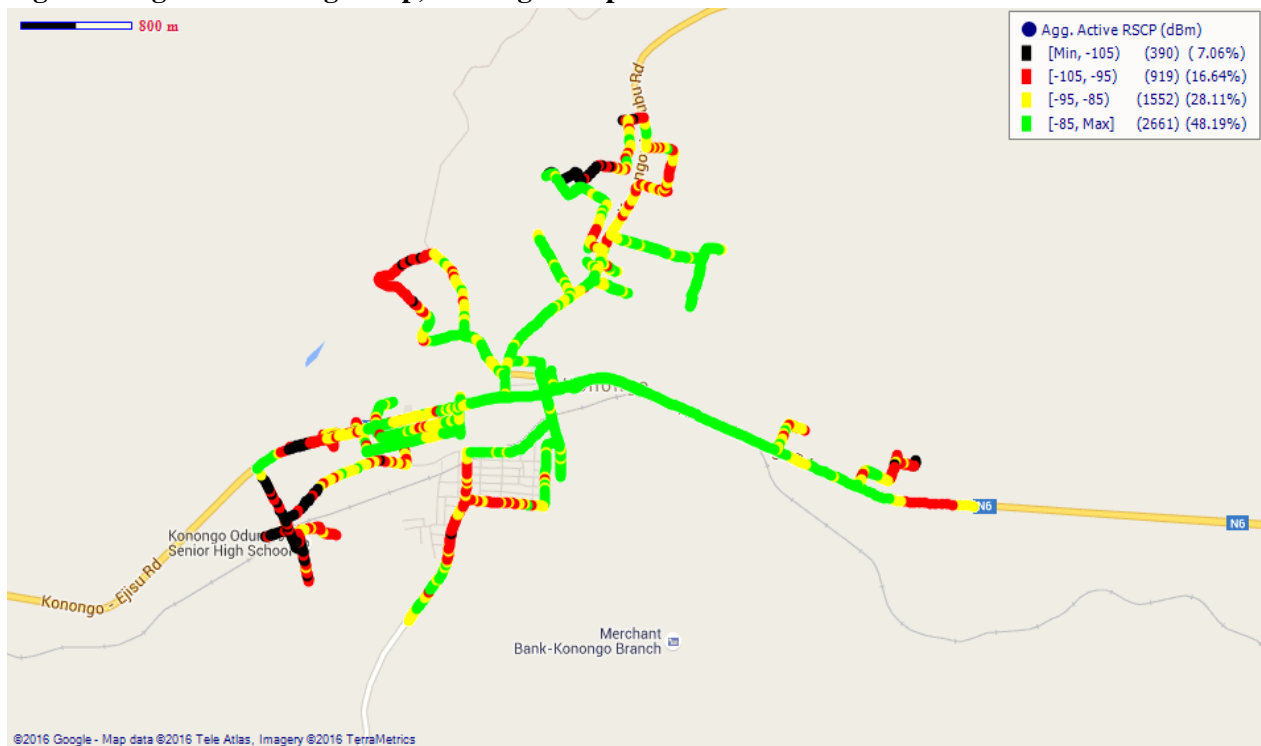
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Fig. 61 - Vodafone 3G Coverage Map, Konongo – September 2016



Remarks: Fair 3G network coverage at Konongo with poor spots around the Konongo Odumasi Senior High School, Konongo-Juaso Rd. and the Merchant Bank. Improvement is needed.

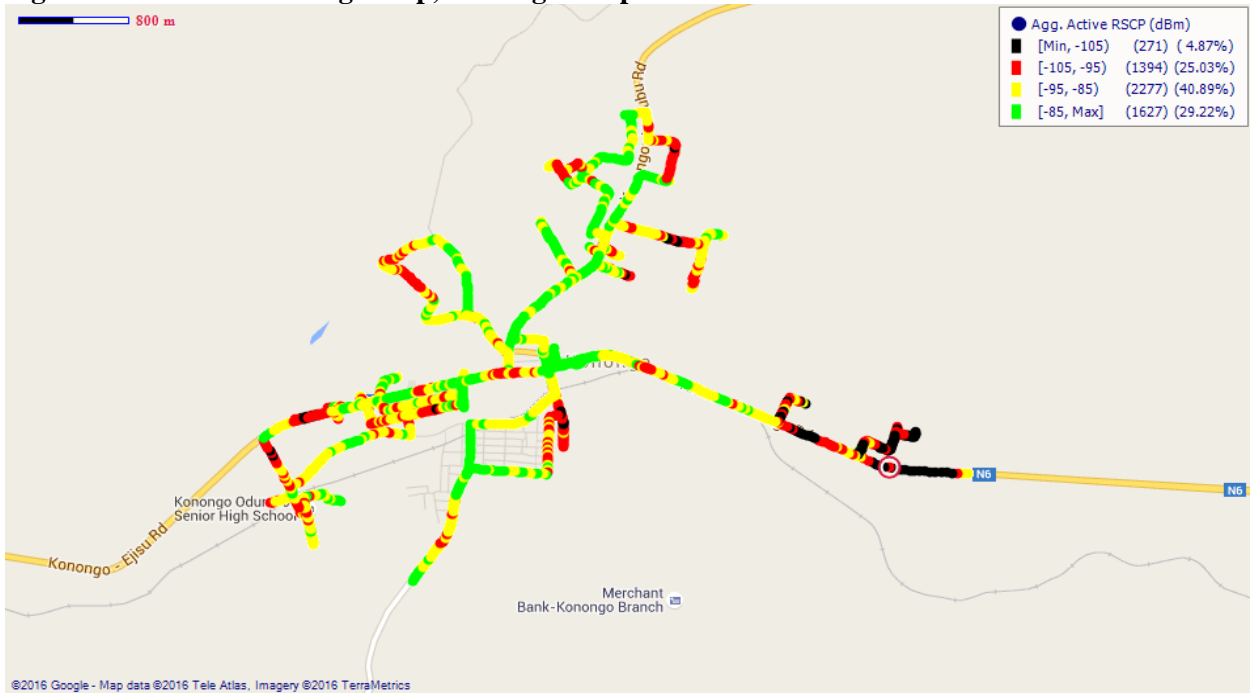
Fig. 62 - Tigo 3G Coverage Map, Konongo – September 2016



Remarks: Good 3G network coverage at Konongo with a sizeable percentage of poor spots, especially around the Konongo Odumasi Senior High School, around Konongo- Odumasi Government Hospital and on the Konongo-Atebubu Rd.

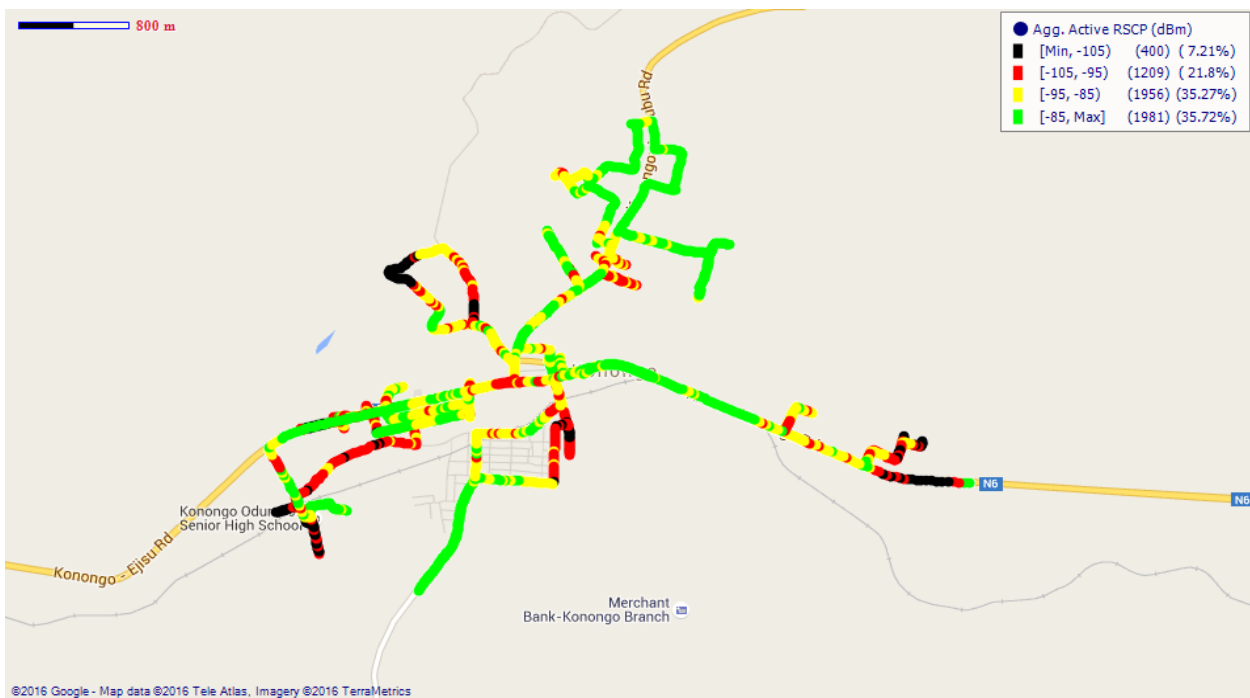
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Fig. 63 - Airtel 3G Coverage Map, Konongo – September



Remarks: Fair 3G network coverage at Konongo which requires major improvement

Fig. 64 – Glo 3G Coverage Map, Konongo – September 2016

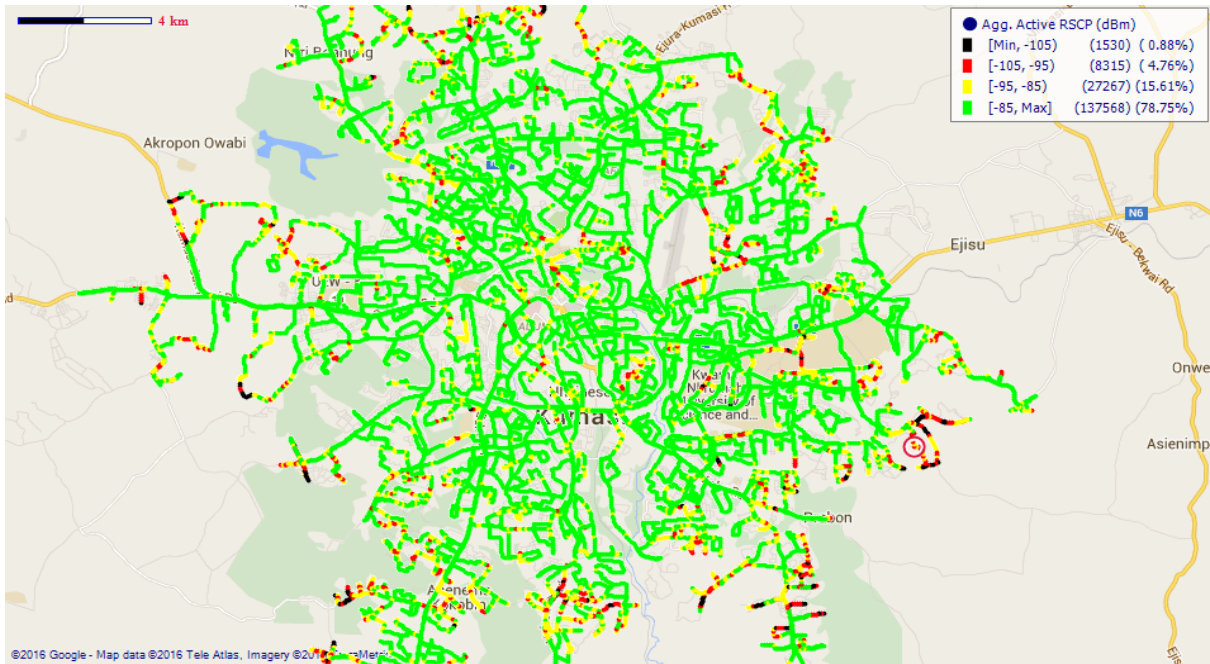


Remarks: Fair 3G network coverage at Konongo. Around market area, Konongo SHS and Konongo-Juaso Rd require improvement.

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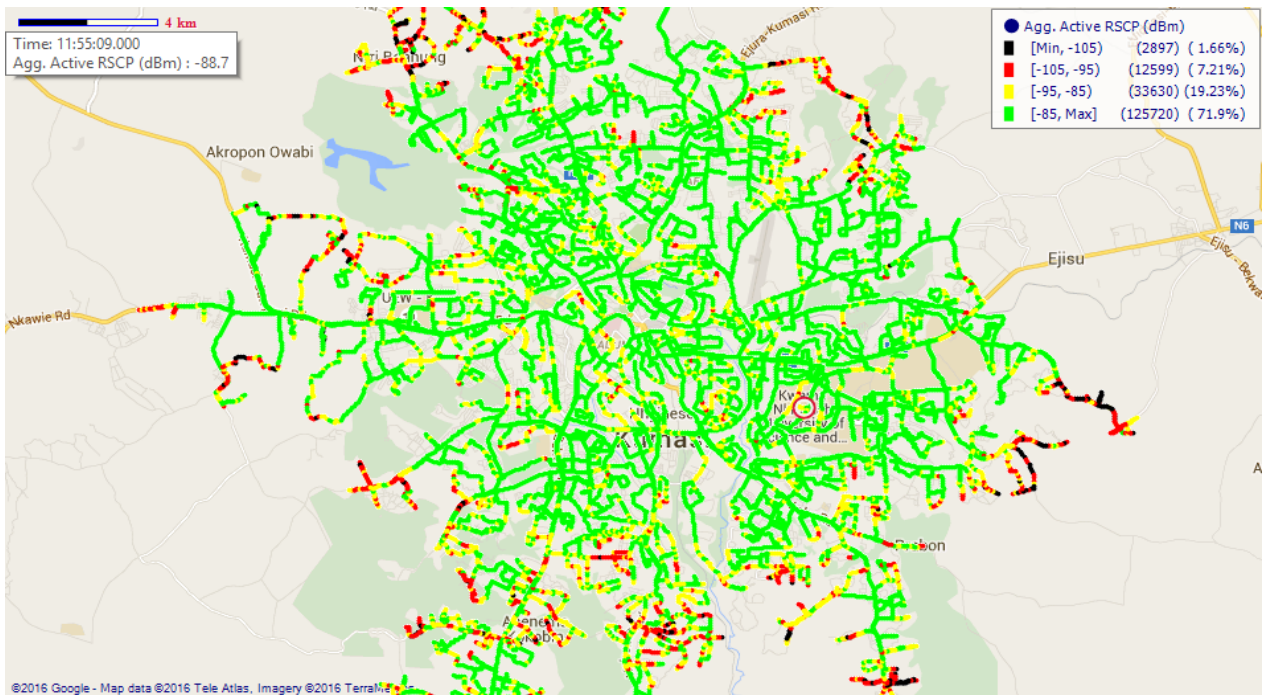
COVERAGE AT KUMASI

Fig. 65 - MTN 3G Coverage Map, Kumasi –September 2016



Remarks: Good 3G network coverage at Kumasi; yet areas like Ayigya, Ayiduase, Kotwi and on the Asuofua road require improvement.

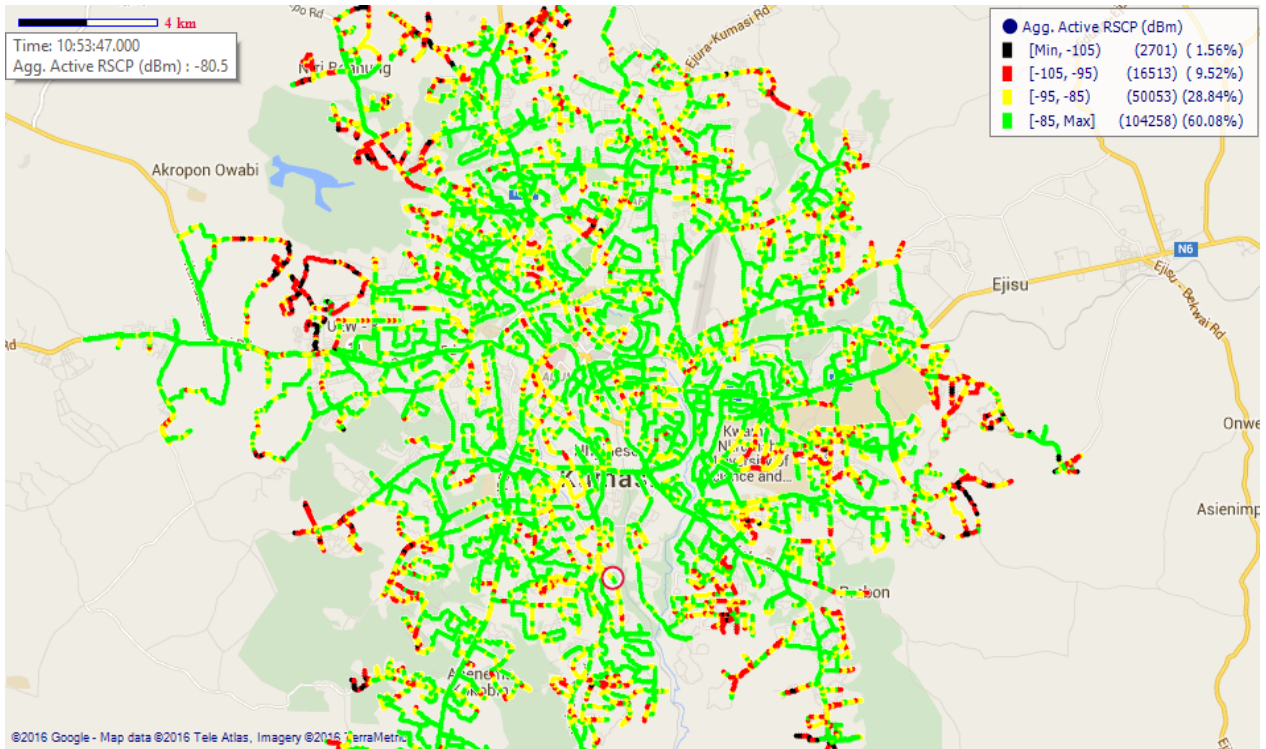
Fig. 66 – Vodafone 3G Coverage Map, Kumasi – September 2016



Remarks: Good 3G network coverage at Kumasi with areas such as Kantikrono, Kotwi, Sepase, and Daaban requiring improvement.

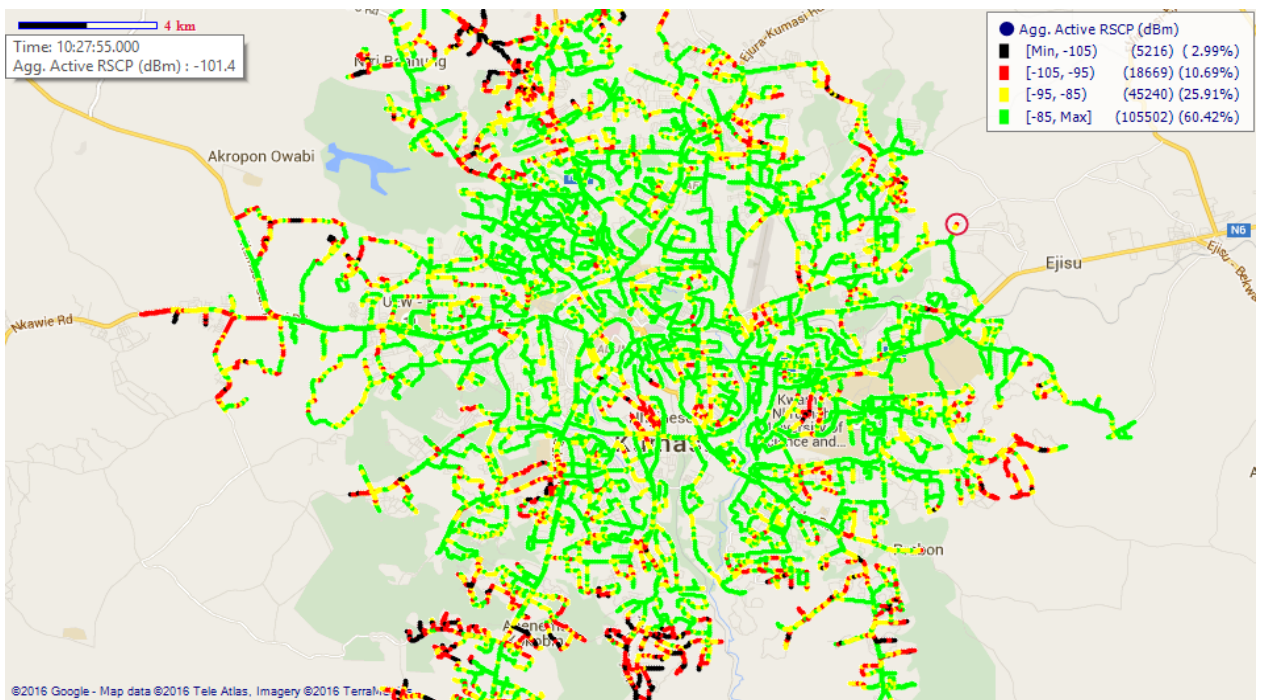
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Fig. 67 –Tigo 3G Coverage Map, Kumasi – September 2016



Remarks: Good 3G network coverage at Kumasi with poor signals around Bohyen, on the Abrepo Rd., Kronum-Abuohia, Deduako, Apemso and Appiadu which require improvement.

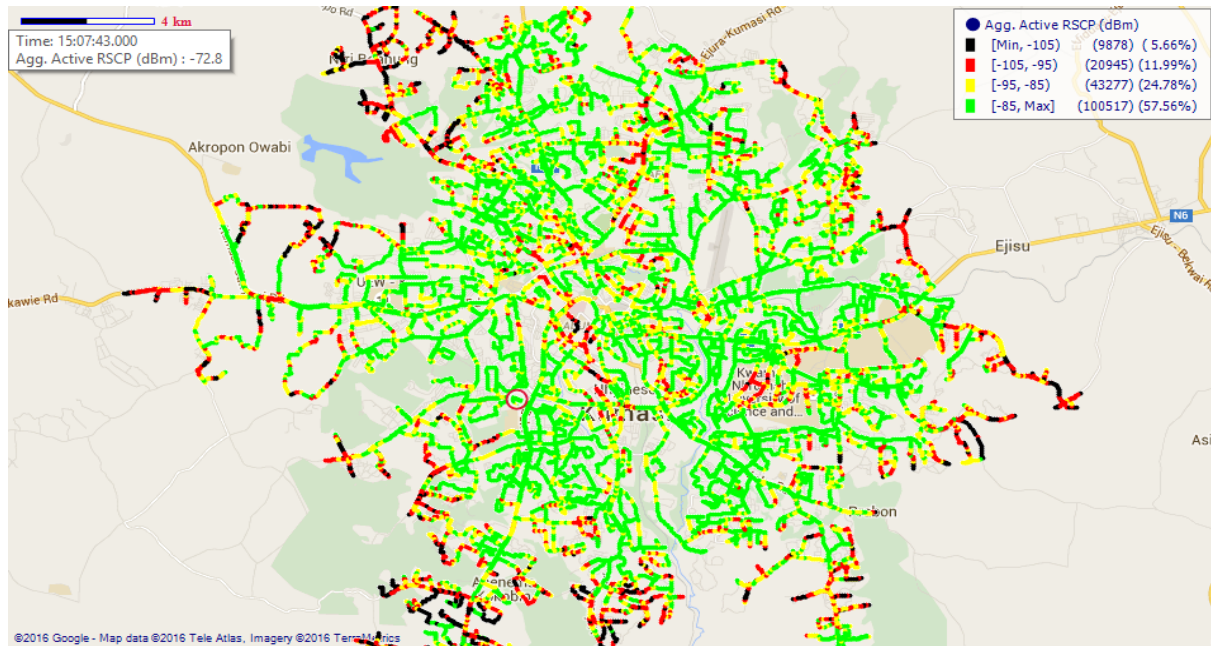
Fig. 68 - Airtel 3G Coverage Map, Kumasi - September 2016



Remarks: Good 3G network coverage at Kumasi but places like Ayigya, Kotwi, Brofoyeduru, Airport roundabout and Asofuo road require improvement.

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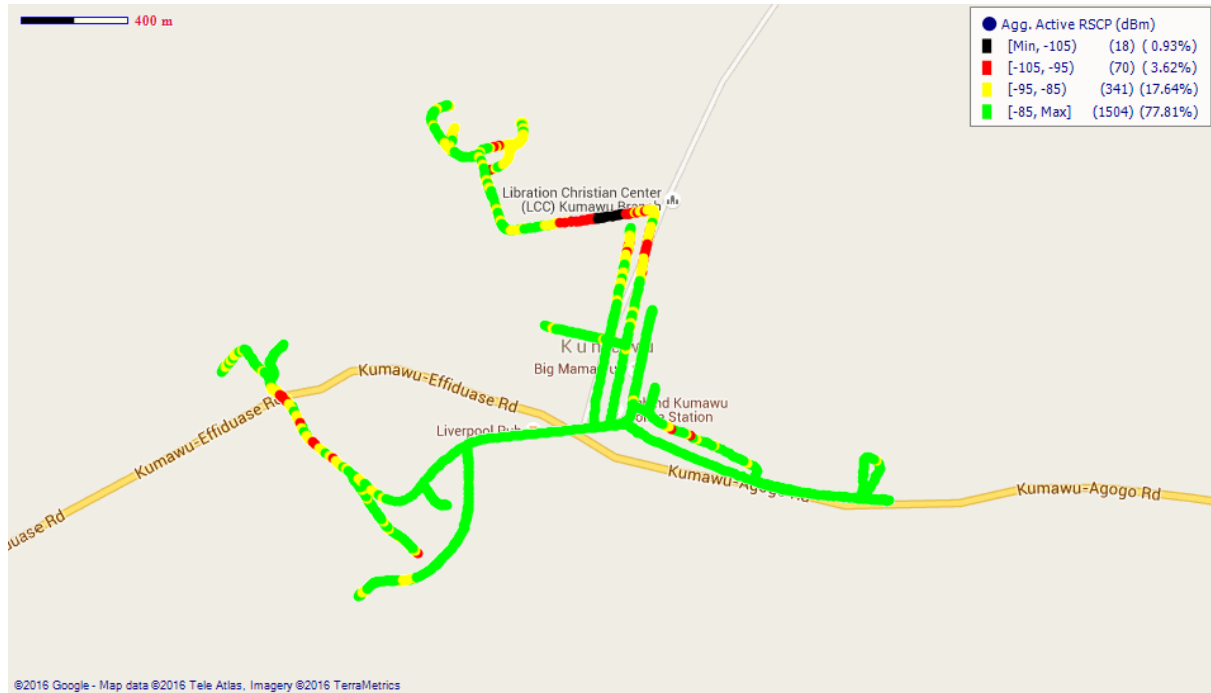
Fig.69 - Glo 3G Coverage Map, Kumasi – September 2016



Remarks: Generally good 3G network coverage at Kumasi with poor spots at Ahenema Kokoben, Nhyiaeso, KNUST and Abuakwa which require improvement.

COVERAGE AT KUMAWU

Fig. 70 - MTN 3G Coverage Map, Kumawu – September 2016



Remarks: Good 3G network coverage across Kumawu yet some improvement is required around Liberation Christian Center.

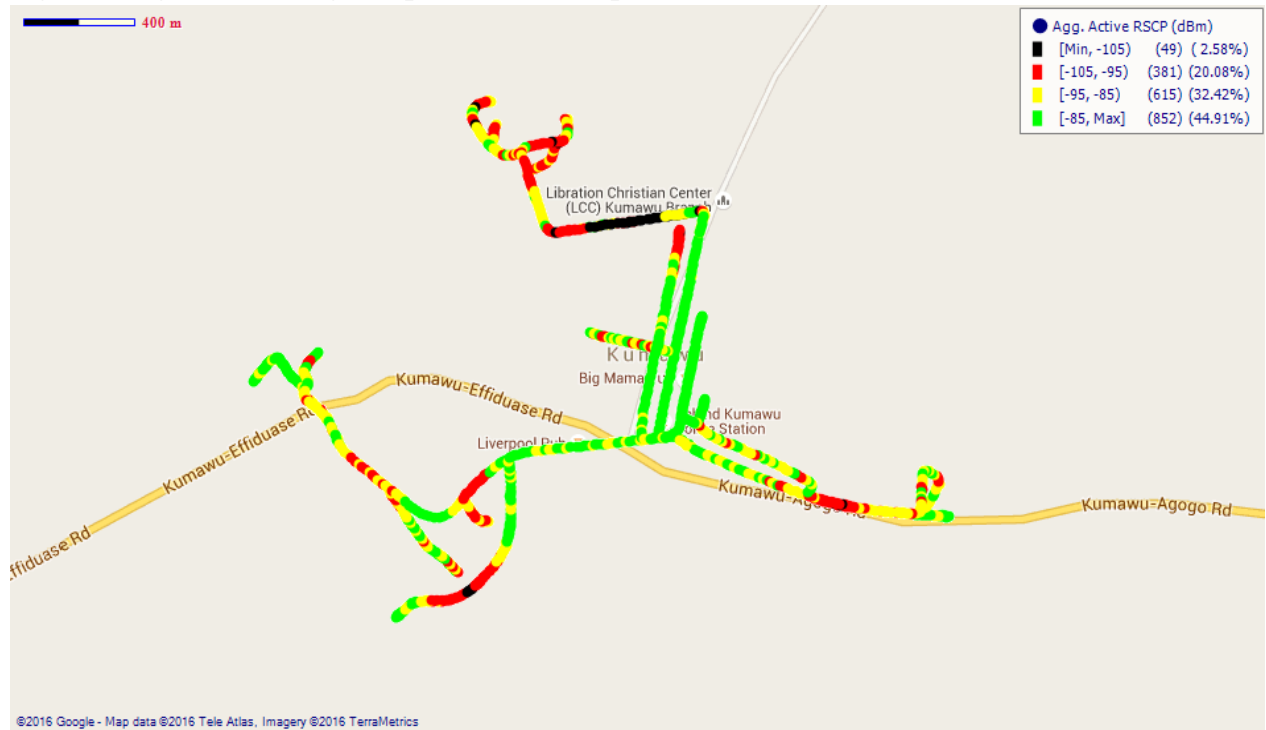
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Fig. 71 - Vodafone 3G Coverage Map, Kumawu – September 2016



Remarks: Good 3G network coverage at Kumawu.

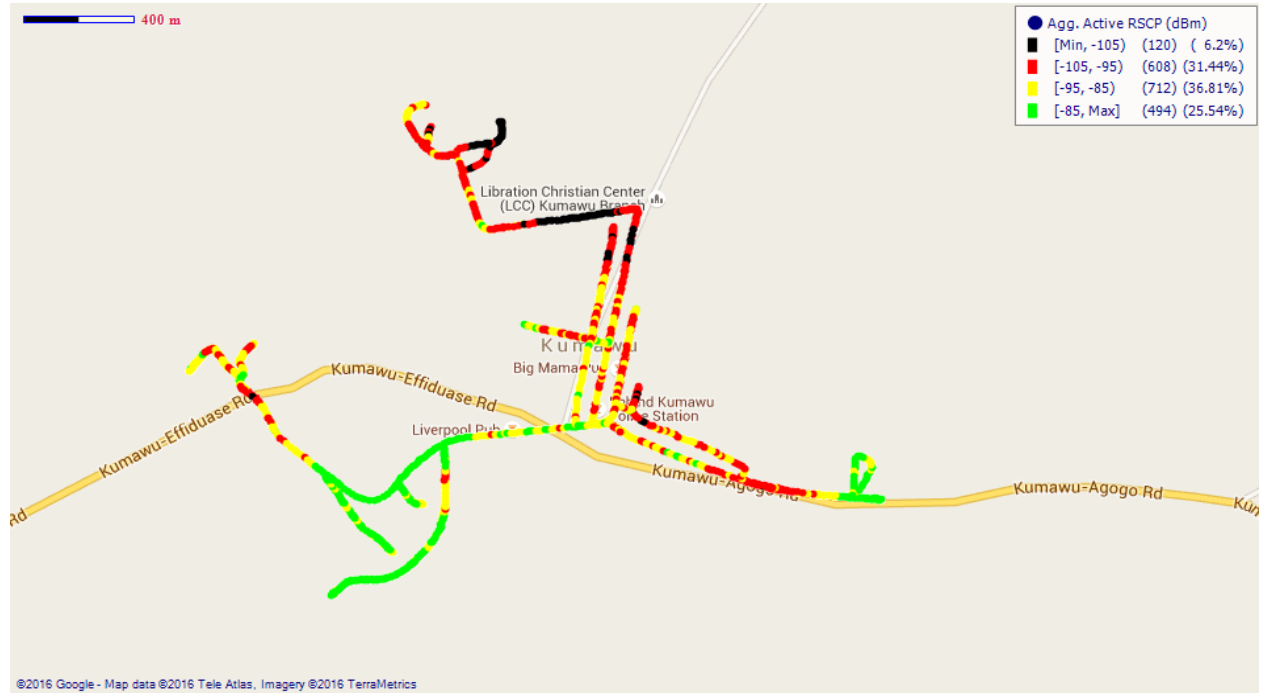
Fig. 72 - Tigo 3G Coverage Map, Kumawu – September 2016



Remarks: Fair 3G network coverage at Kumawu which requires improvement especially at areas around Liberation Christian Center and on Kumawu- Agogo Rd.

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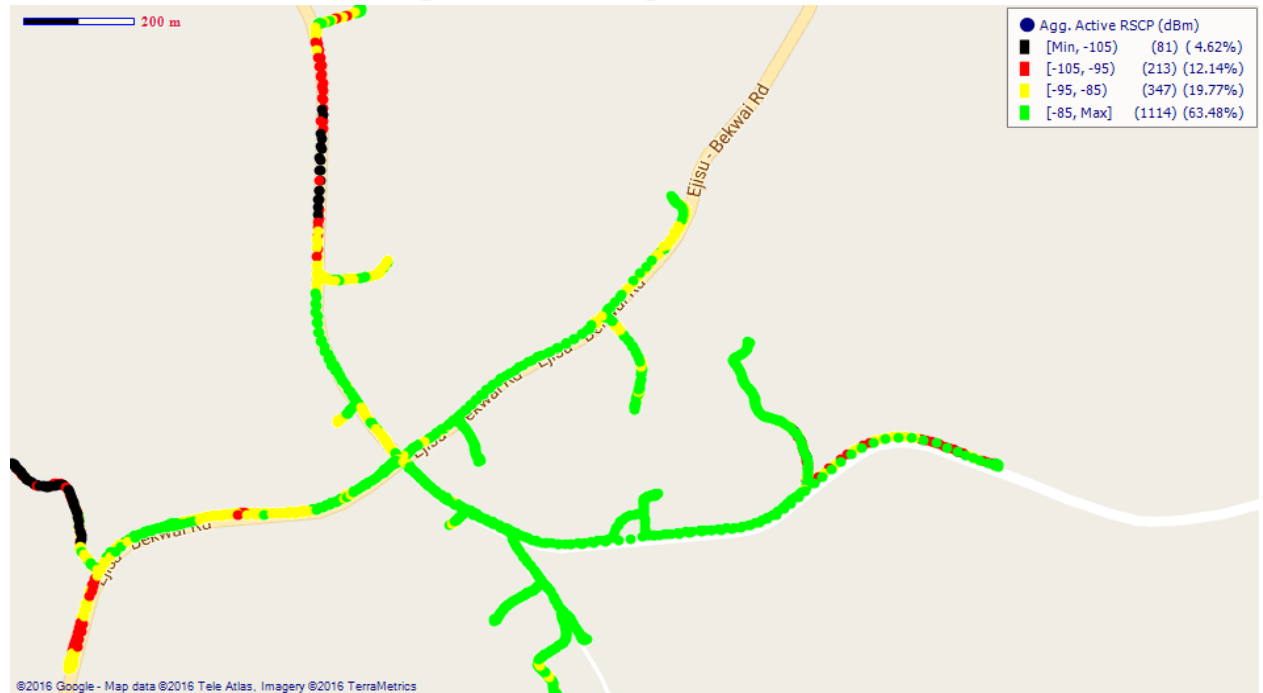
Fig. 73 – Airtel 3G Coverage Map, Kumawu – September 2016



Remarks: Fair 3G network coverage at Kumawu which requires a major improvement especially around Big Mama shop and around Kumawu station.

COVERAGE AT KUNTANASE

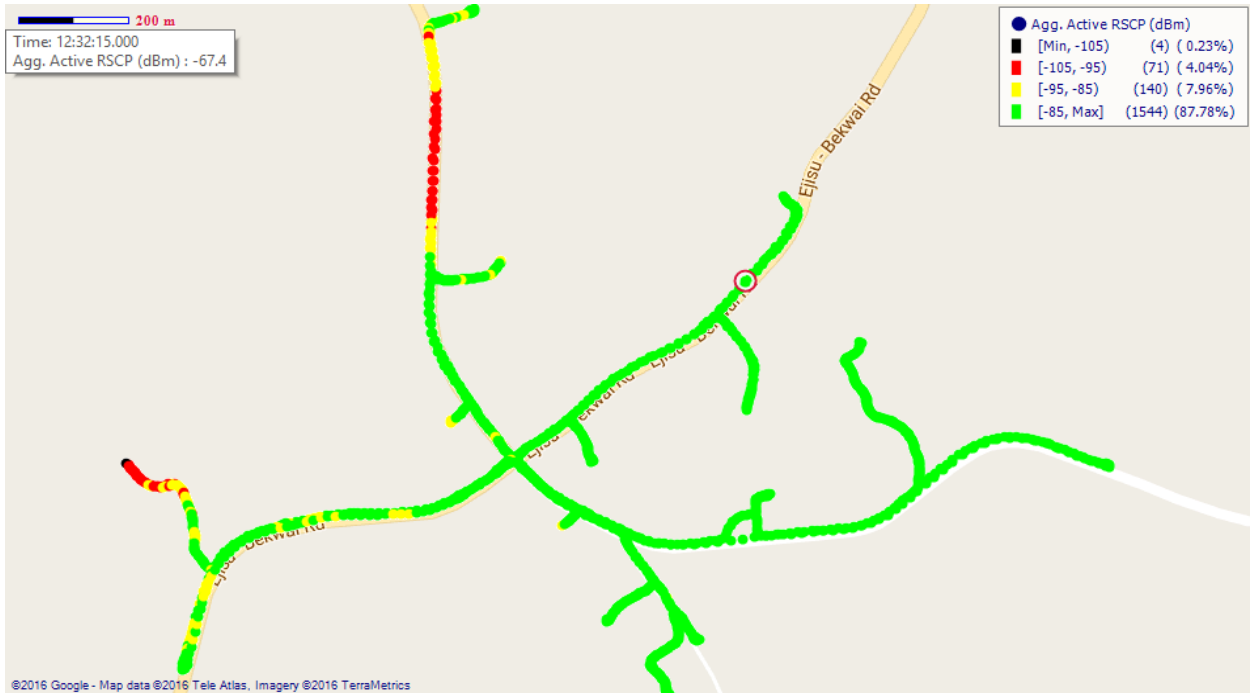
Fig. 74 – MTN 3G Coverage Map, Kuntanase – September 2016



Remarks: Good 3G network coverage at Kuntanase.

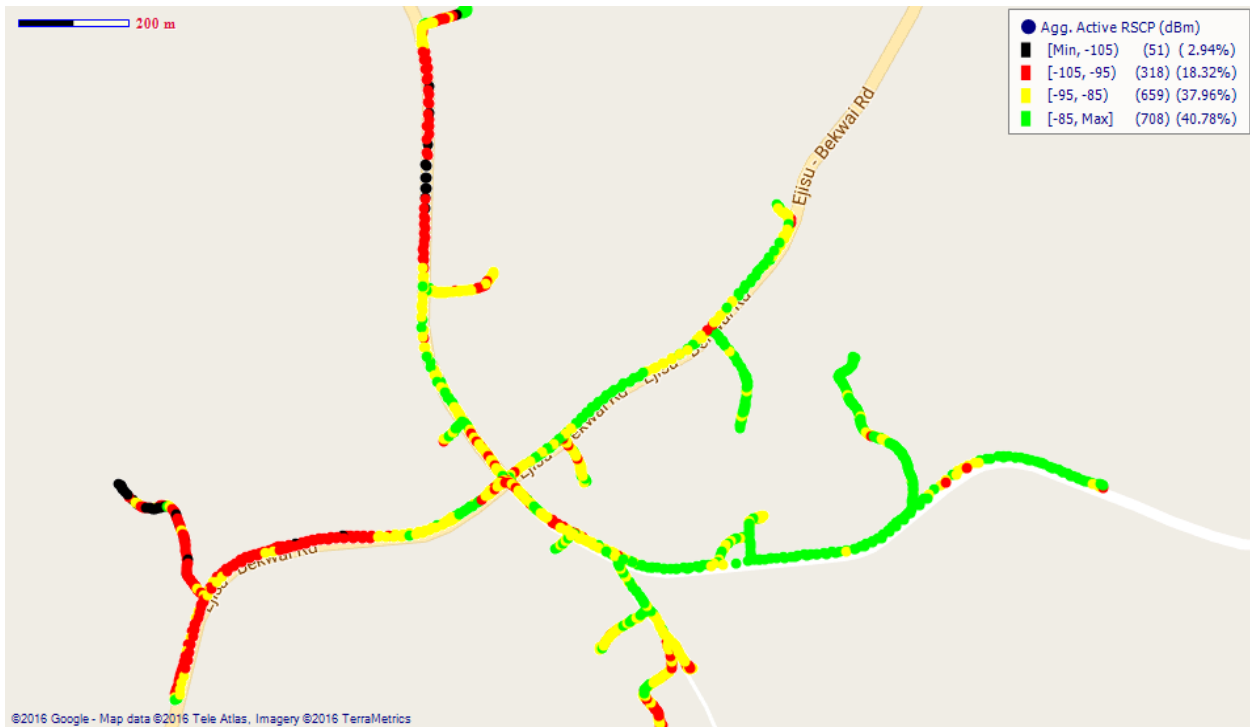
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Fig. 75 - Vodafone 3G Coverage Map, Kuntanase – September 2016



Remarks: Good 3G network coverage at Kuntanase.

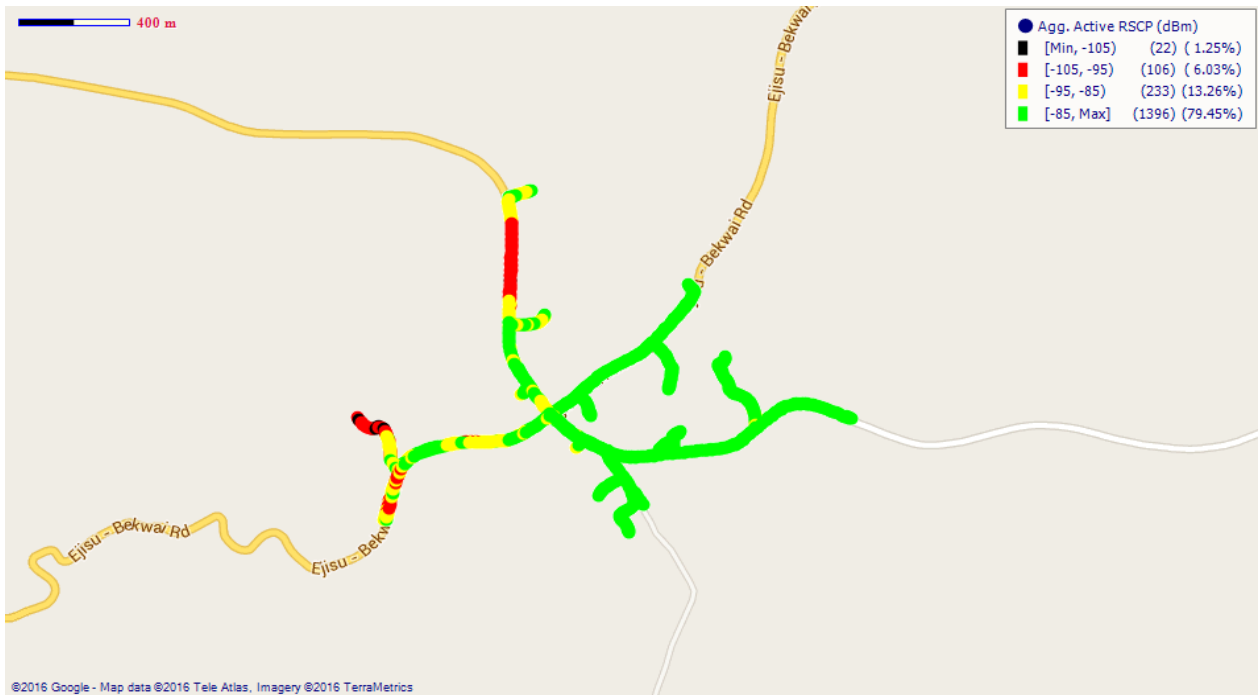
Fig. 76 – Tigo 3G Coverage Map, Kuntanase – September 2016



Remarks: Generally fair 3G network coverage with poor spots at Kuntanase. Major improvement is needed on Pramso Rd.

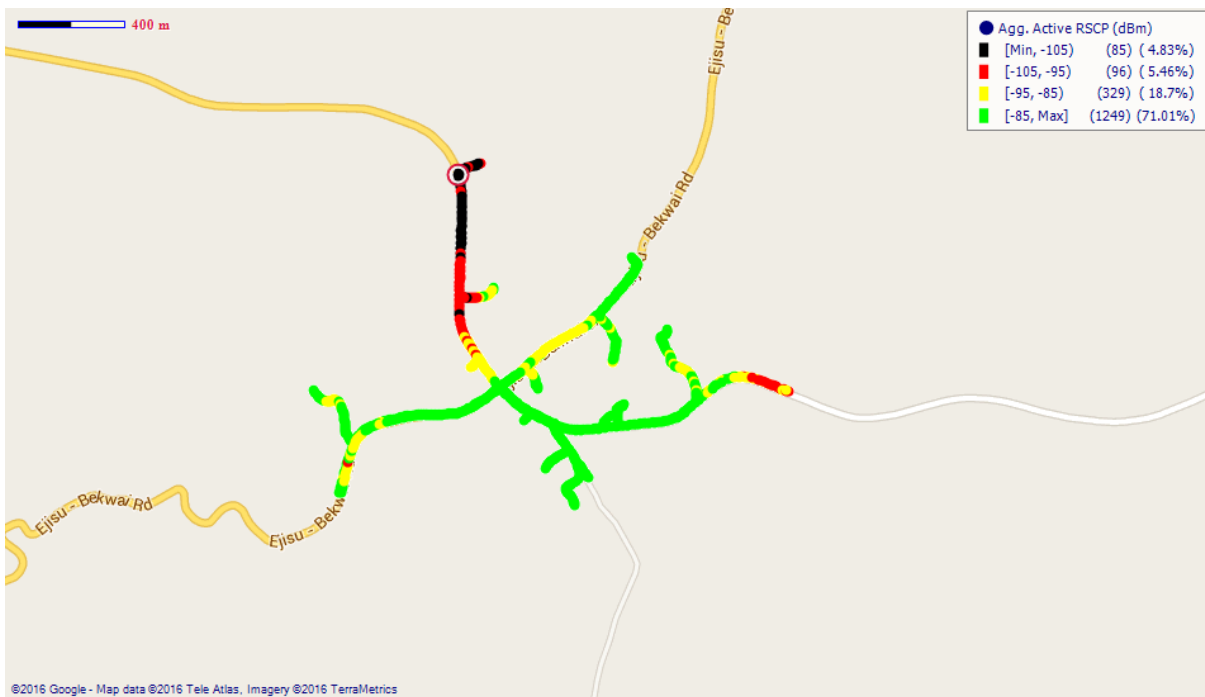
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Fig. 77 – Airtel 3G Coverage Map, Kuntanase –September 2016



Remarks: Good 3G network coverage at Kuntanase with some bad spots at the outskirts which require improvement.

Fig. 78 – Glo 3G Coverage Map, Kuntanase – September 2016

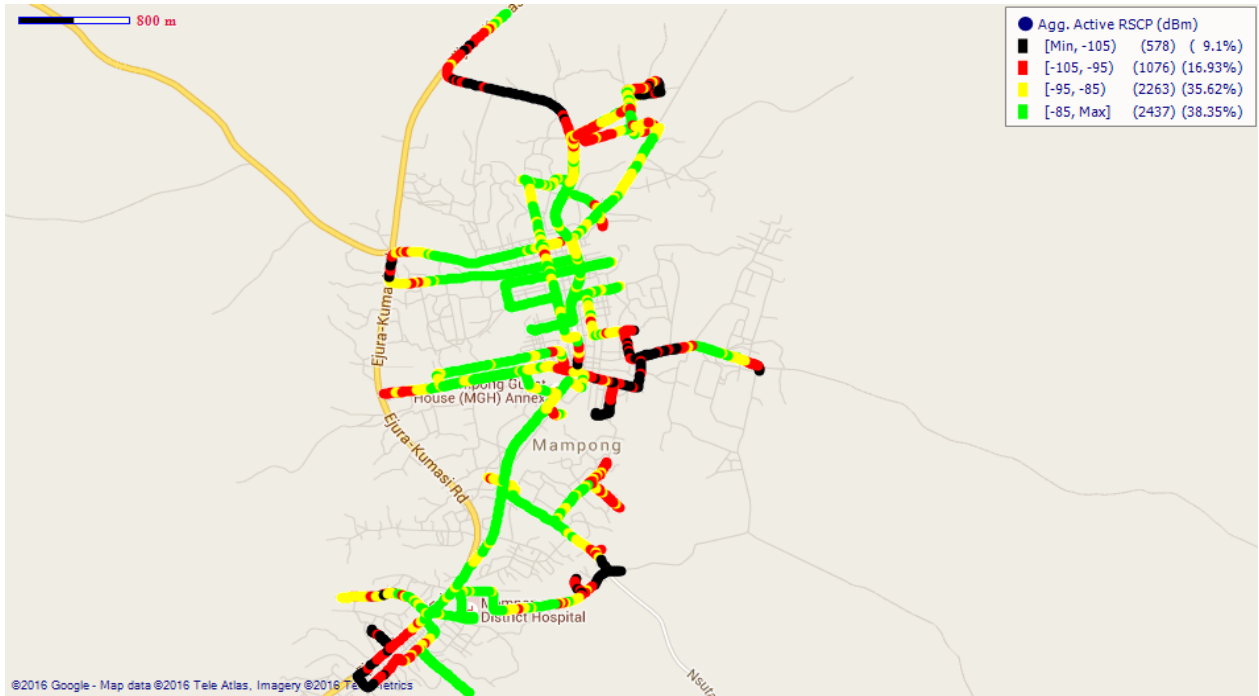


Remarks: Good 3G network coverage at Kuntanase with some fair spots on the Pramso-Lake Rd. which require improvement.

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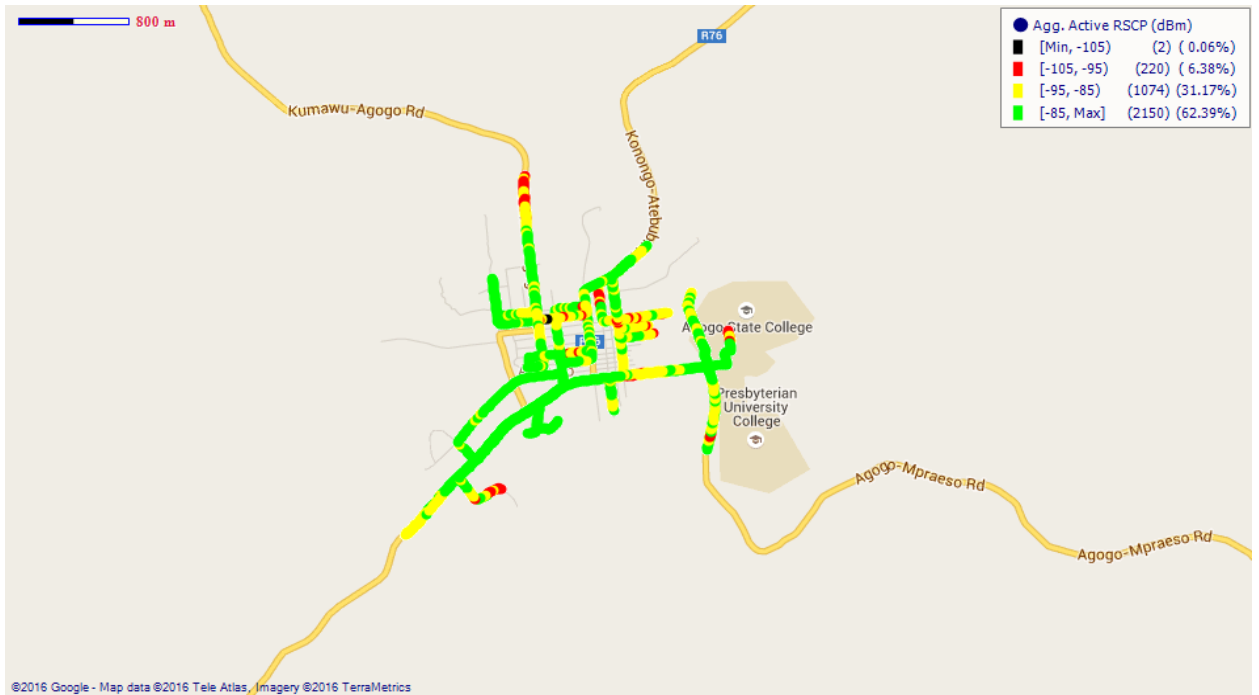
COVERAGE AT MAMPONG

Fig. 79 – MTN 3G Coverage Map, Mampong – September 2016



Remarks: Fair 3G network coverage at Mampong with almost equal percentage of poor coverage which requires major improvement.

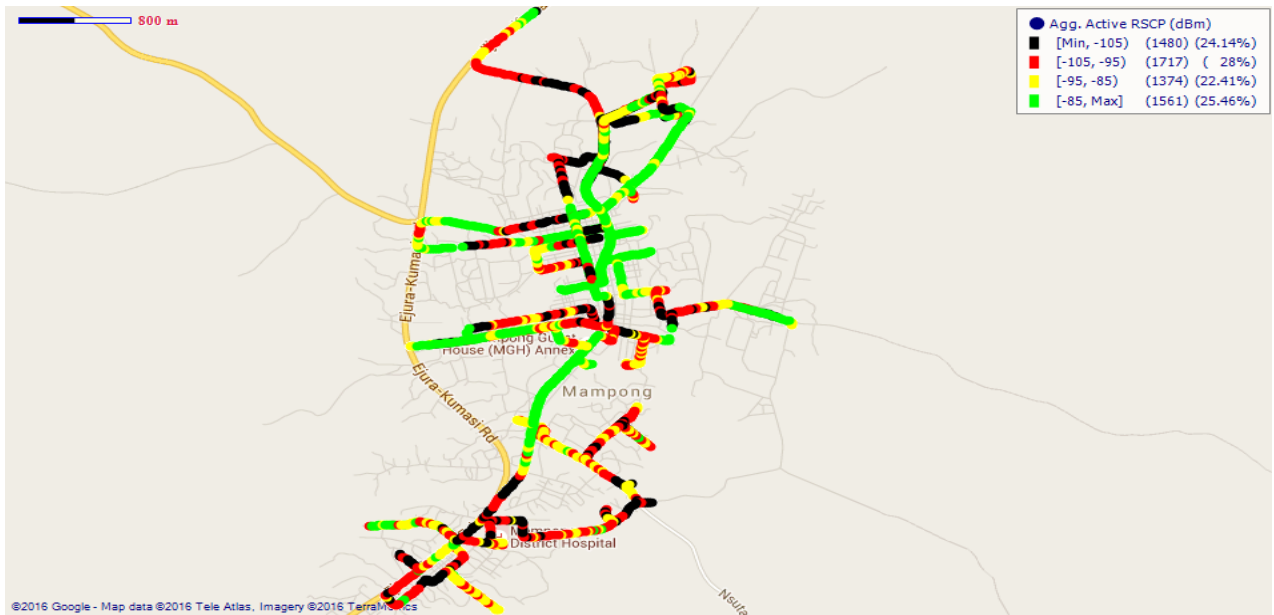
Fig. 80 –Vodafone 3G Coverage Map, Mampong – September 2016



Remarks: Good 3G network coverage in Mampong.

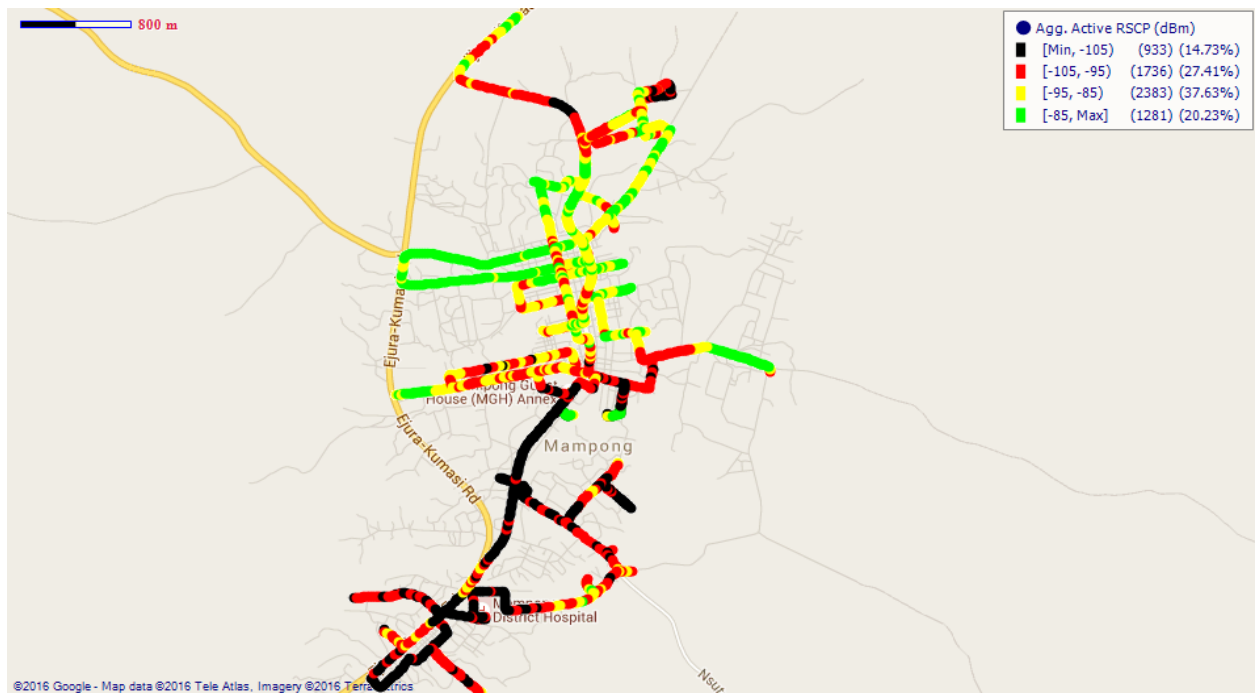
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Fig. 81 - Tigo 3G Coverage Map, Mampong – September 2016



Remarks: Poor 3G network coverage at Mampong which requires a major improvement.

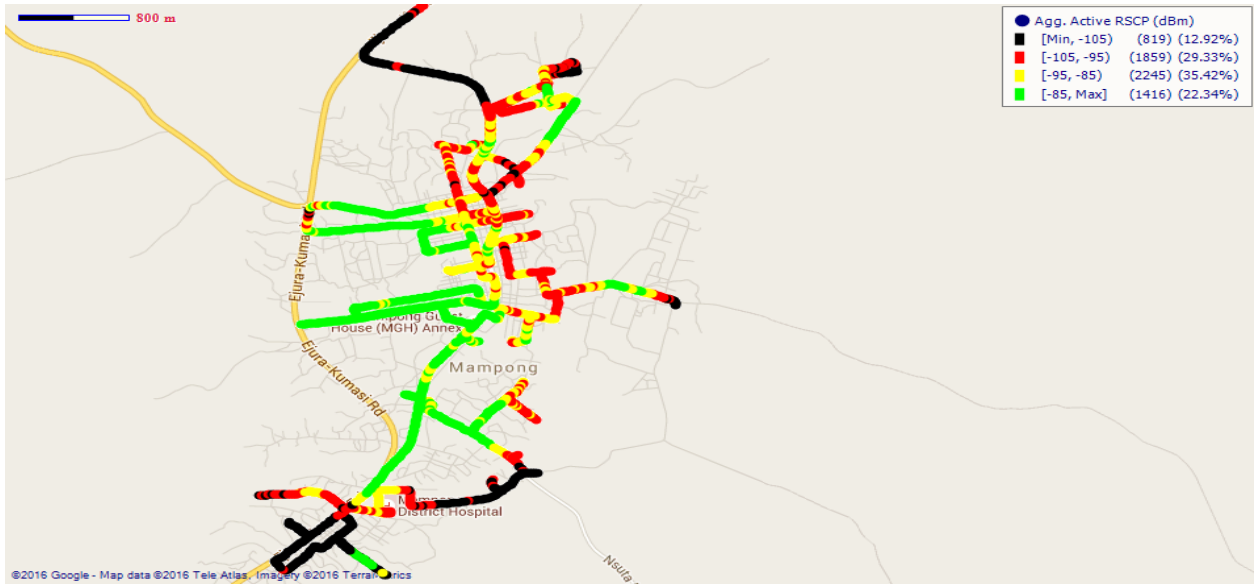
Fig. 82 - Airtel 3G Coverage Map, Mampong – September 2016



Remarks: Fair 3G network coverage in and around Mampong. A major improvement is required around the District Hospital.

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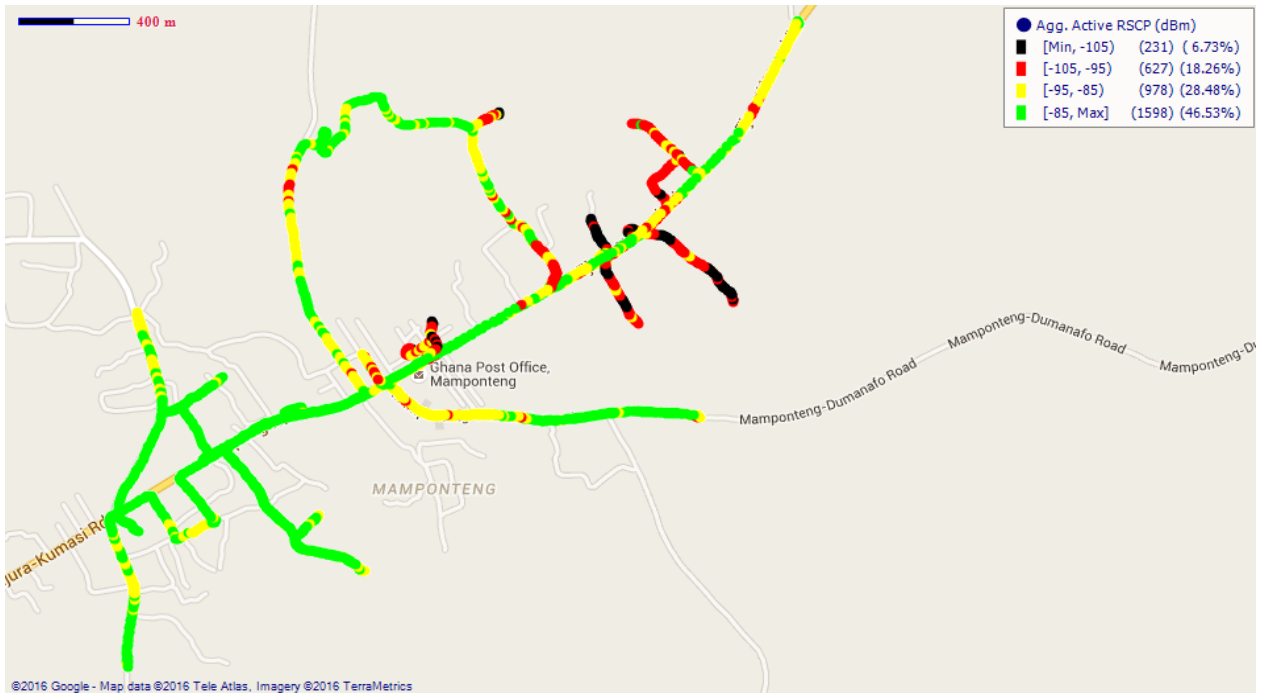
Fig. 83 - Glo 3G Coverage Map, Mampong – September 2016



Remarks: Generally fair 3G network coverage in Mampong with bad spots around Episcopal Holy Temple, Freedom Bar, St. Pauls Catholic Church and around the SDA Church which need to be improved.

COVERAGE AT MAMPONTENG

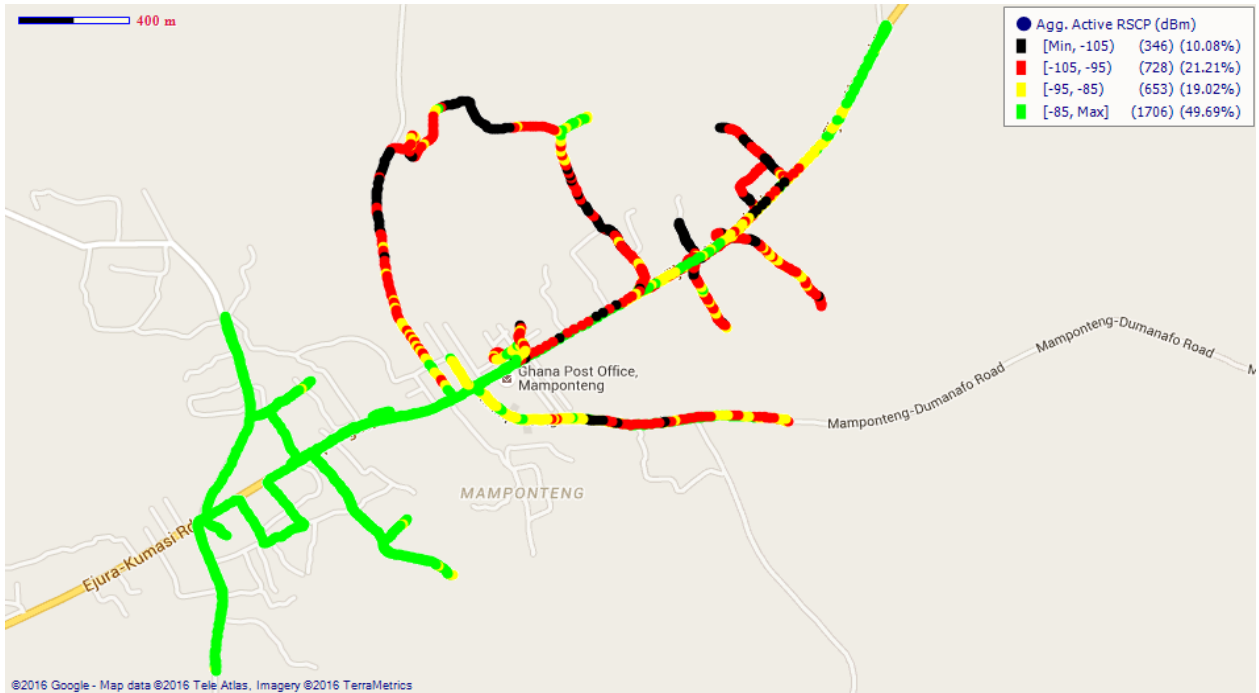
Fig. 84 - MTN 3G Coverage Map, Mamponteng – September 2016



Remarks: Fair 3G network coverage at Mamponteng yet improvement is required along Mamponteng- Ntonso Rd.

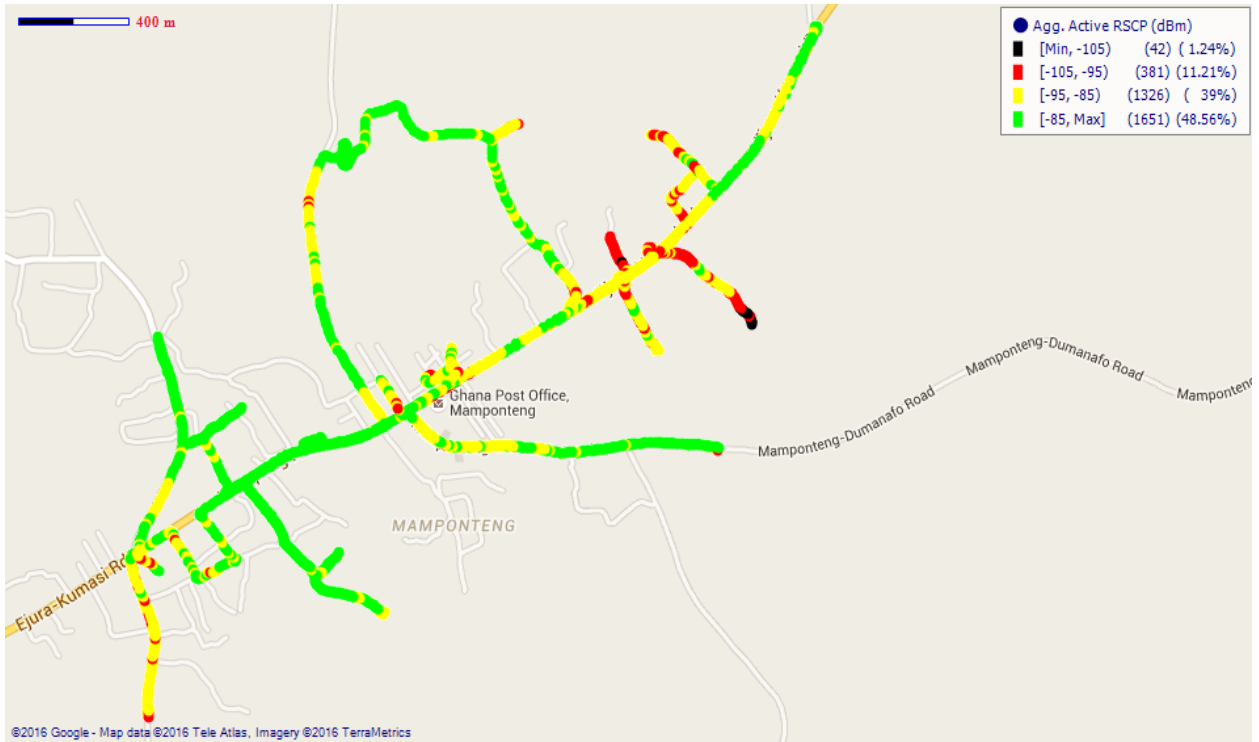
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Fig. 85 - Vodafone 3G Coverage Map, Mampondeng – September 2016



Remarks: Fair 3G network coverage at Mampondeng which requires major improvement at the Ghana Post Office, on Mampondeng- Dumanafa Rd.

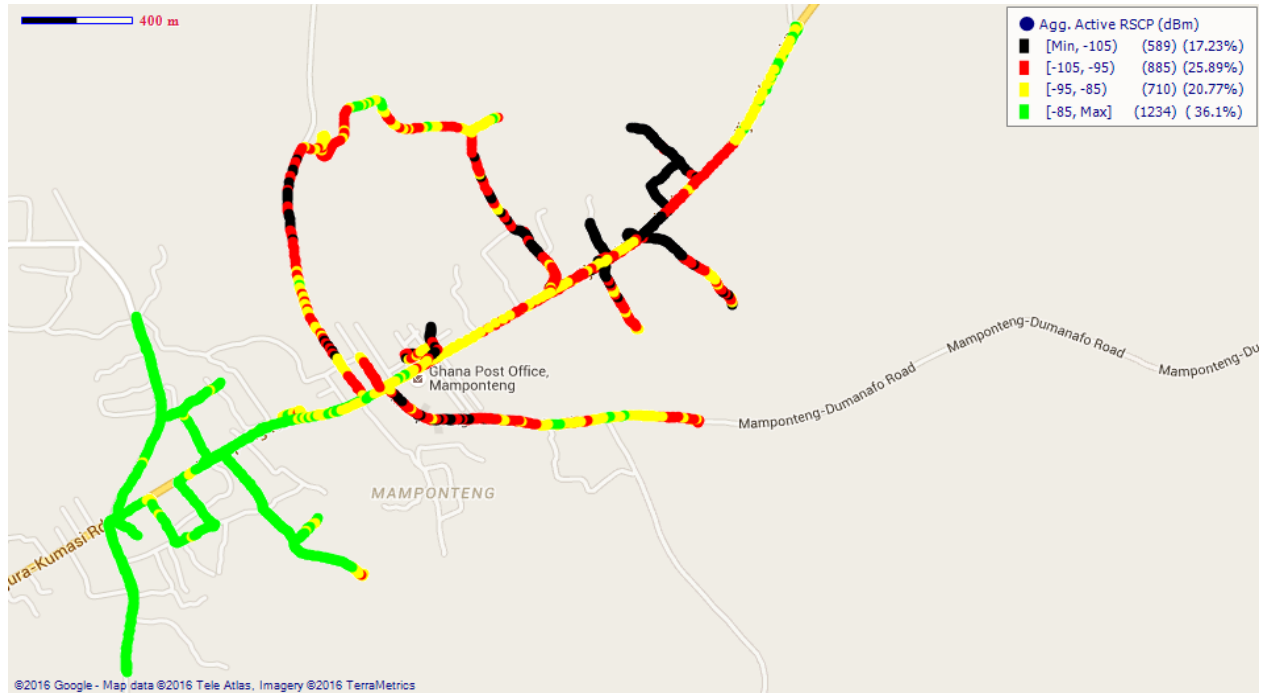
Fig. 86 - Tigo 3G Coverage Map, Mampondeng – September 2016



Remarks: Good 3G network coverage at Mampondeng with equally high percentage of fair coverage scattered in the town. Major improvement is required.

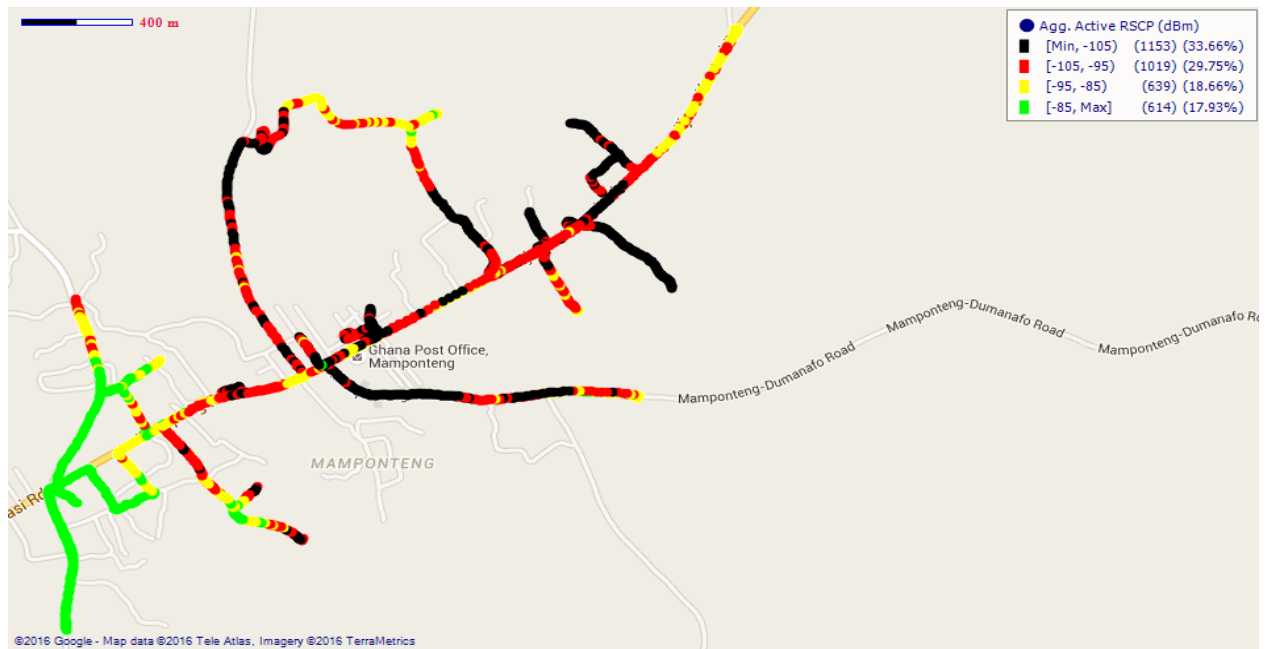
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Fig. 87 - Airtel 3G Coverage Map, Mampondeng – September 2016



Remarks: Fair 3G network coverage at Mampondeng which requires improvement around the Post Office and on Ntonso road.

Fig. 88 - Glo 3G Coverage Map, Mampondeng – September 2016

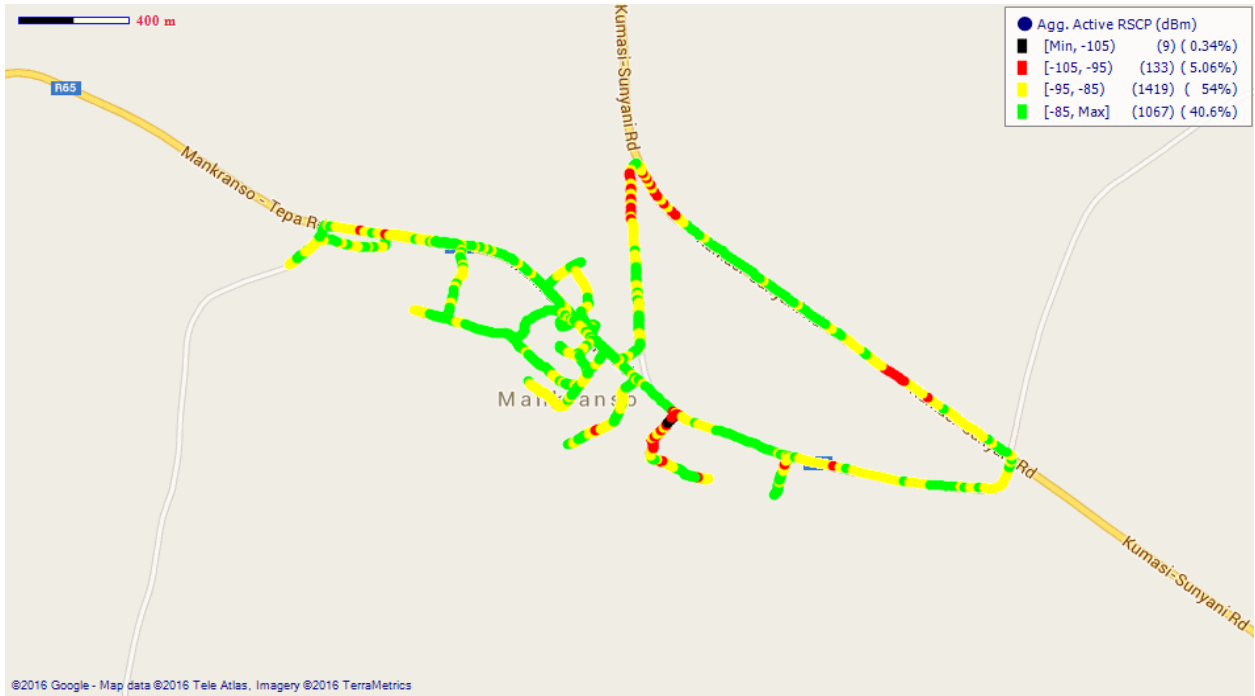


Remarks: Poor 3G network coverage in and around Mampondeng. A major improvement is required around Mampondeng-Dumanafa Rd., Ghana Post Office, Sekyere Rural Bank and around El-Shaddai AG Church.

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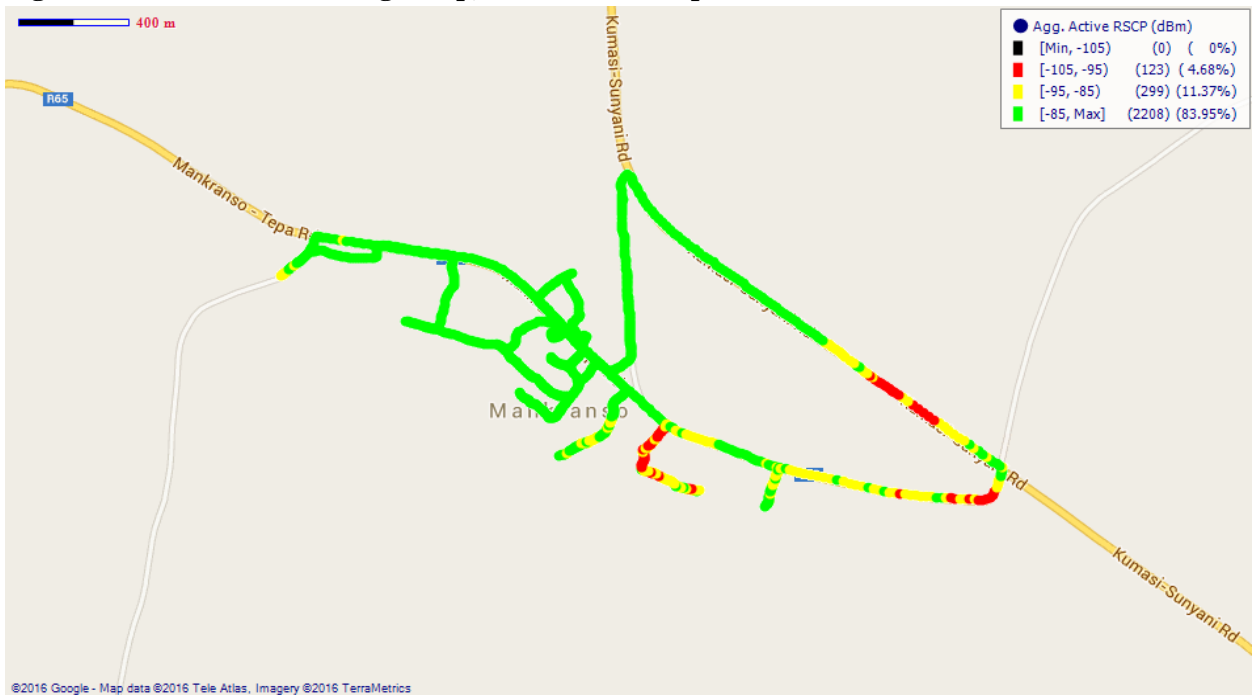
COVERAGE AT MANKRANSO

Fig. 89 - MTN 3G Coverage Map, Mankranso – September 2016



Remarks: Fair 3G network coverage in Mankranso. Major improvement is needed.

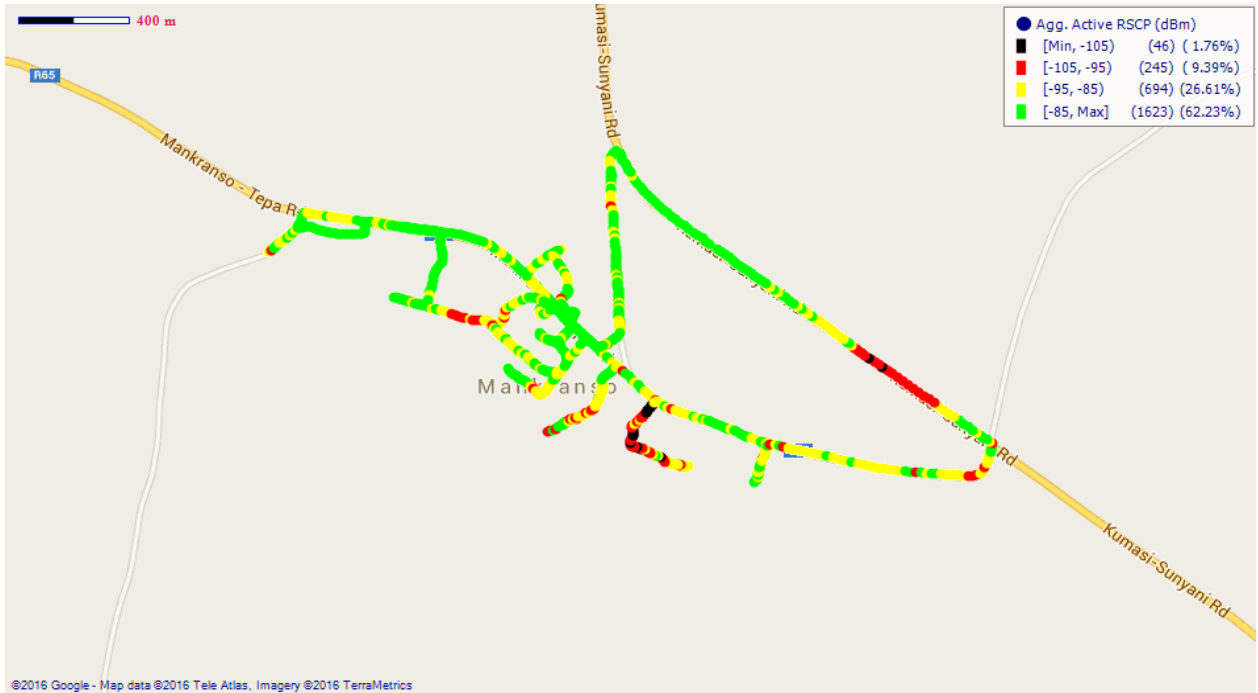
Fig. 90 - Vodafone 3G Coverage Map, Mankranso – September 2016



Remarks: Good 3G network coverage in and around Mankranso.

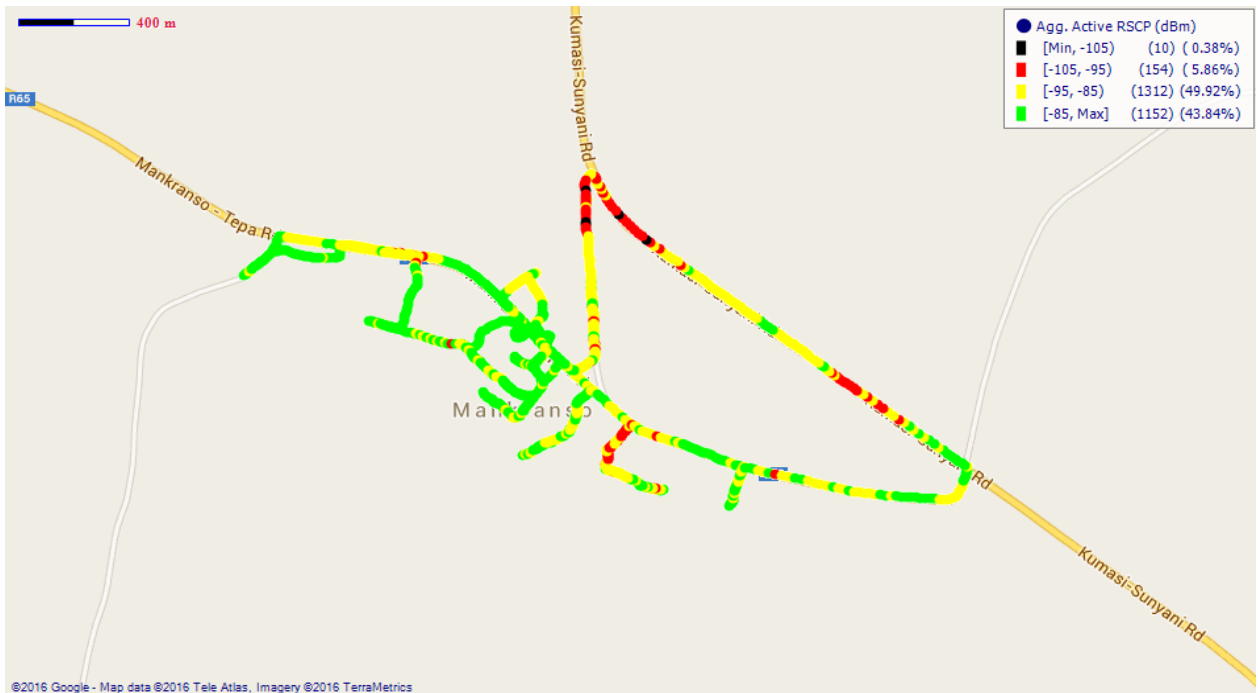
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Fig. 91 - Tigo 3G Coverage Map, Mankranso – September 2016



Remarks: Good 3G network coverage at Mankranso.

Fig. 92 - Airtel 3G Coverage Map, Mankranso – September 2016

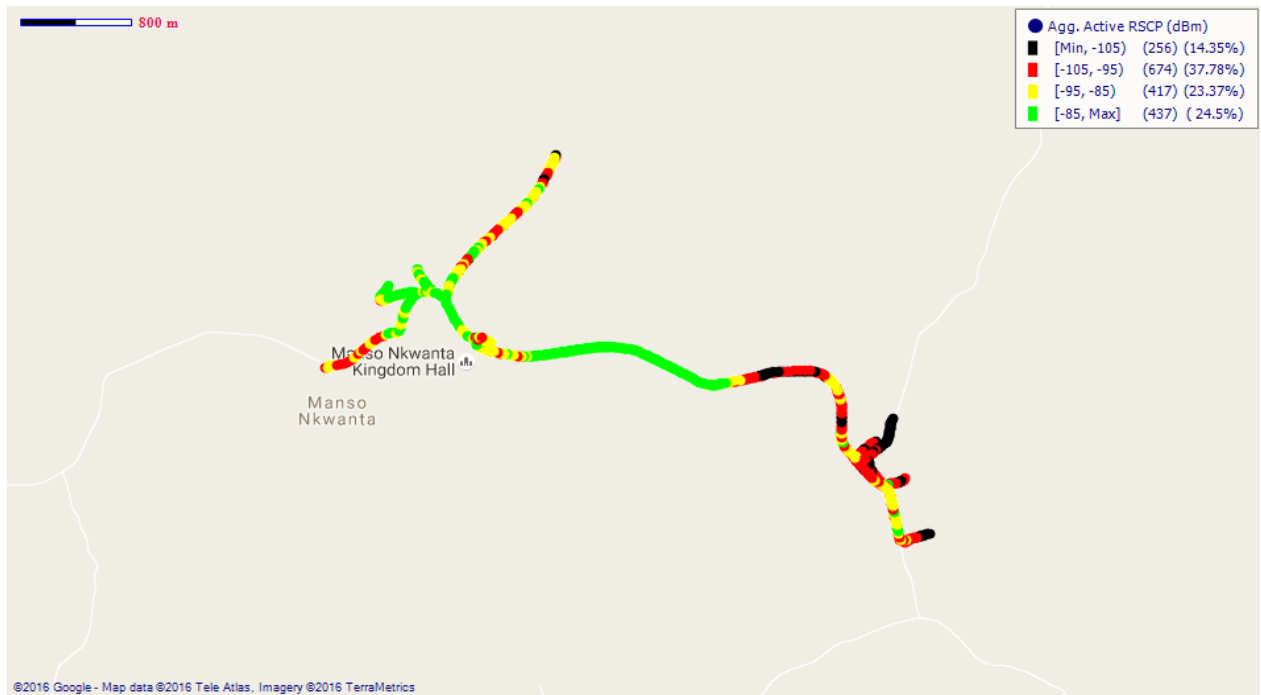


Remarks: Fair 3G network coverage at Mankranso which requires improvement.

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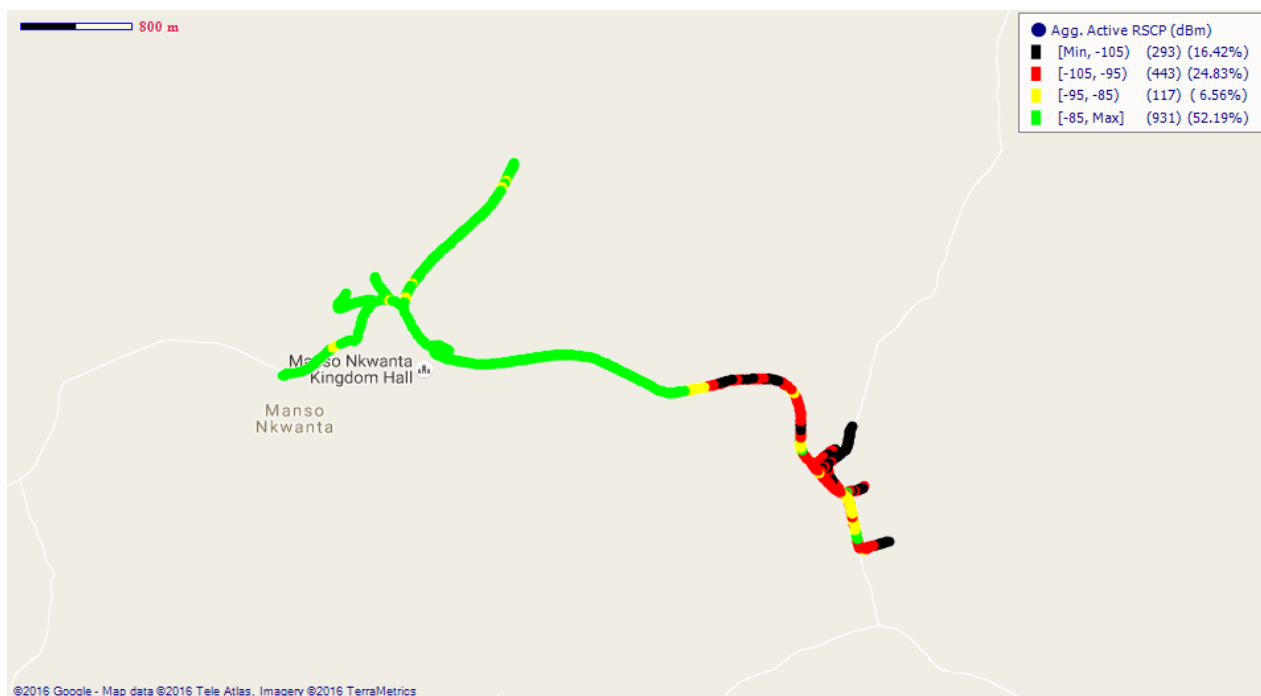
COVERAGE AT MANSO NKWANTA

Fig. 93 - MTN 3G Coverage Map, Manso Nkwanta – September 2016



Remarks: Fair 3G network coverage in Manso Nkwanta which require improvement.

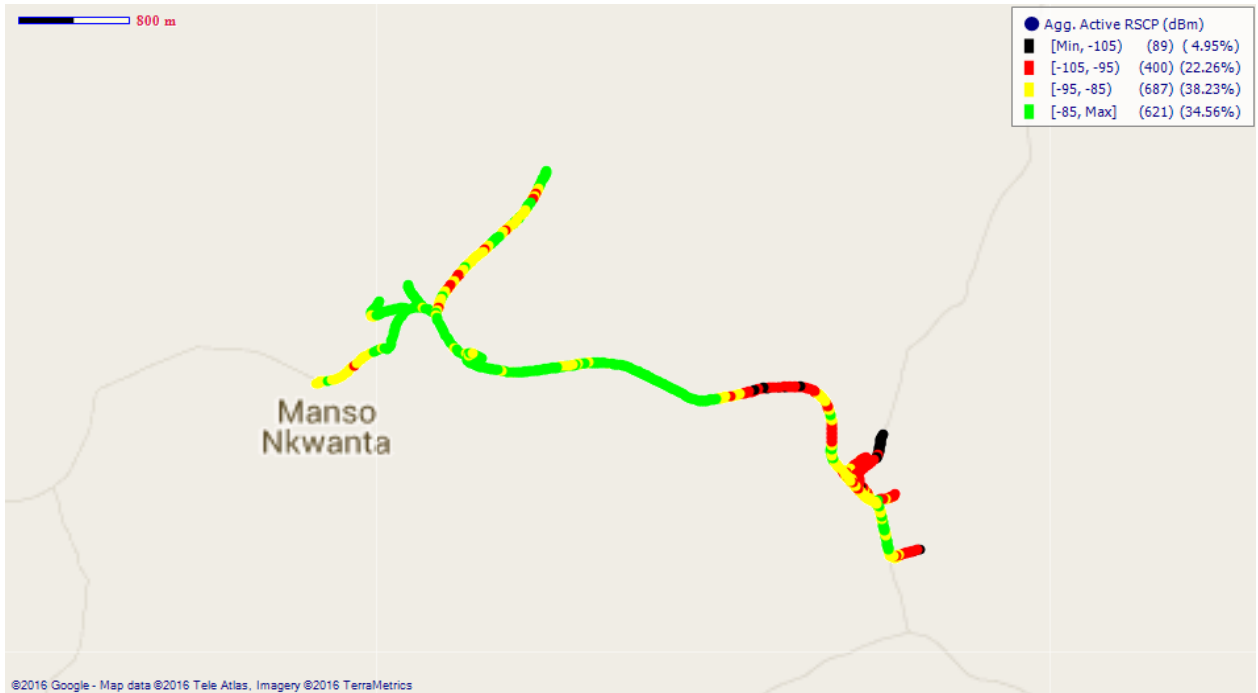
Fig. 94 - Vodafone 3G Coverage Map, Manso Nkwanta – September 2016



Remarks: Fair 3G network coverage in and around Manso Nkwanta. The outskirts requires improvement.

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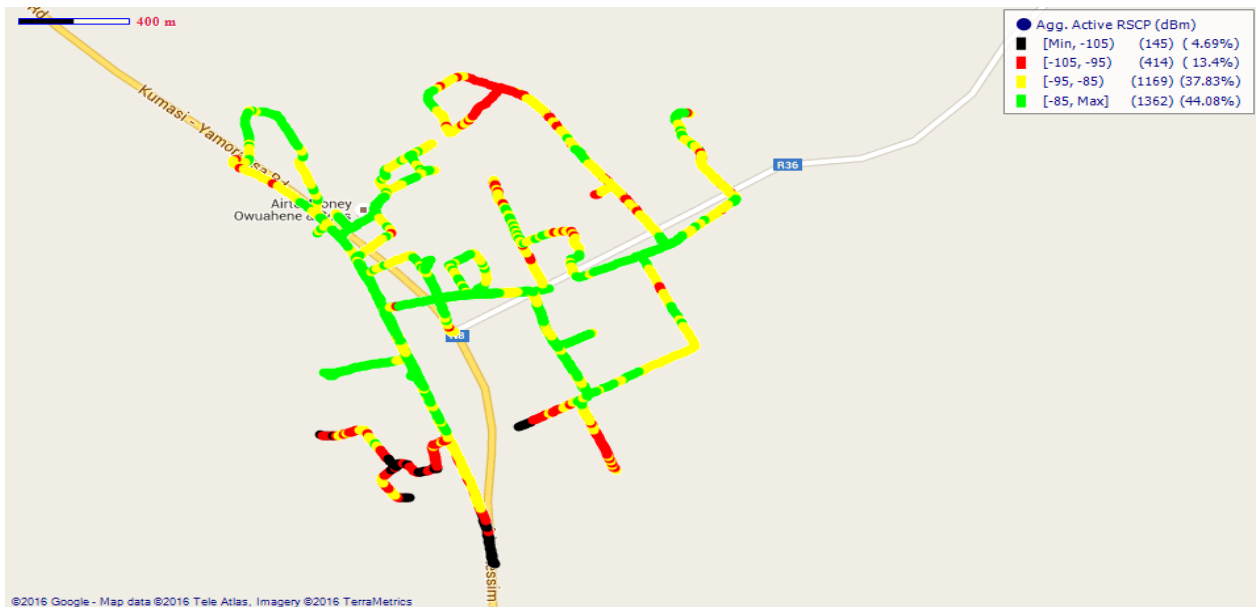
Fig. 95 - Airtel 3G Coverage Map, Manso Nkwanta – September 2016



Remarks: Fair 3G network coverage at Manso Nkwanta which requires improvement especially around the DCE’s residence.

COVERAGE AT NEW EDUBIASE

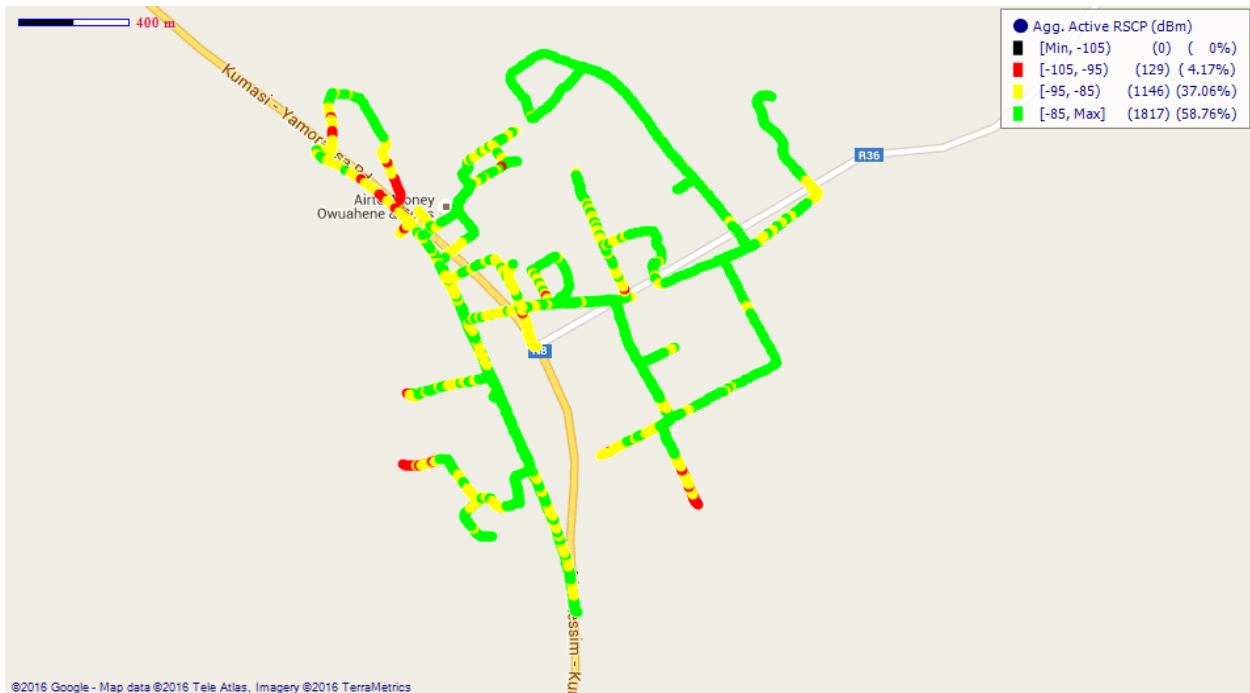
Fig. 96 - MTN 3G Coverage Map, New Edubiase – September 2016



Remarks: Fair 3G network coverage spread across the town which requires major improvement.

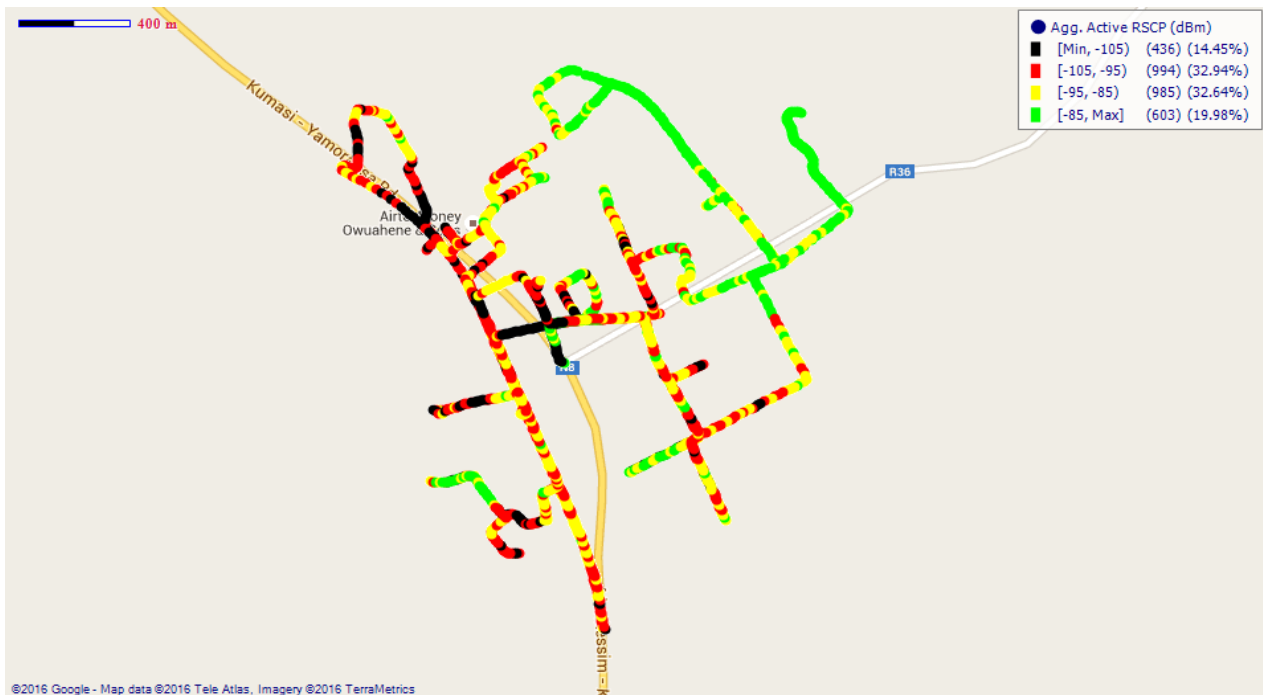
**3G COVERAGE ASSESSMENT OF CELLULAR MOBILE SERVICES IN ASHANTI REGION, –
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Fig. 97 - Vodafone 3G Coverage Map, New Edubiase – September 2016



Remarks: Good 3G network coverage, however areas around Airtel Money agent requires improvement.

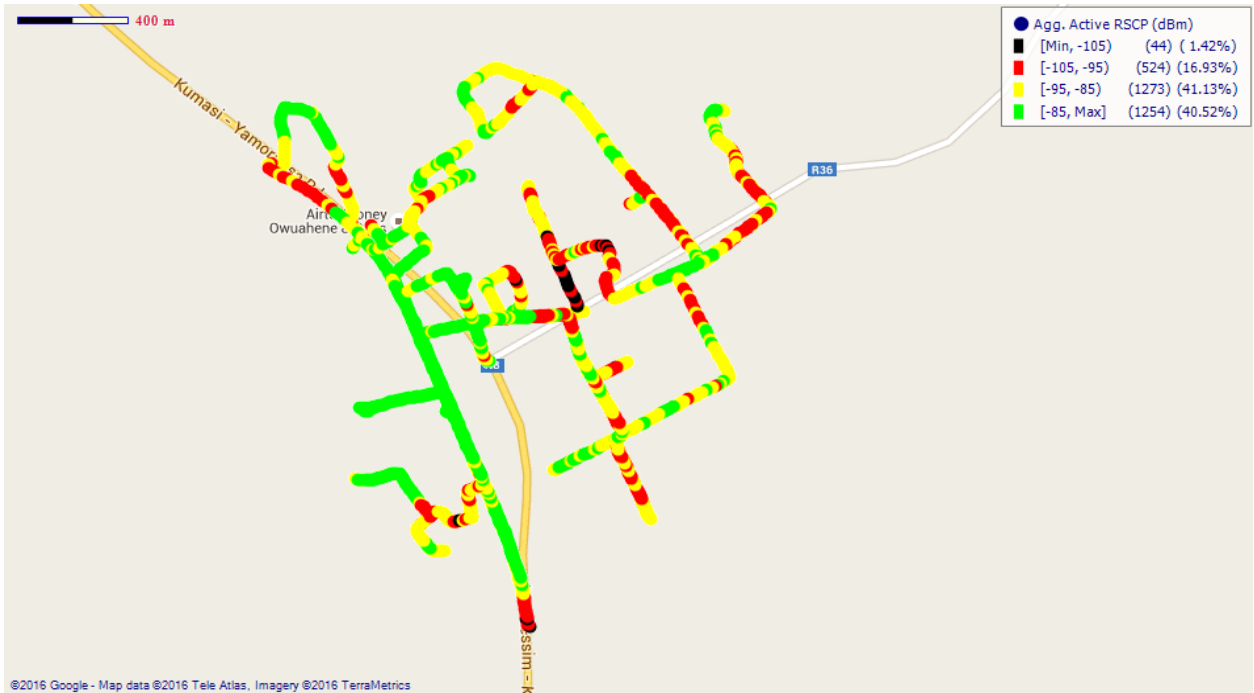
Fig. 98 – Tigo 3G Coverage Map, New Edubiase – September 2016



Remarks: Poor 3G network coverage at New Edubiase which requires a major improvement.

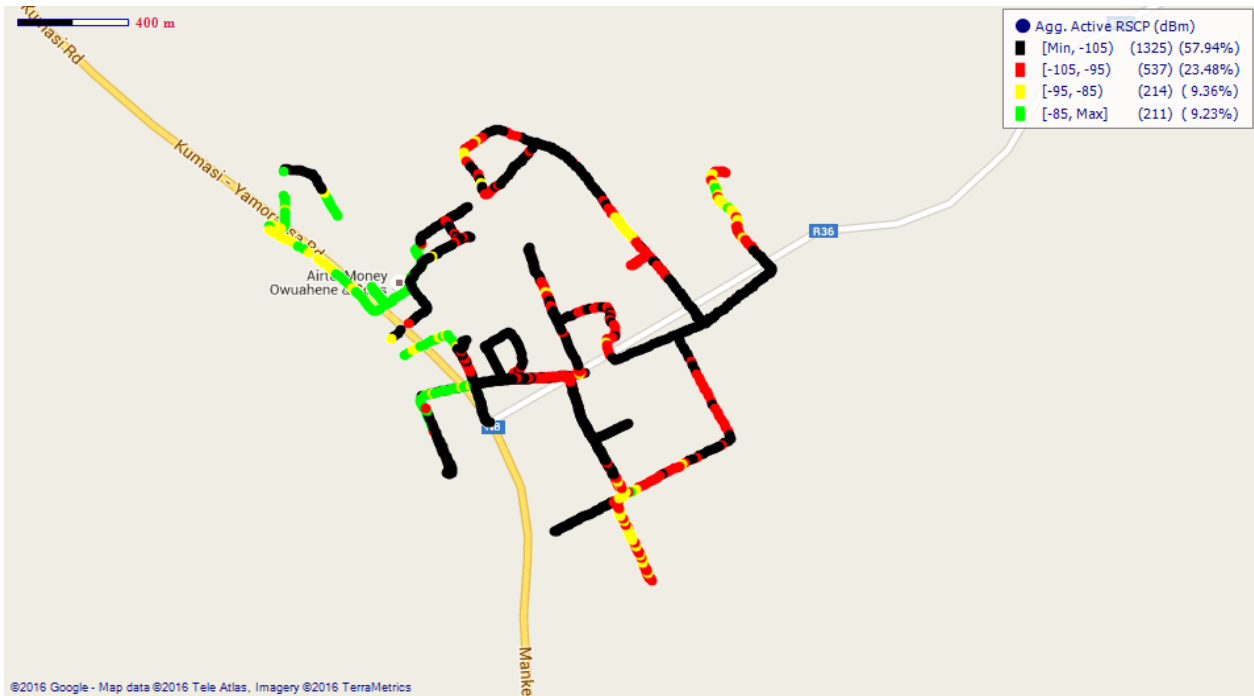
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Fig. 99 – Airtel 3G Coverage Map, New Edubiase – September 2016



Remarks: Fair 3G network coverage at New Edubiase which requires improvement.

Fig. 100 – Glo 3G Coverage Map, New Edubiase – September 2016

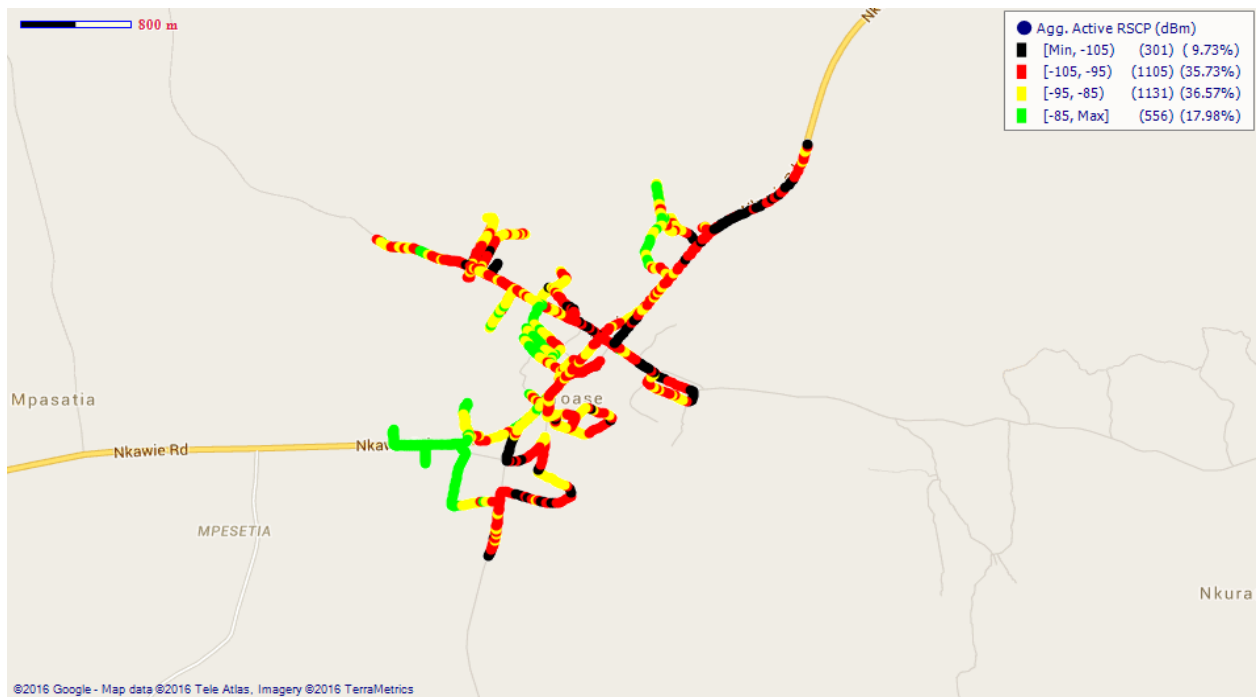


Remarks: Poor 3G network coverage in and around New Edubiase. A major improvement is required.

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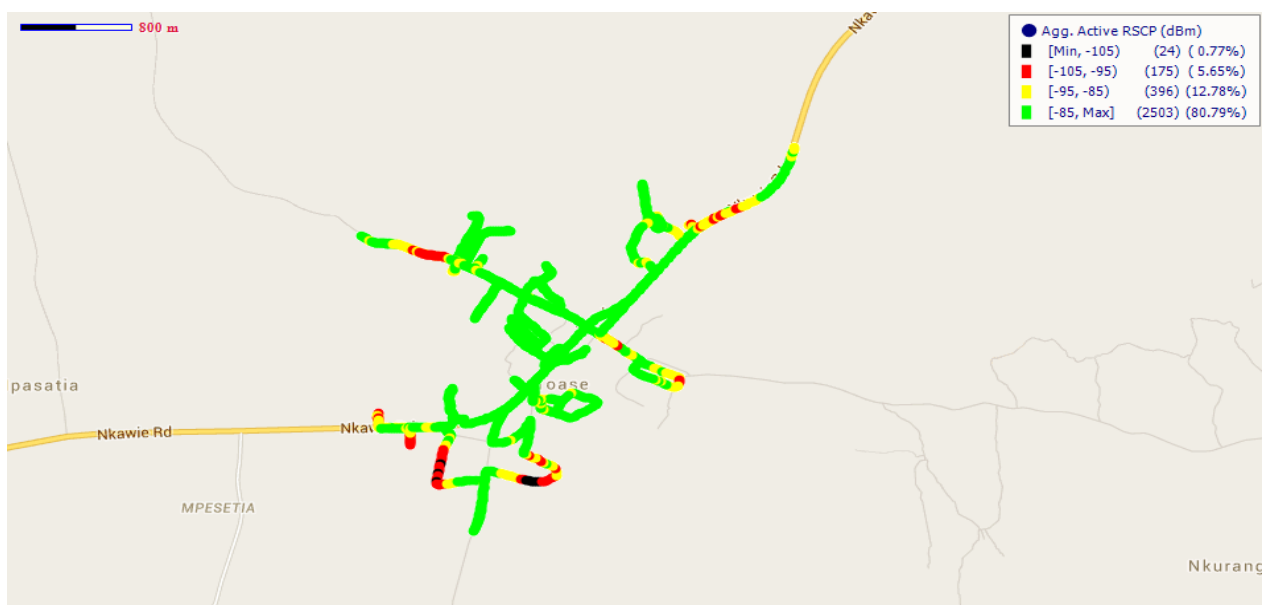
COVERAGE AT NKAWIE

Fig. 101 – MTN 3G Coverage Map, Nkawie– September 2016



Remarks: Fair 3G network coverage throughout Nkawie. A major improvement is needed.

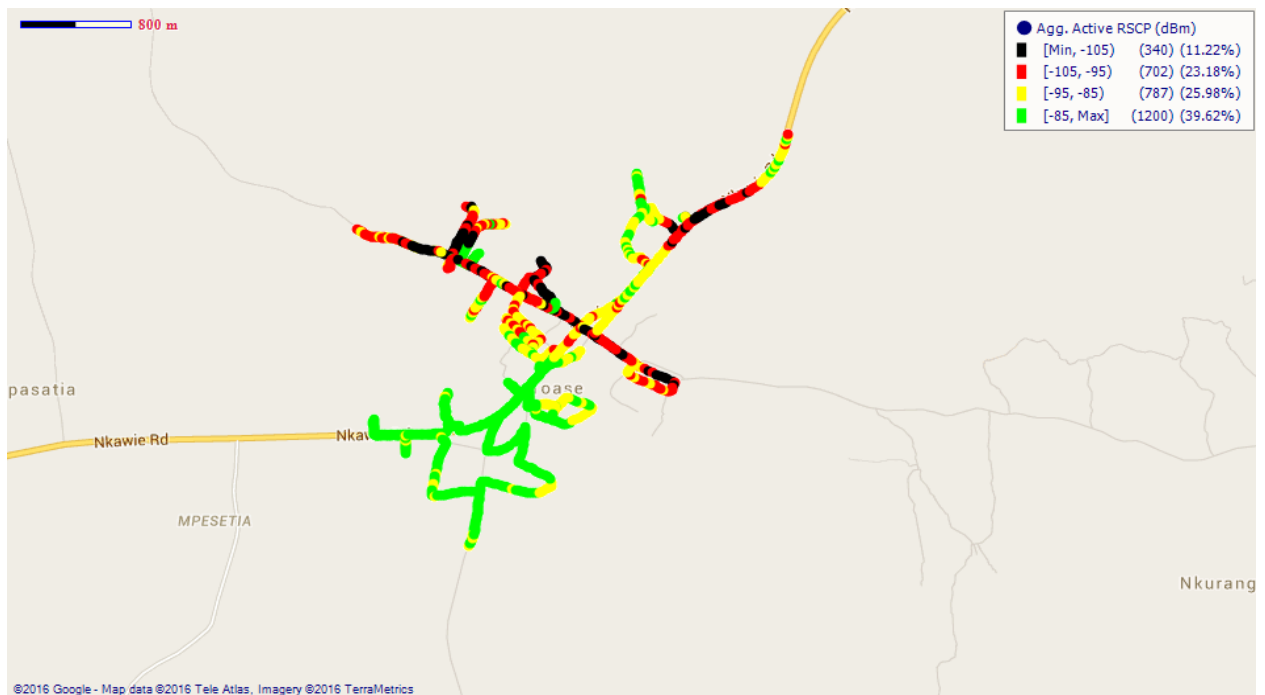
Fig. 102 – Vodafone 3G Coverage Map, Nkawie – September 2016



Remarks: Good 3G network coverage.

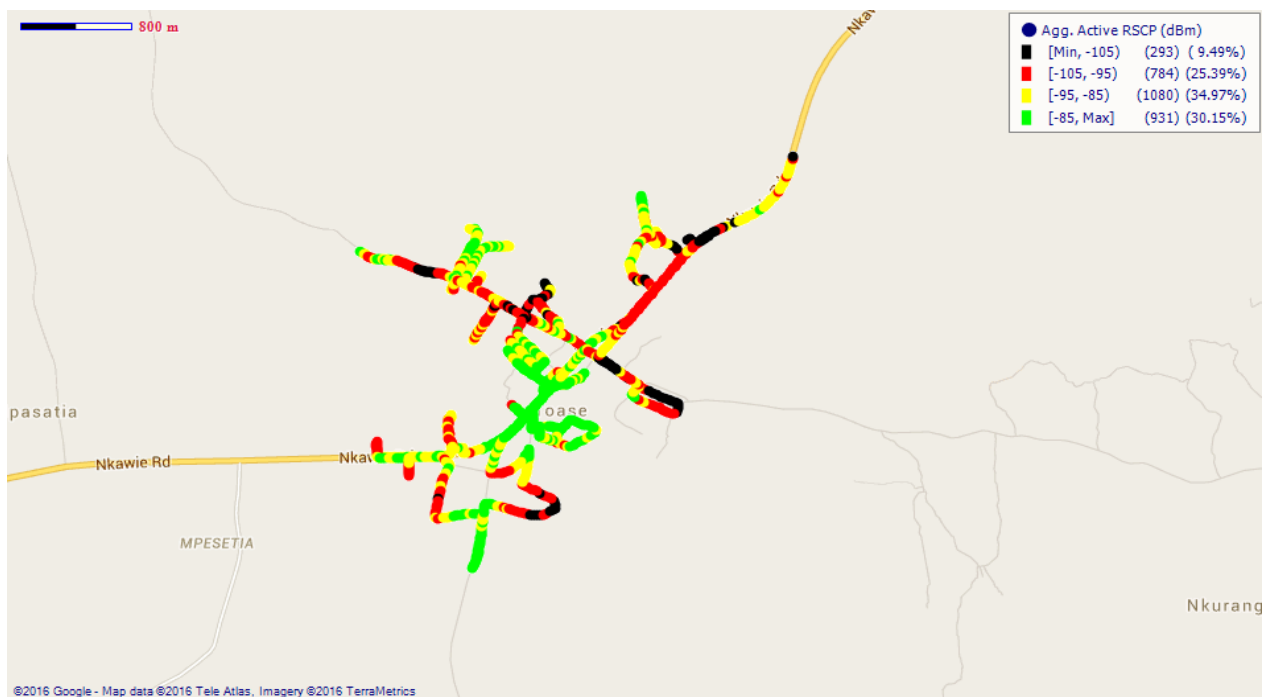
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Fig. 103 – Tigo 3G Coverage Map, Nkawie – September 2016



Remarks: Fair 3G network coverage with some poor spots. A major improvement is needed.

Fig. 104 – Airtel 3G Coverage Map, Nkawie – September 2016

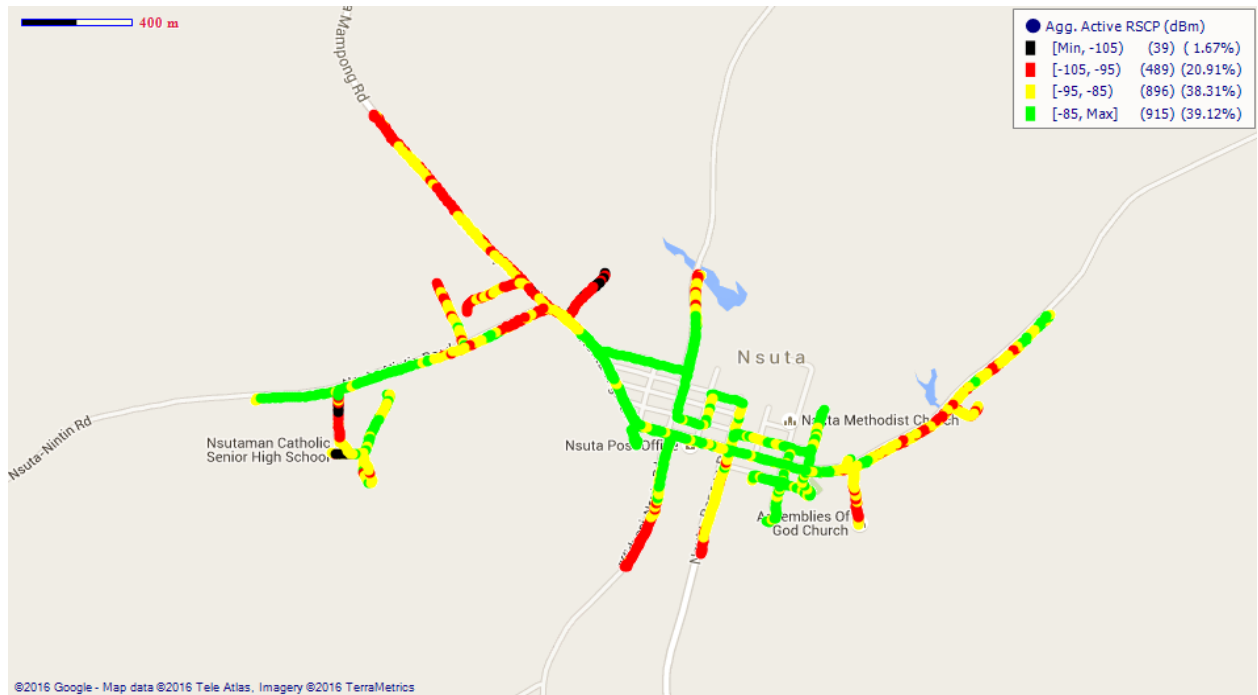


Remarks: Good 3G network coverage at Nkawie which requires improvement.

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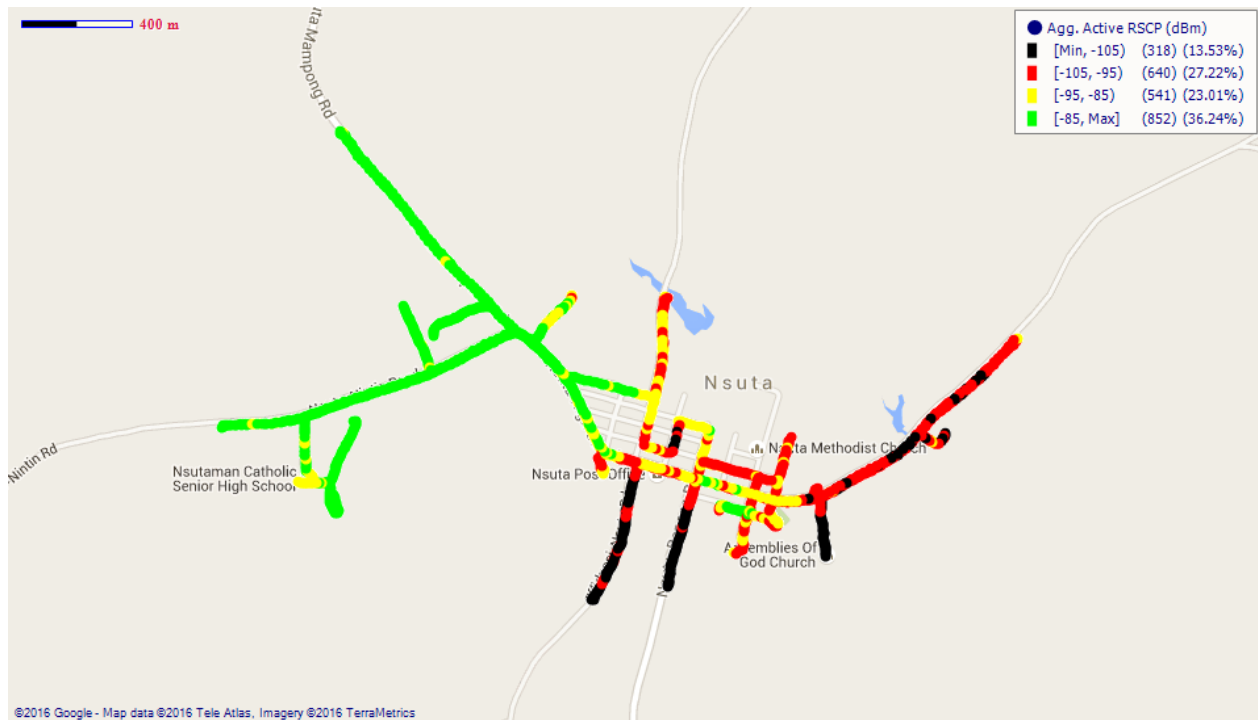
COVERAGE AT NSUTA

Fig. 105 –MTN 3G Coverage Map, Nsuta – September 2016



Remarks: Fair 3G network coverage. Major improvement is needed along Mampong Rd., Nsuta Catholic Church and around Nsuta Methodist Church.

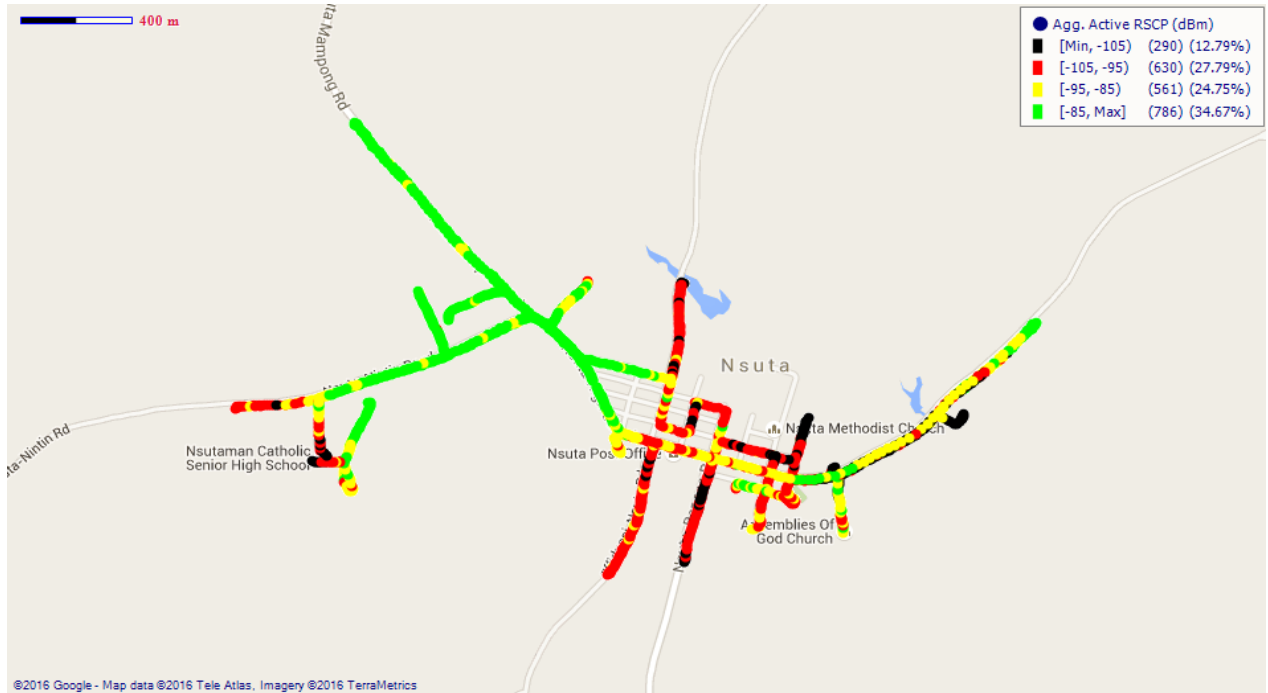
Fig. 106 – Vodafone 3G Coverage Map, Nsuta – September 2016



Remarks: Fair 3G network coverage. Major improvement is needed around Nsuta Post Office, Methodist Church and around Assemblies of God Church.

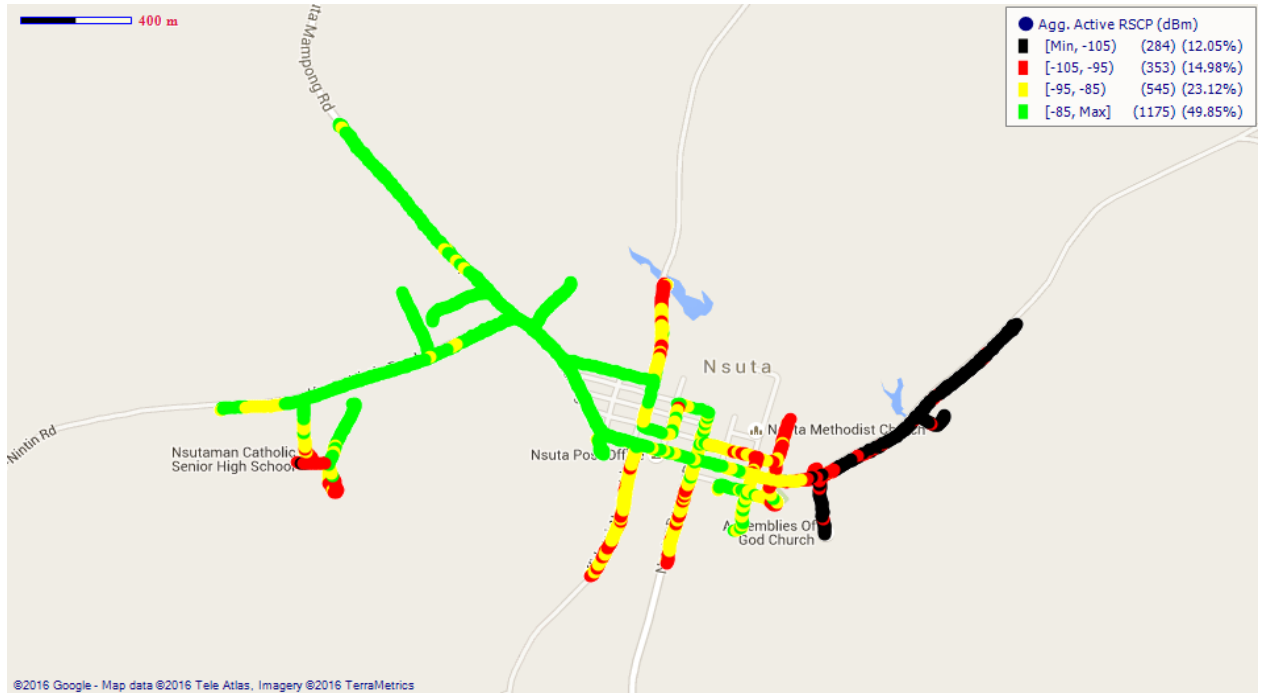
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Fig. 107 – Tigo 3G Coverage Map, Nsuta – September 2016



Remarks: Fair 3G network coverage with some poor spots around the Post Office area, around Assemblies of God Church and Nsuta Methodist Church. A major improvement is needed.

Fig. 108 – Airtel 3G Coverage Map, Nsuta – September 2016

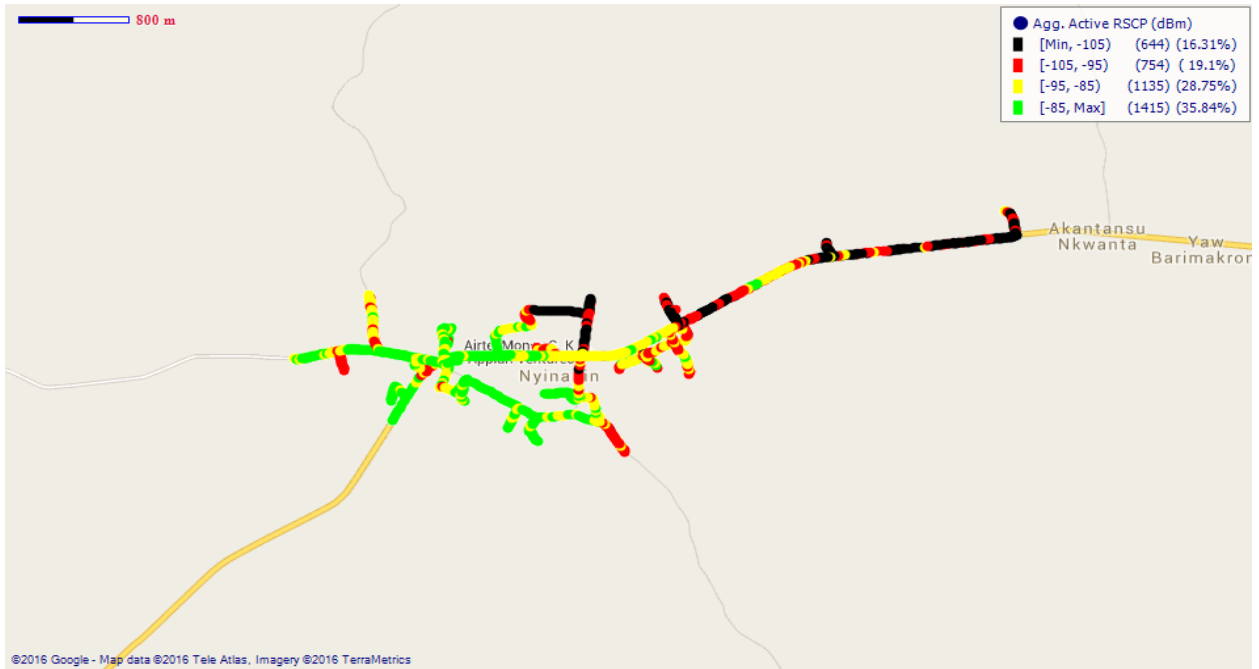


Remarks: Fair 3G network coverage at Nsuta which requires improvement.

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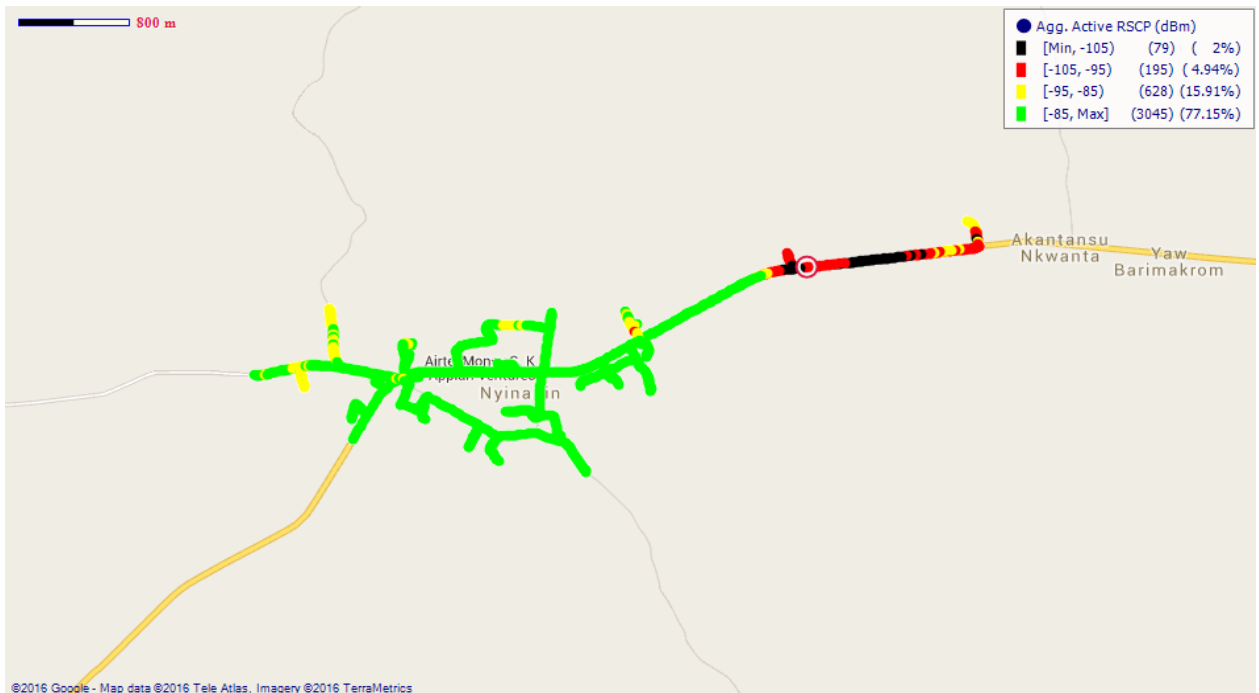
COVERAGE AT NYINAHIN

Fig. 109 – MTN 3G Coverage Map, Nyinahin – September 2016



Remarks: Fair 3G network coverage at Nyinahin with some percentage of poor coverage along the Akantansu road. Major Improvement is needed.

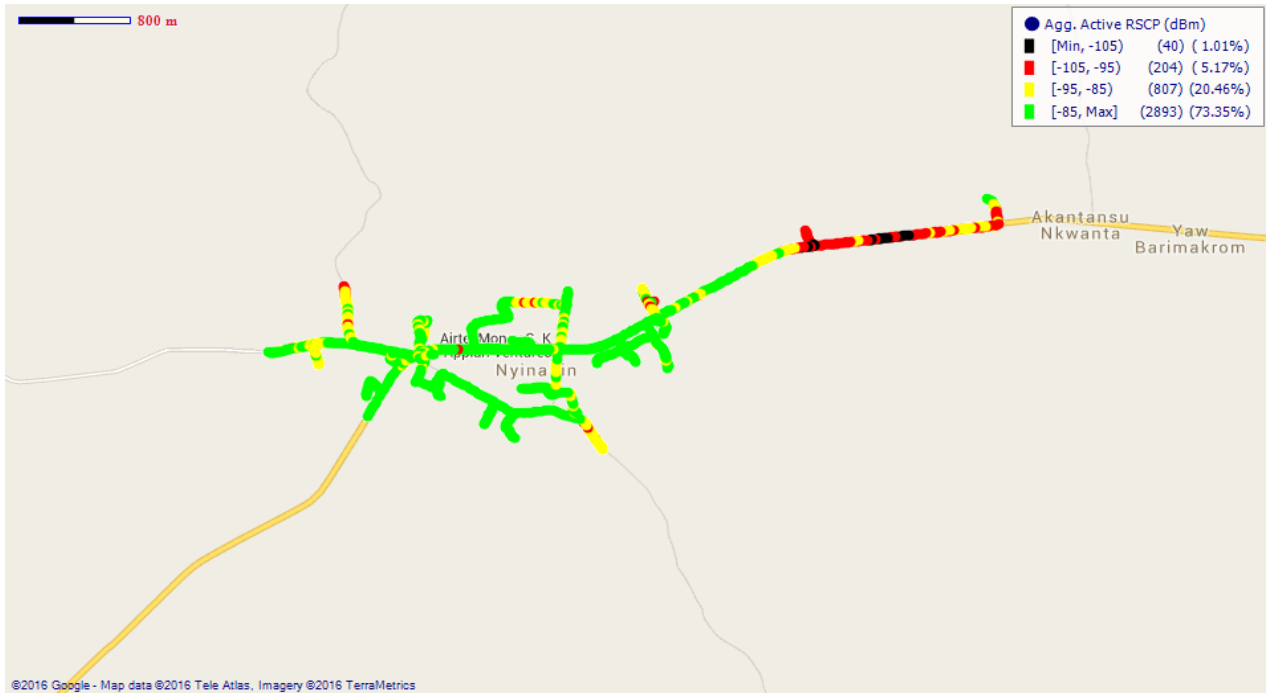
Fig. 110 – Vodafone 3G Coverage Map, Nyinahin – September 2016



Remarks: Good 3G network coverage at Nyinahin. However, 3G coverage is needed on Nyinahin-Akantansu Nkwanta Rd.

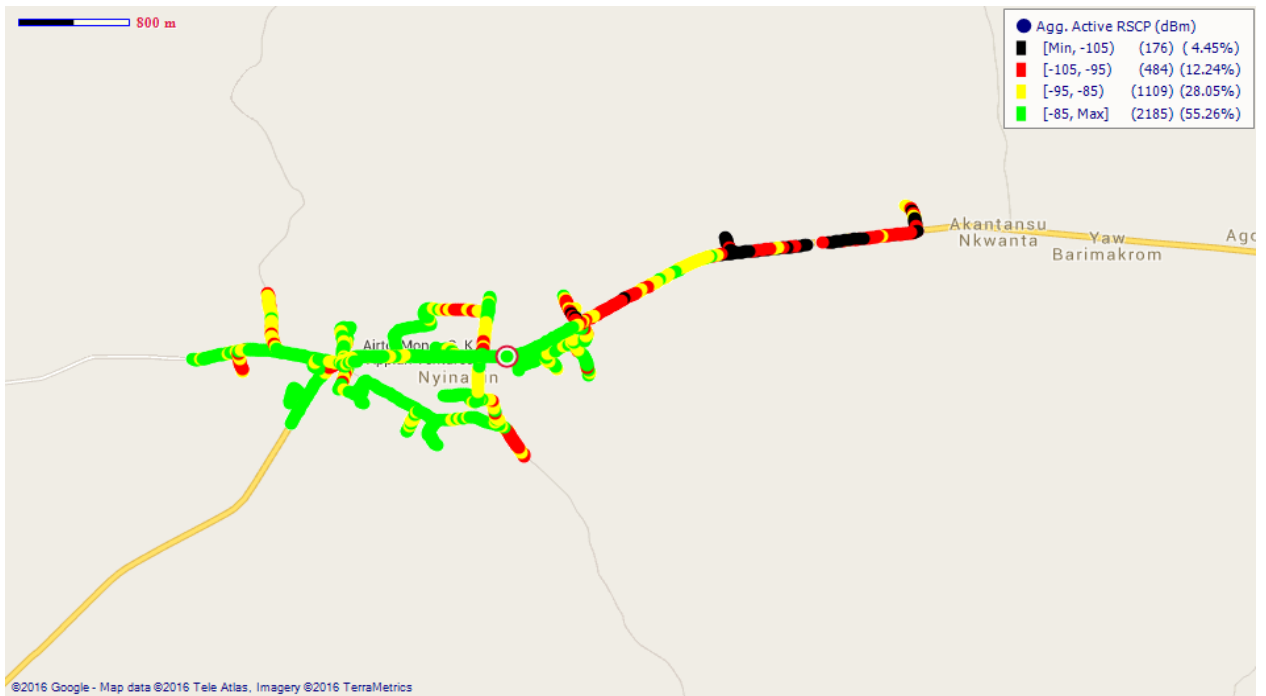
**3G COVERAGE ASSESSMENT OF CELLULAR MOBILE SERVICES IN ASHANTI REGION, –
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Fig. 111 – Tigo 3G Coverage Map, Nyinahin – September 2016



Remarks: Good 3G network coverage at Nyinahin.

Fig. 112 – Airtel 3G Coverage Map, Nyinahin – September 2016

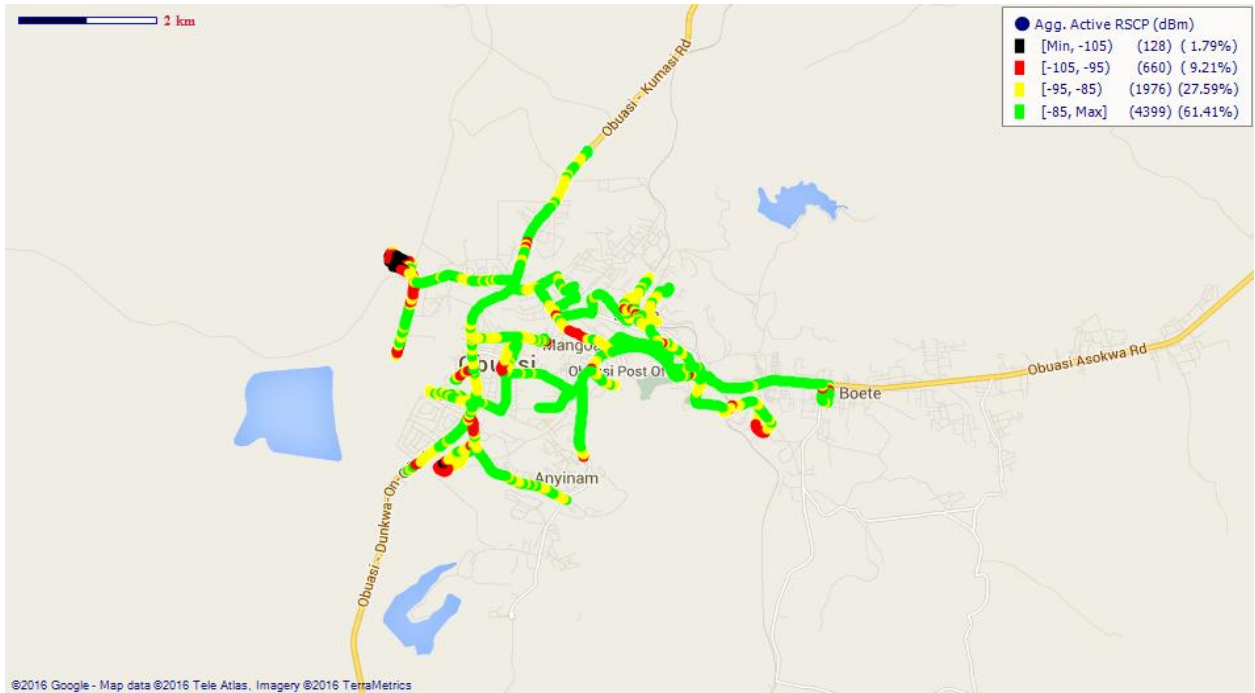


Remarks: Good 3G network coverage at Nyinahin which requires improvement.

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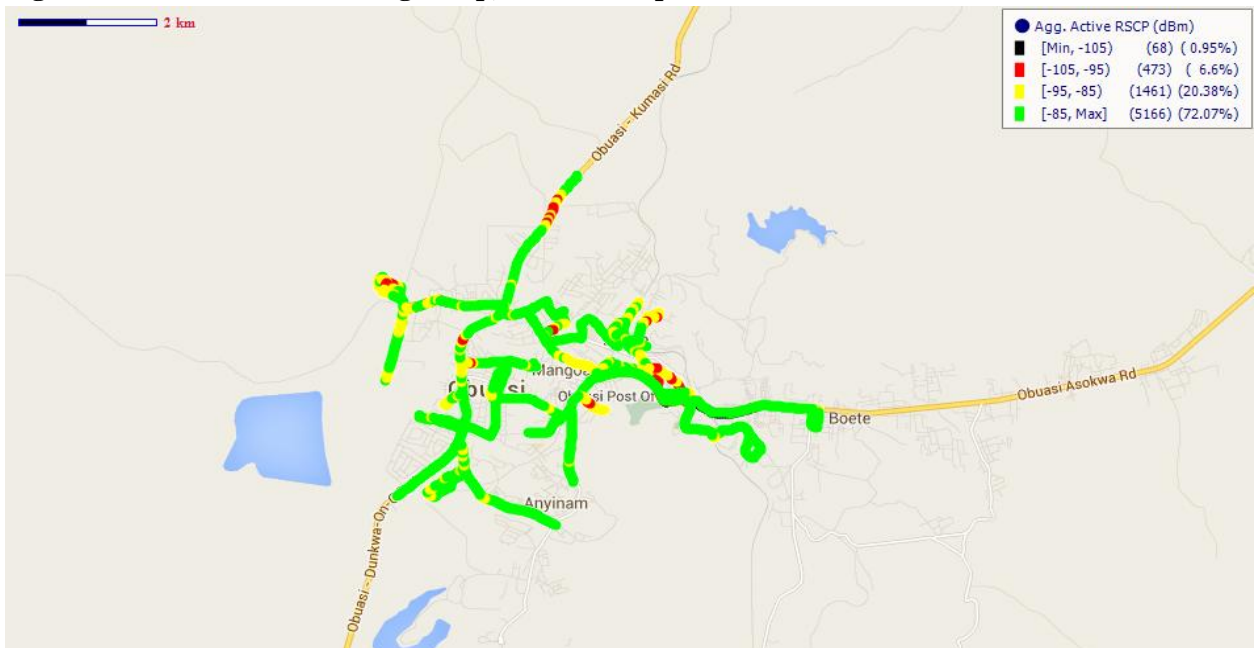
COVERAGE AT OBUASI

Fig. 113 – MTN 3G Coverage Map, Obuasi – September 2016



Remarks: Good 3G network coverage at Obuasi. However, some bad spots scattered in the town require improvement.

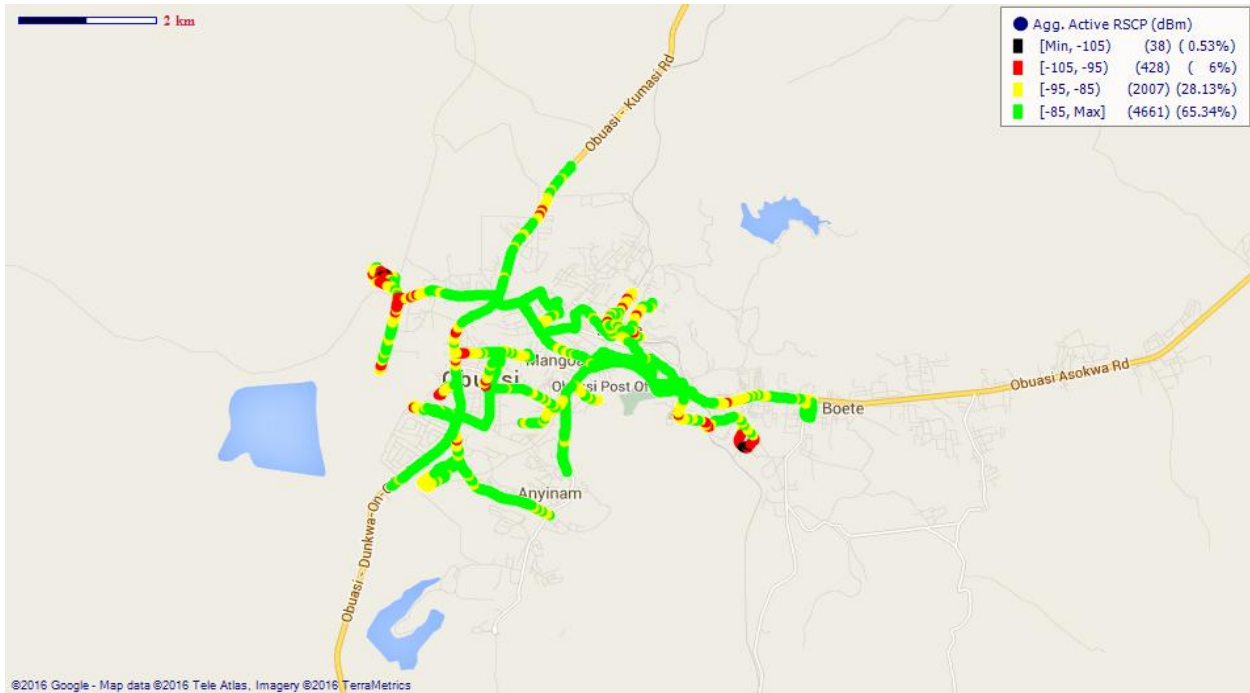
Fig. 114 – Vodafone 3G Coverage Map, Obuasi – September 2016



Remarks: Good 3G network coverage at Obuasi.

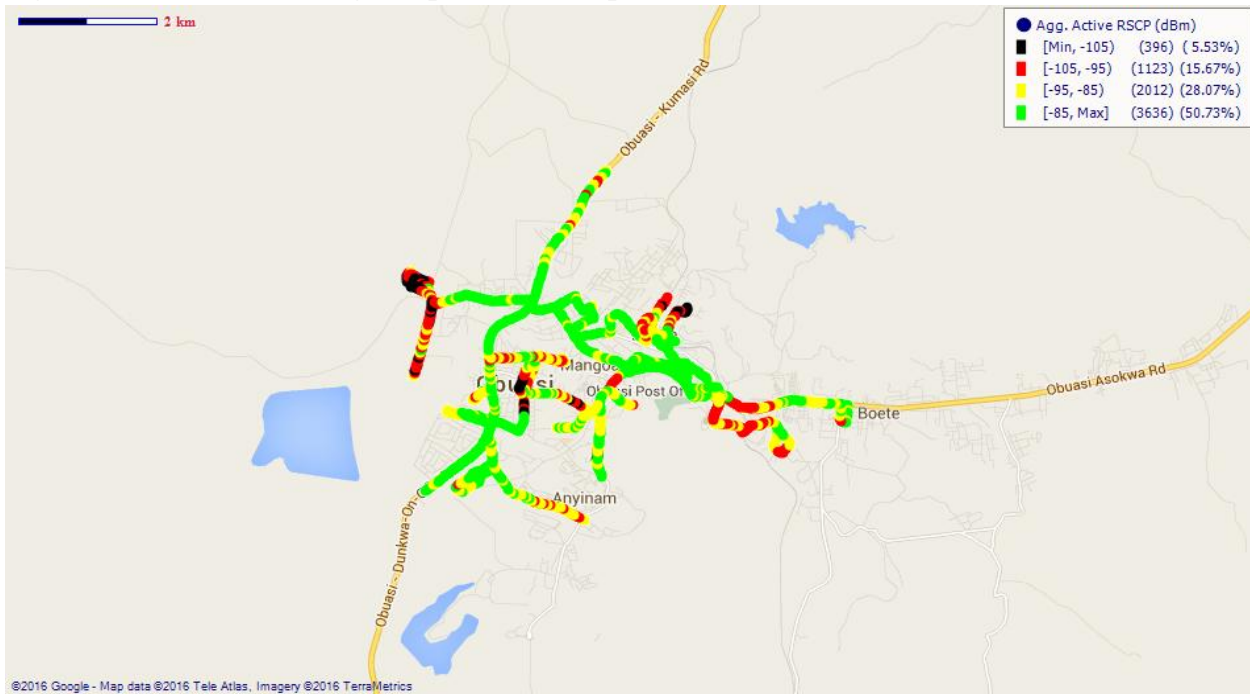
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Fig. 115 – Tigo 3G Coverage Map, Obuasi – September 2016



Remarks: Good 3G network coverage at Obuasi.

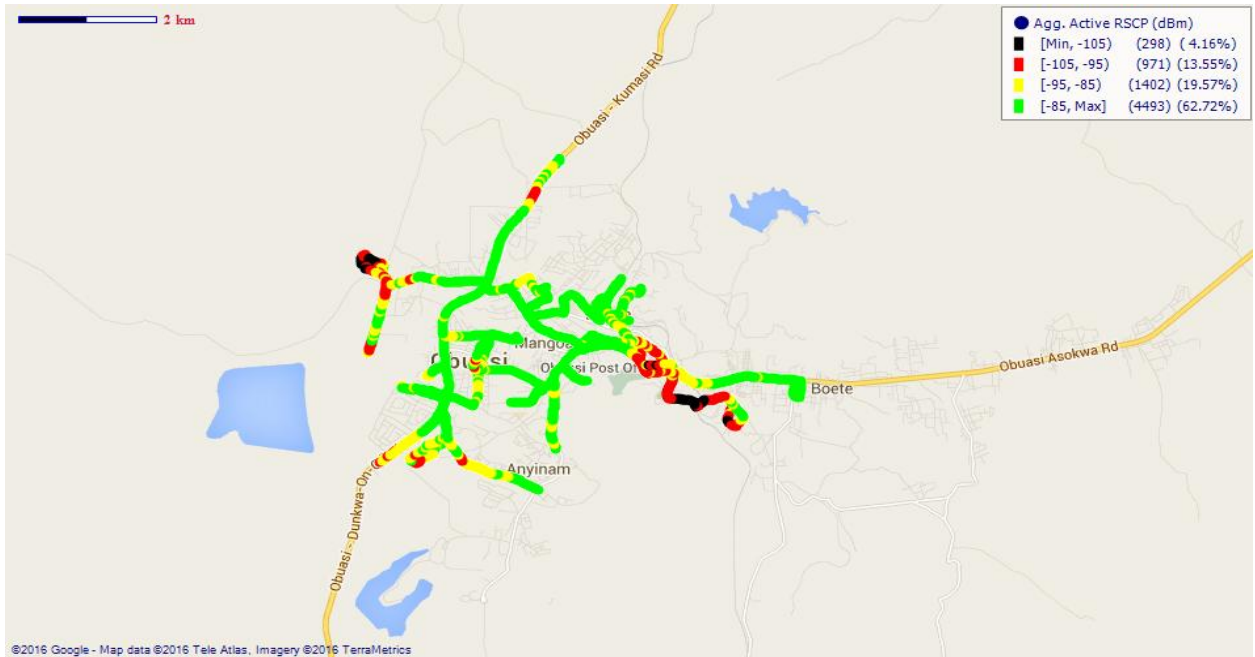
Fig. 116 – Airtel 3G Coverage Map, Obuasi – September 2016



Remarks: Fair 3G network coverage at Obuasi which requires improvement.

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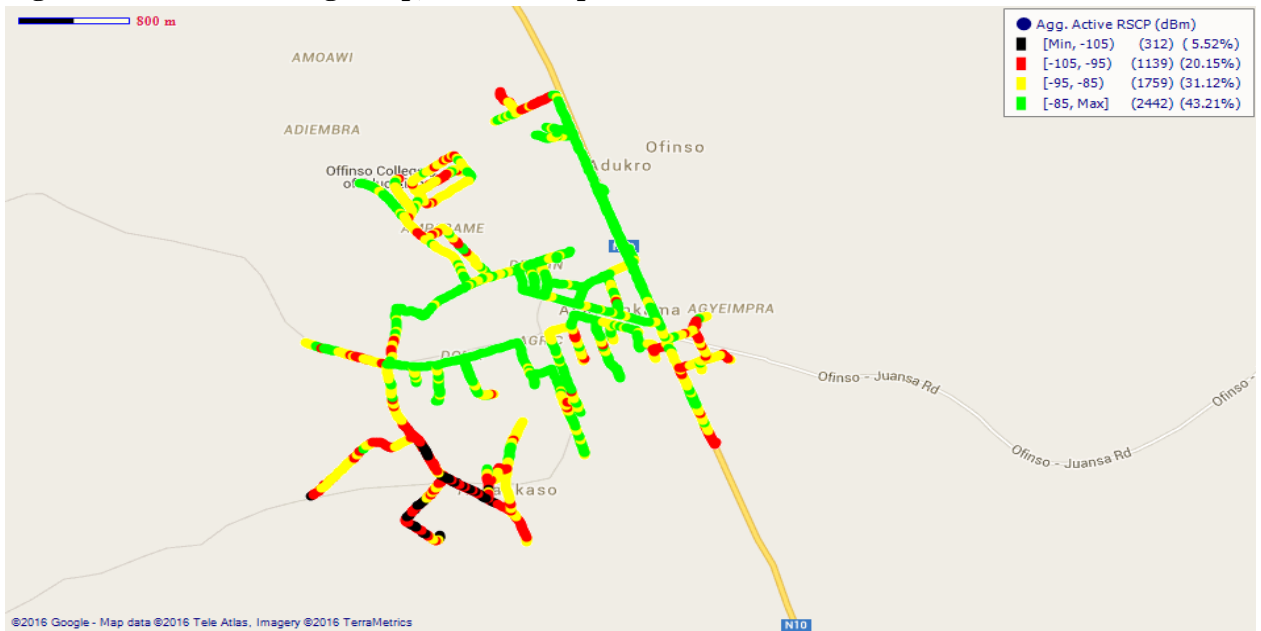
Fig. 117 – Glo 3G Coverage Map, Obuasi – September 2016



Remarks: Good 3G network coverage at Obuasi. However, some improvement is required around Golden Pride Savings and Loans, Biney Estates and National Investment Bank.

COVERAGE AT OFFINSO

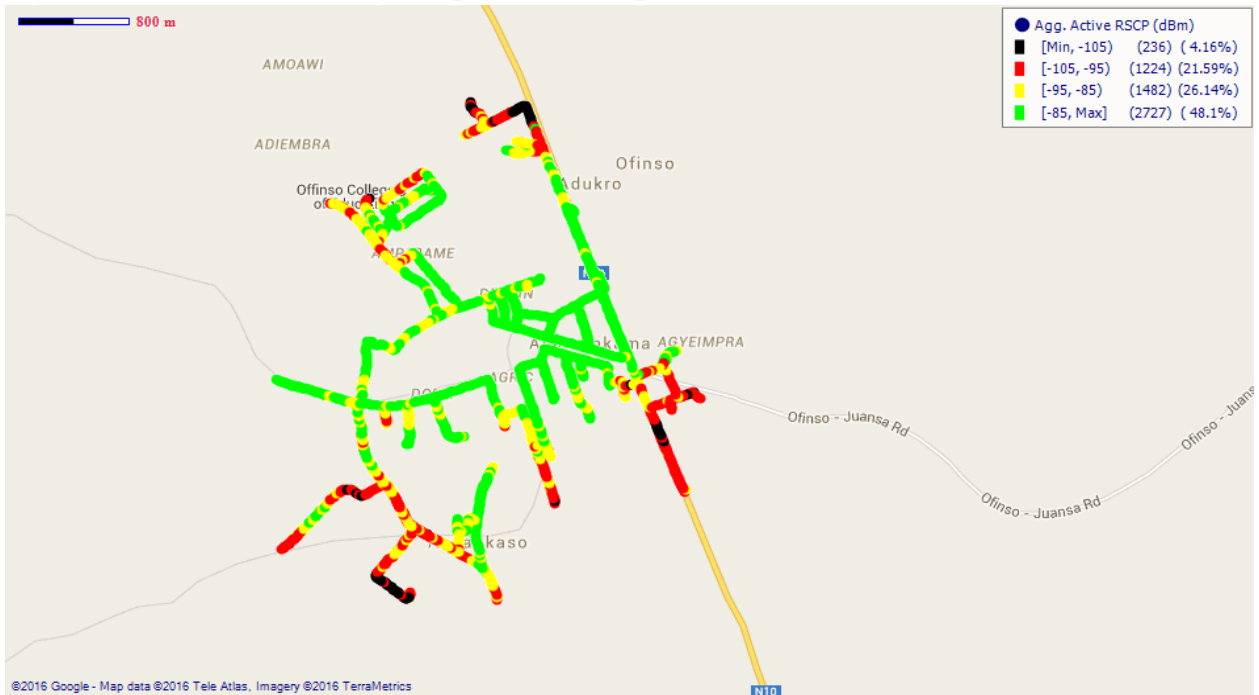
Fig. 118 MTN 3G Coverage Map, Offinso– September 2016



Remarks: Fair 3G network coverage at Offinso with a high percentage of poor spots around the College of Education, Ampabame and Anyankaso. Major improvement is required.

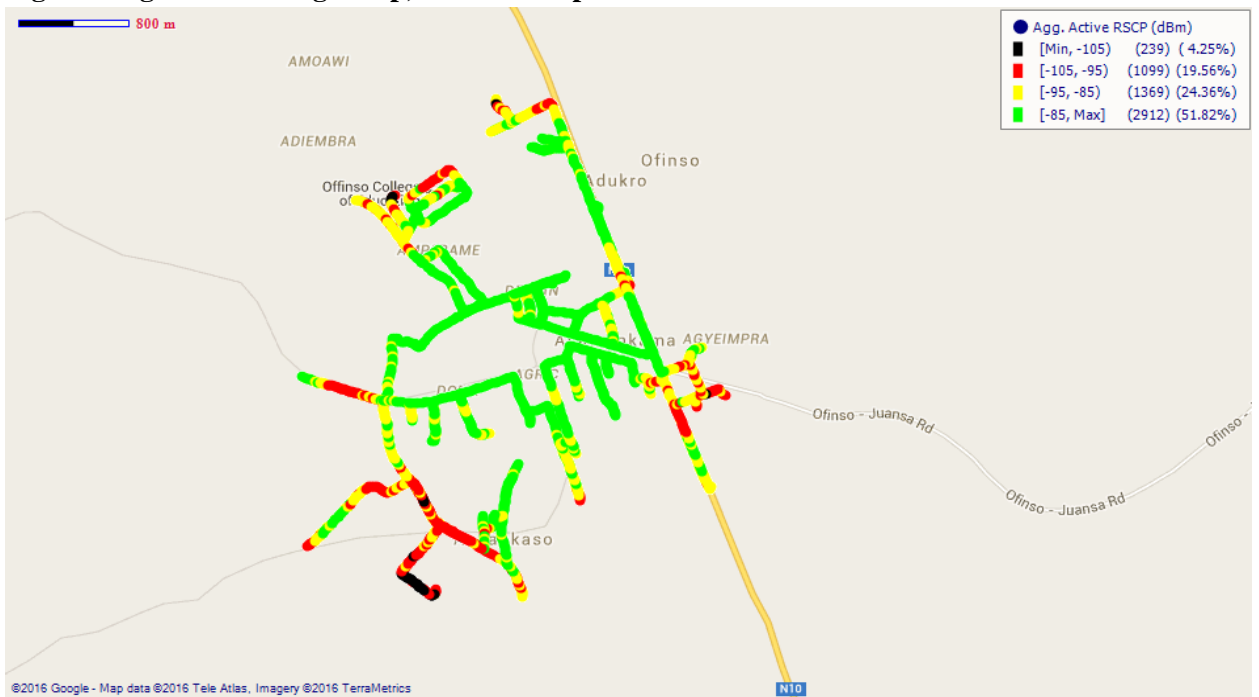
**3G COVERAGE ASSESSMENT OF CELLULAR MOBILE SERVICES IN ASHANTI REGION, –
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Fig. 119 Vodafone 3G Coverage Map, Offinso – September 2016



Remarks: Fair 3G network coverage at Offinso with poor spots around the College of Education, as well as the outskirts. Improvement is required.

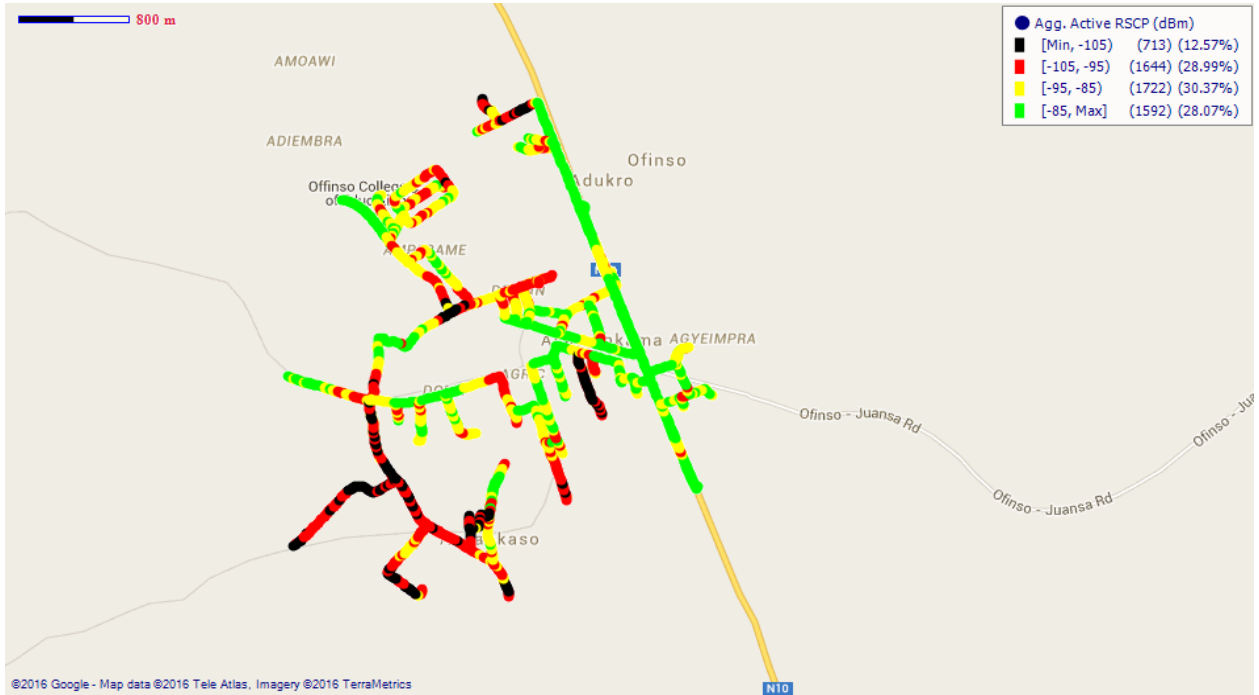
Fig. 120 Tigo 3G Coverage Map, Offinso – September 2016



Remarks: Good 3G network coverage at Offinso with poor spots around the College of Education, around Ayankaso and on Offinso-Juansa Rd. Improvement is required.

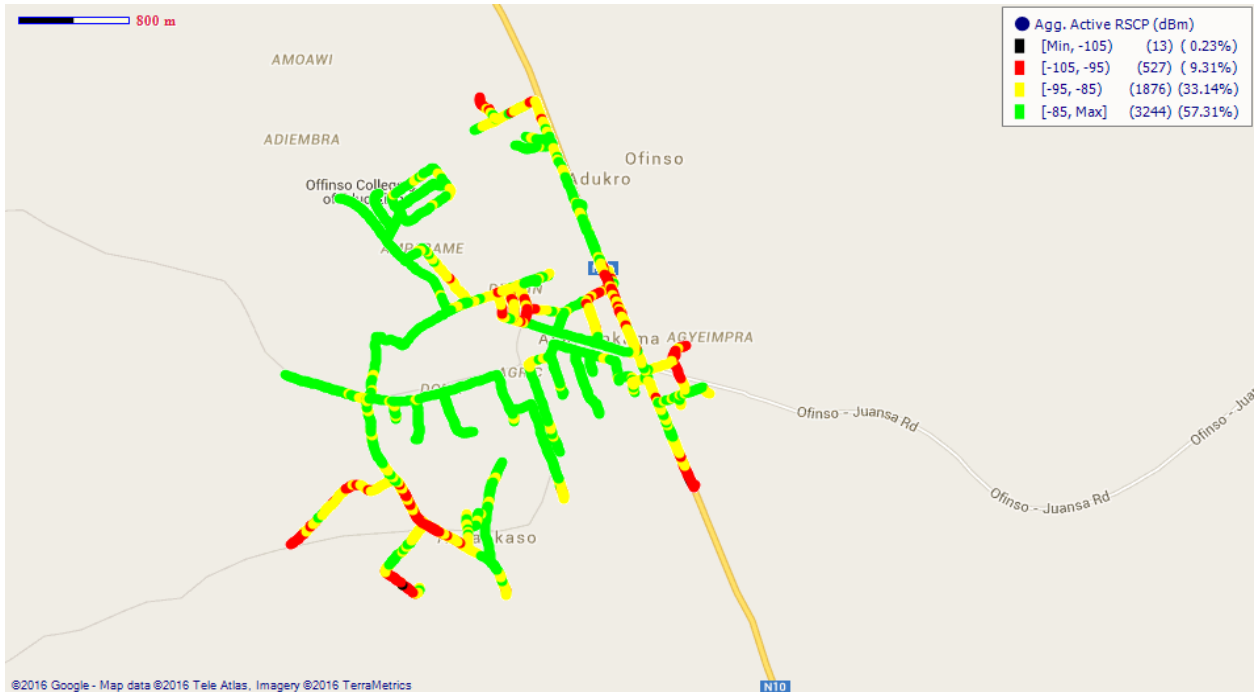
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Fig. 121 Airtel 3G Coverage Map, Offinso – September 2016



Remarks: Fair 3G network coverage at Offinso which requires improvement.

Fig. 122 Glo 3G Coverage Map, Offinso – September 2016

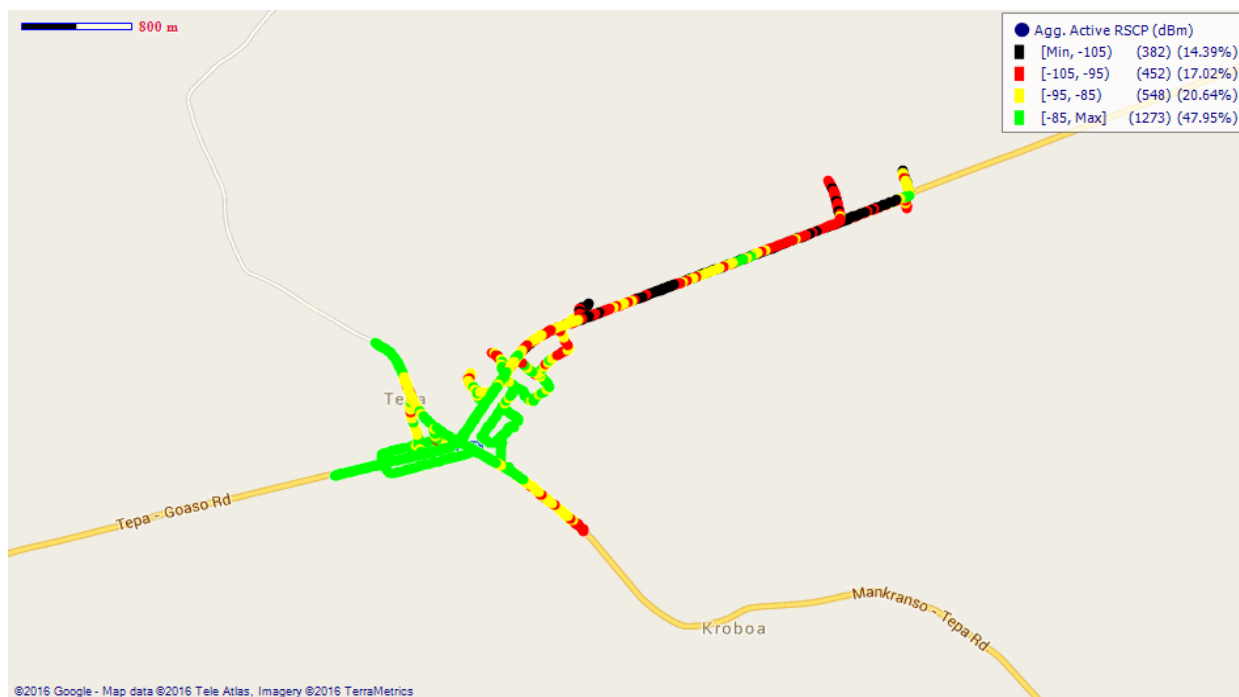


Remarks: Good 3G network coverage at Offinso with poor spots at Asamankama, Agric and around Dome which requires improvement.

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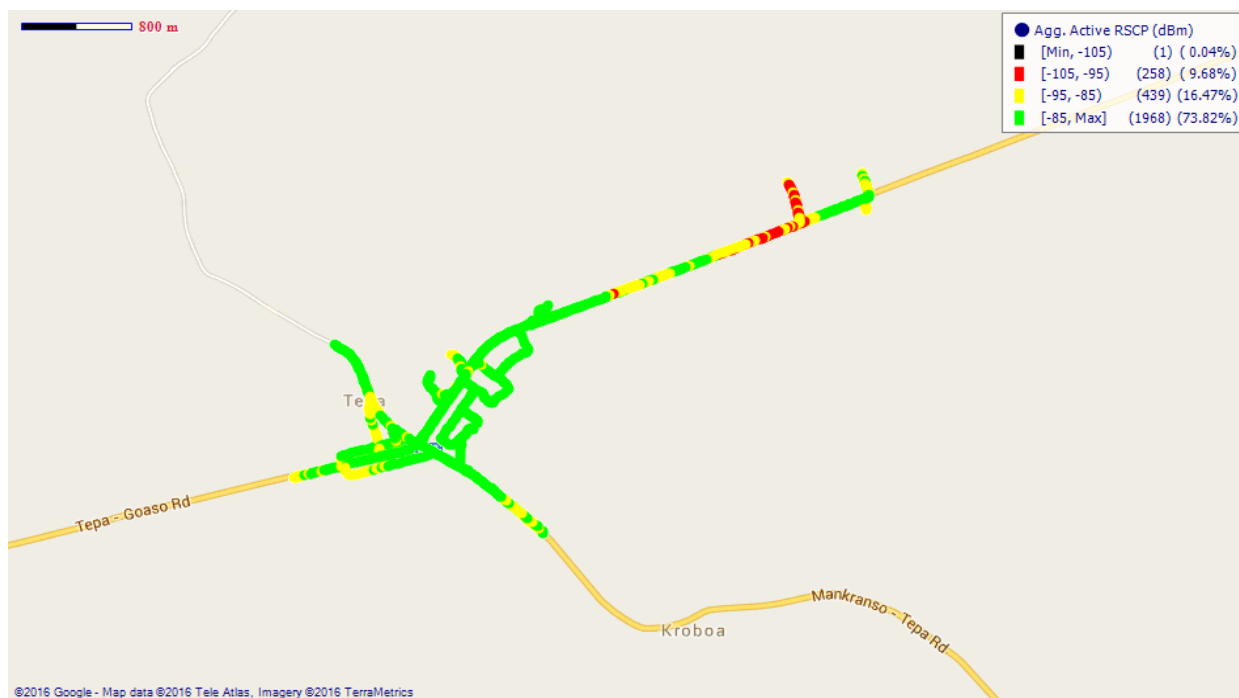
COVERAGE AT TEPA

Fig. 123 MTN 3G Coverage Map, Tewa – September 2016



Remarks: Good 3G network coverage in Tewa with high percentage of fair network coverage along the New Brosankro road. Major improvement is required.

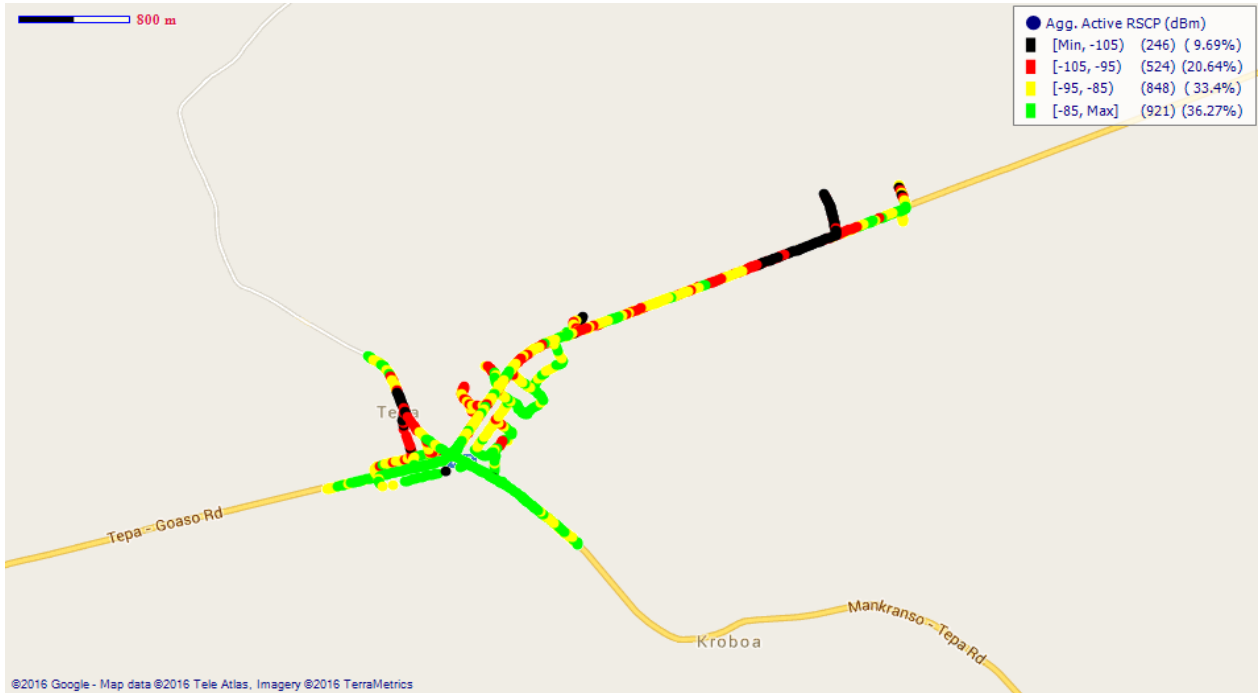
Fig. 124 Vodafone 3G Coverage Map, Tewa – September 2016



Remarks: Good 3G network coverage across Tewa which requires improvement.

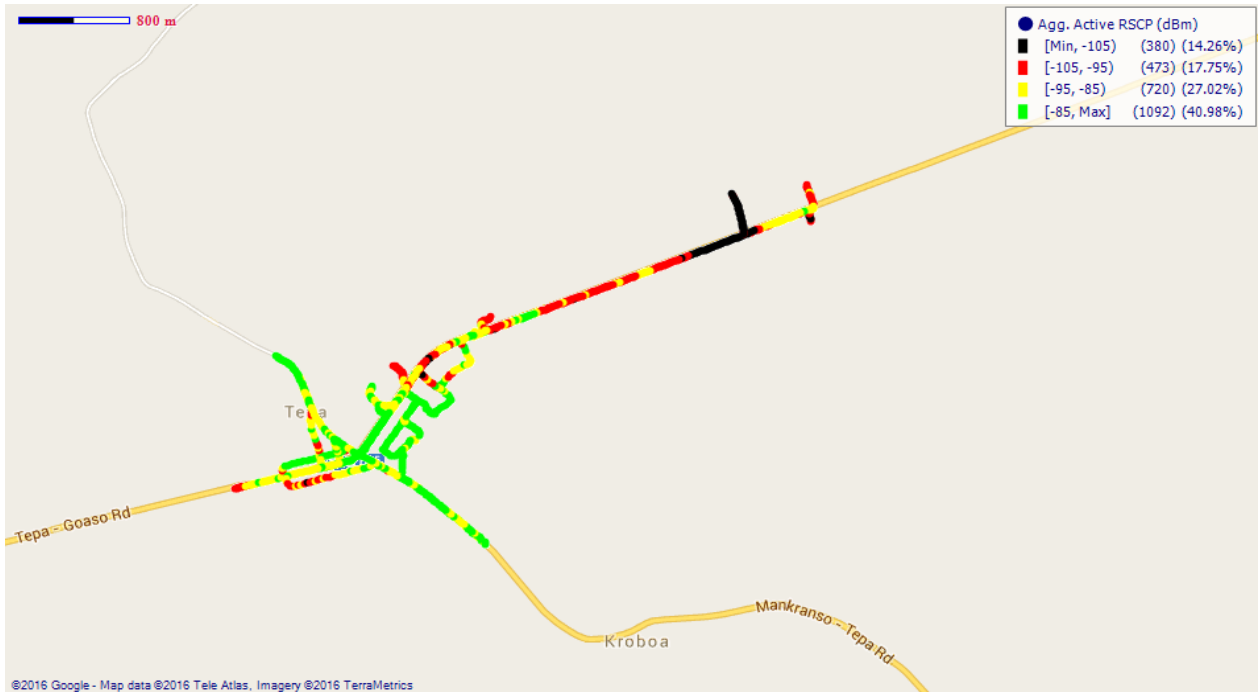
**3G COVERAGE ASSESSMENT OF CELLULAR MOBILE SERVICES IN ASHANTI REGION, –
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Fig. 125 Tigo 3G Coverage Map, Tega – September 2016



Remarks: Fair 3G network coverage across Tega which requires improvement.

Fig. 126 Airtel 3G Coverage Map, Tega – September 2016



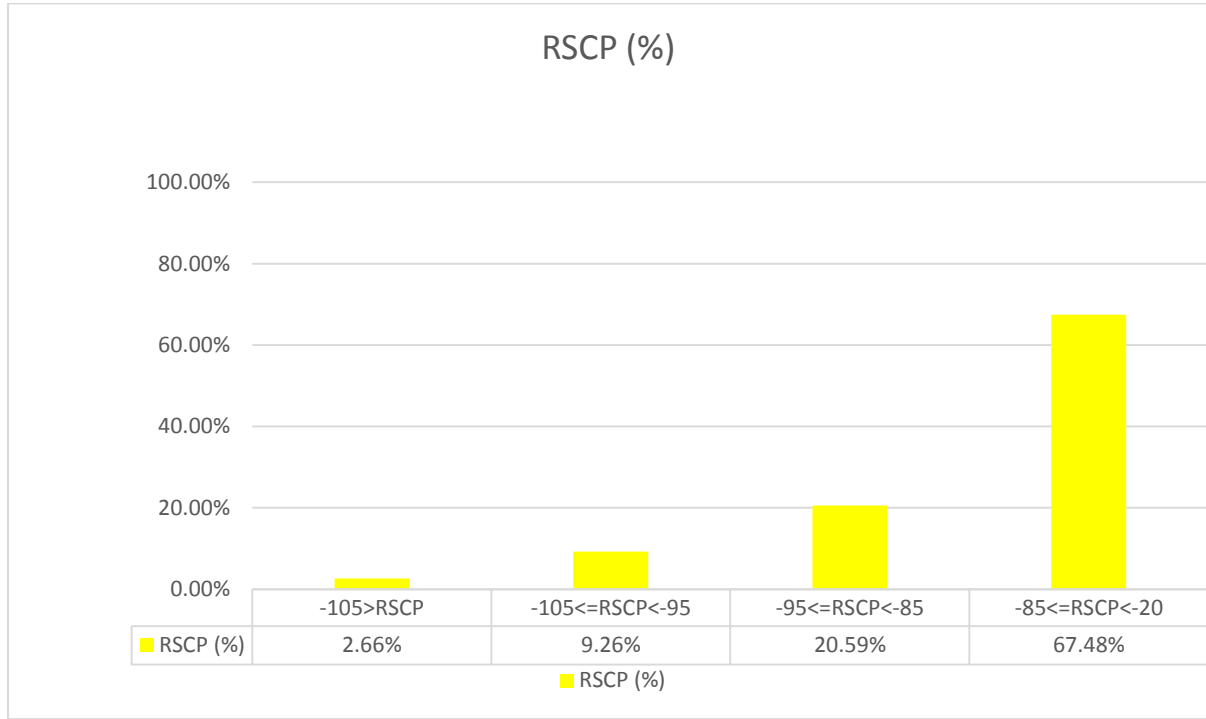
Remarks: Fair 3G network coverage in and around Tega which requires improvement.

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APPENDIX II

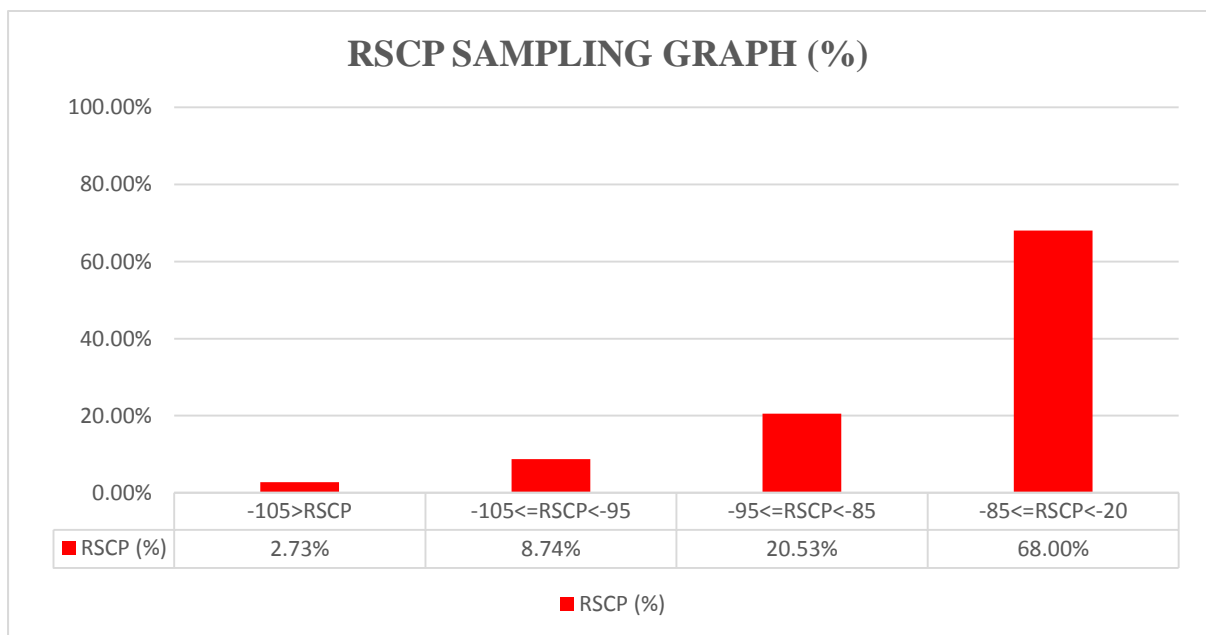
RSCP SAMPLING DISTRIBUTION

Fig. 127 - MTN 3G Coverage Samples Plot in the Ashanti Region



Remarks: MTN recorded its highest count of RSCP samples in the range $-85 \leq RSCP < -20$ dBm across most of the district areas tested.

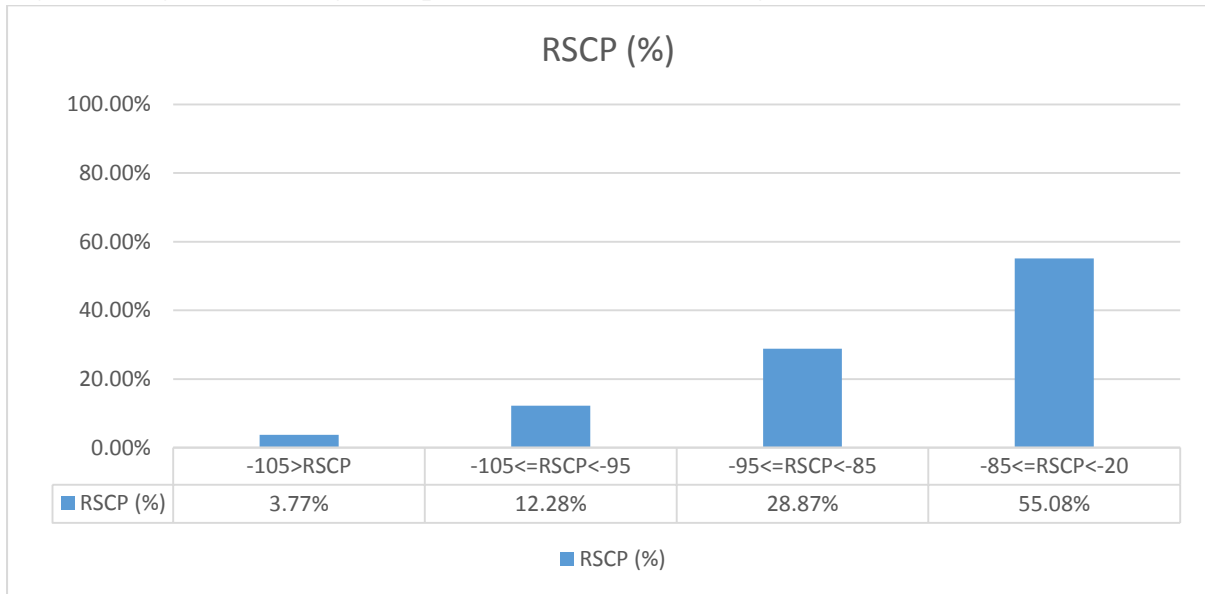
Fig. 128 - Vodafone 3G Coverage Samples Plot in the Ashanti Region



Remarks: Vodafone recorded its highest count of RSCP samples in the range $-85 \leq RSCP < -20$ dBm across most of the district areas tested.

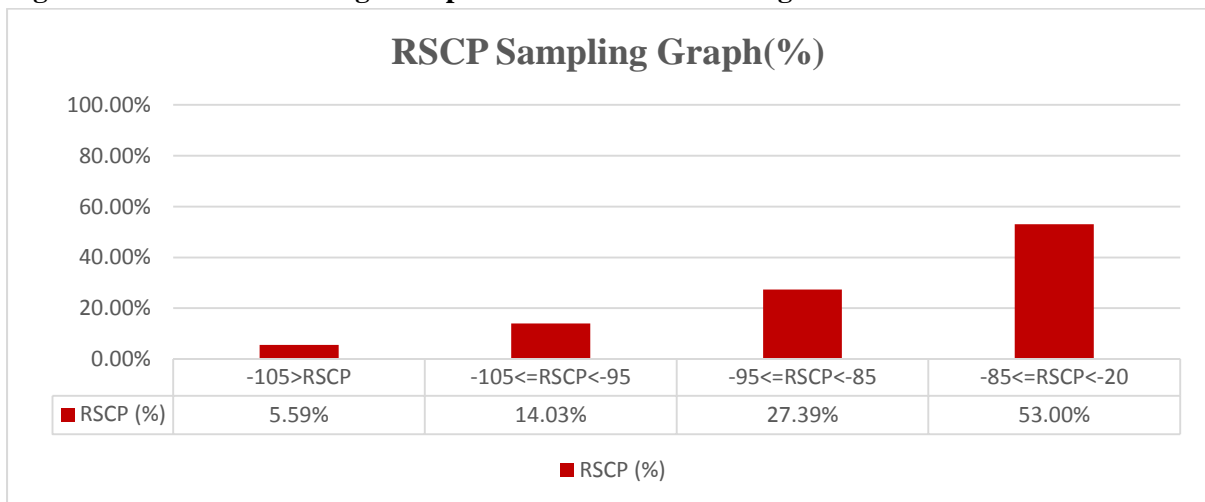
**3G COVERAGE ASSESSMENT OF CELLULAR MOBILE SERVICES IN ASHANTI REGION, –
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Fig. 129- Tigo 3G Coverage Samples Plot in the Ashanti Region



Remarks: Tigo recorded its highest count of RSCP samples in the range $-85 \leq RSCP < -20$ dBm across most of the district areas tested.

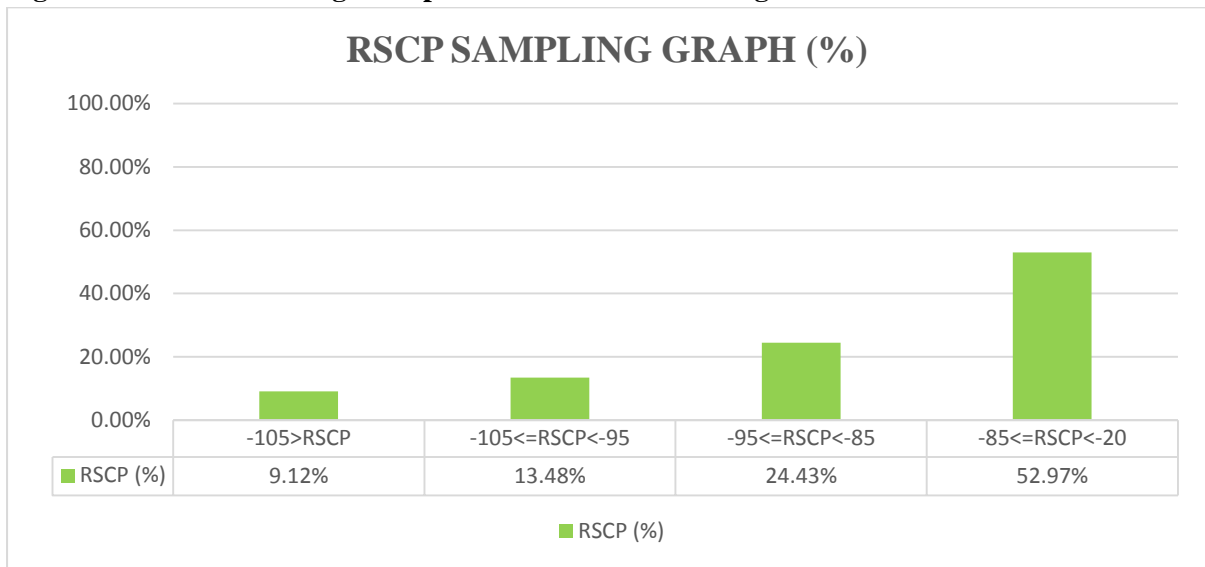
Fig. 130 - Airtel 3G Coverage Samples Plot in the Ashanti Region



Remarks: Airtel recorded its highest count of RSCP samples in the range $-85 \leq RSCP < -20$ dBm across most of the district areas tested.

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Fig. 131 – Glo 3G Coverage Samples Plot in the Ashanti Region



Remarks: Glo recorded its highest count of RSCP samples in the range $-85 \leq \text{RSCP} < -20$ dBm across most of the district areas tested.