Air Quality Systems East Africa
December 2025
Nairobi, Kenya

Contents

Executive Summary

This report details the technical maintenance activities and resultant outcomes conducted by AQS in collaboration with Nairobi City County. The fourth-quarter 2025 network maintenance for the city-owned air quality network, conducted over six days, followed a three-stage protocol involving data-driven desk-based analysis, physical device maintenance, and post-maintenance analysis. The initial analysis identified four primary fault categories: offline status (due to theft, vandalism, or obstruction), hardware failure, software/firmware issues, and communication deficiencies. Physical maintenance covered all fifty Low-Cost Sensor (LCS) sites, with substantial intervention required at 60% of locations, predominantly addressing hardware component malfunctions, communication/GPRS connectivity deficiencies, and firmware anomalies. Remedial actions included deploying the new firmware version 42.76, replacing or reformatting SD cards, and optimizing IoT SIM network profiles by setting Safaricom as the default roaming profile. The intervention successfully restored functionality to six of the seven offline devices, addressing varied causes including hardware failure, site obstructions, and two recorded incidents of vandalism requiring device retrieval or relocation.

In general, throughout the quarter, the air quality network experienced higher average weekly offline percentages (up to ~25%) before the maintenance period (mid-November). Post-maintenance, it generally remained lower, fluctuating between approximately 13% and 21%, with a notable low point immediately after maintenance. There is a clear and encouraging downward trend in the average weekly error margin throughout the entire quarter, starting from over 9µg/m3 in late September and consistently decreasing to around 4µg/m3 by late December. This suggests a continuous improvement in sensor data quality over time. The data completeness experienced a noticeable dip during the maintenance week, followed by a strong recovery in subsequent weeks, often surpassing pre-maintenance levels. The average intra-sensor error margin did not show an immediate impact during maintenance, continuing its general downward trend or remaining stable, suggesting maintenance primarily addressed connectivity rather than sensor calibration.

1.0 Introduction

Within the framework of the project "*Procurement and deployment of a comprehensive city-owned low-cost sensor AQ monitoring network"* in Nairobi City County Government, the Air Quality Systems East Africa (AQSEA) deployed 50 sensors across the county. The deployed devices provide near real-time data on particulate matter concentrations with sizes from PM2.5, and PM10 including temperature and humidity readings. The network has enabled tracking of the ambient emissions and understanding of the concentrations of pollutants, and informing the actions. This report provides insights on the performance of the devices and recommendations for optimizations wherever required.

1.1 General Recommendations

Air quality monitors require preventative maintenance every 6 months to prevent failures, limit unplanned downtime and ensure high data quality. It is generally recommended to perform both preventative and corrective maintenance. Critical components, such as sensing elements and batteries, should be replaced or serviced as needed. Maintenance activities will include firmware upgrades (to the latest software version), sensor replacement and cleaning, battery upgrades, solar panel upgrades (where applicable), and secure SD card data logging and backup.

Objective	Key results	Outcome
Restore the air quality sensor network to full operational status, ensuring all sensors are functioning correctly and providing accurate, reliable data within acceptable performance standards.	● Preventive maintenance: ○ Clean sensor filters for all devices. ● Corrective maintenance: ○ Sensing element replacement for all devices ○ Battery replacements for all critical devices. ○ Firmware upgrade for devices.	● Improved air quality monitoring to support awareness and policy engagement ● Improve uptime for device operation. ● Extended runtime on battery ● Improve charging, allowing for longer float periods.

2.0 Biweekly Network Performance

This is a comprehensive summary of the performance of the air quality monitoring devices over the specified period from 1st November 2025 to 20th November 2025 regarding data availability and quality.

2.1 Device Runtime

The devices are expected to provide data throughout the day and thus should be available 100% of the time for the selected period. Below is the availability of each device.

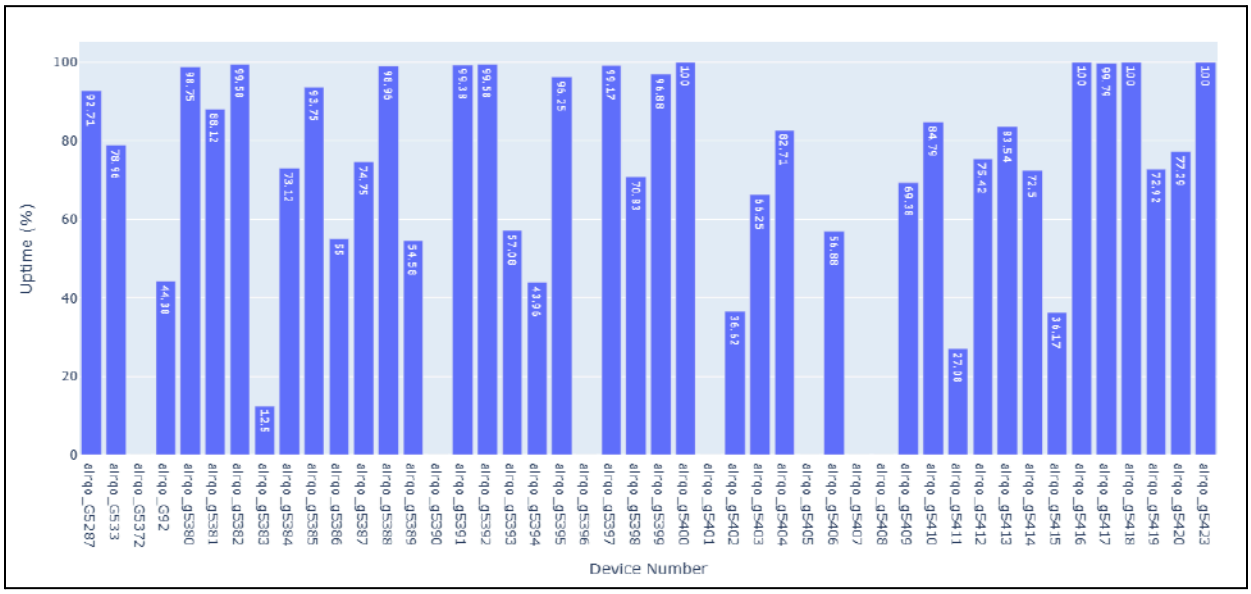
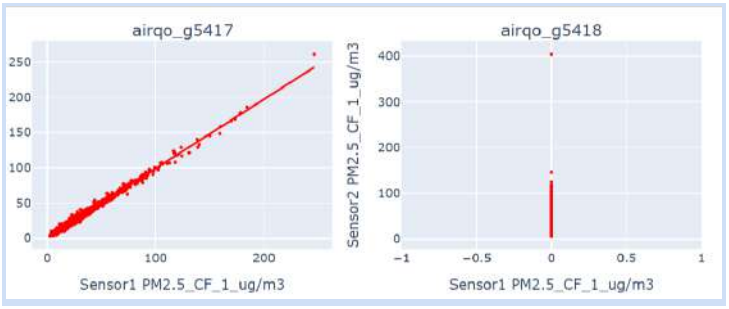


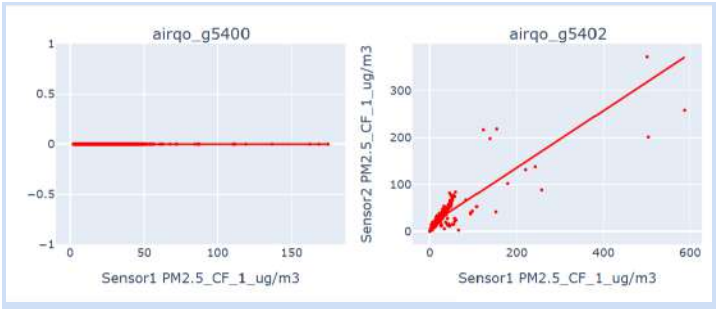
Figure 1. Network uptime trends before maintenance. This figure illustrates the device uptime two weeks before maintenance as a function of hours of the day with a record of entries transmitted by the device.

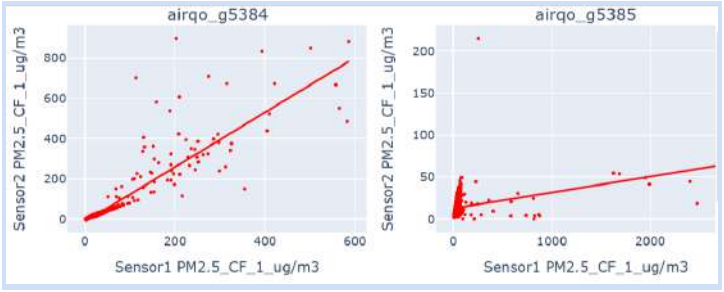
During the analysis period, 19 devices failed to meet the manufacturer's prescribed minimum uptime performance of 75%. Notably, seven of these devices were completely offline throughout the entire analysis period. The desk-based analysis focused on indicators of potential issues; for a comprehensive overview of the actual faults confirmed during subsequent site visits, please refer to Section 4 (Maintenance Activities) of this report.

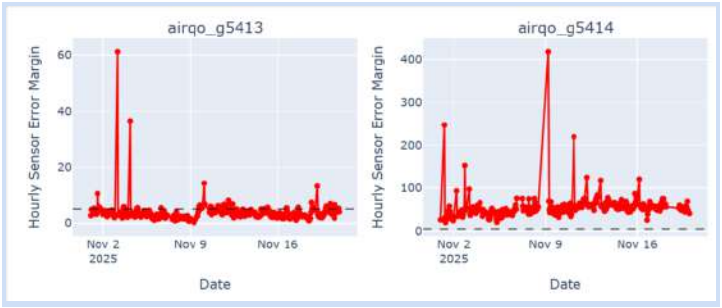
2.2 Performance Indicators

PM Sensors

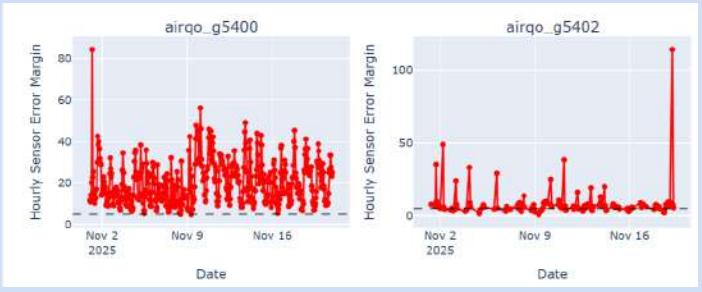


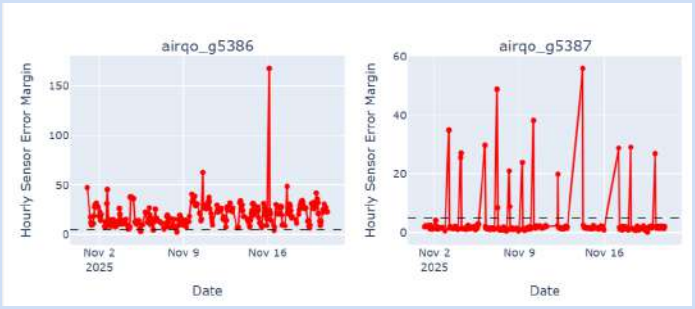




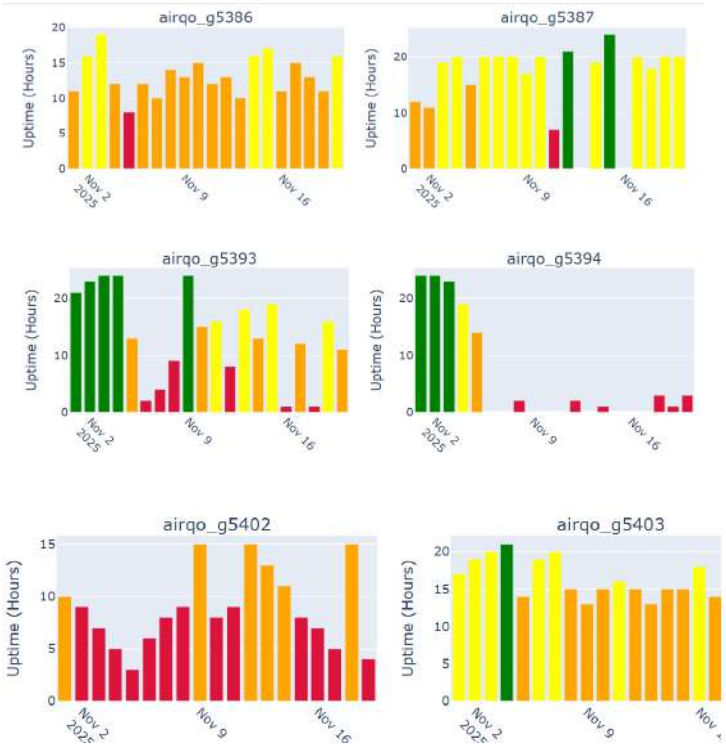


- Indicators:
  - Intra-sensor correlation
  - Average error margin
- Poor intra-sensor correlation - device AIRQO_G5400 and AIRQO_G5418 had a faulty sensor. Others such as AIRQO_G5402, AIRQO_G5384 and AIRQO_G5385 showed deteriorating intrasensor correlation.
- Error margin - devices AIRQO_G5386, AIRQO_G5387, AIRQO_G5400, AIRQO_G5402, AIRQO_G5413 and AIRQO_G5414 had error margin above 5.
- Preventive maintenance :
  - Blowing off dust from the sensor inlet
  - Clearing cobwebs from the inlet
- Corrective maintenance:
  - Replace PM sensors for AIRQO_G5400 and AIRQO_G5418

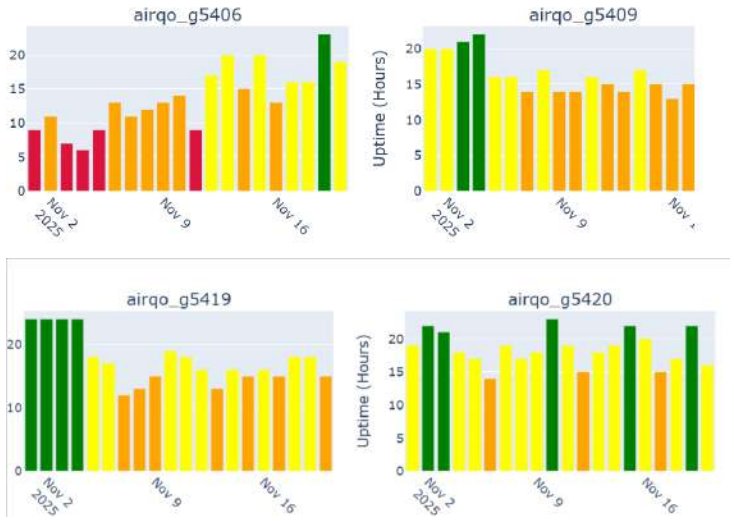




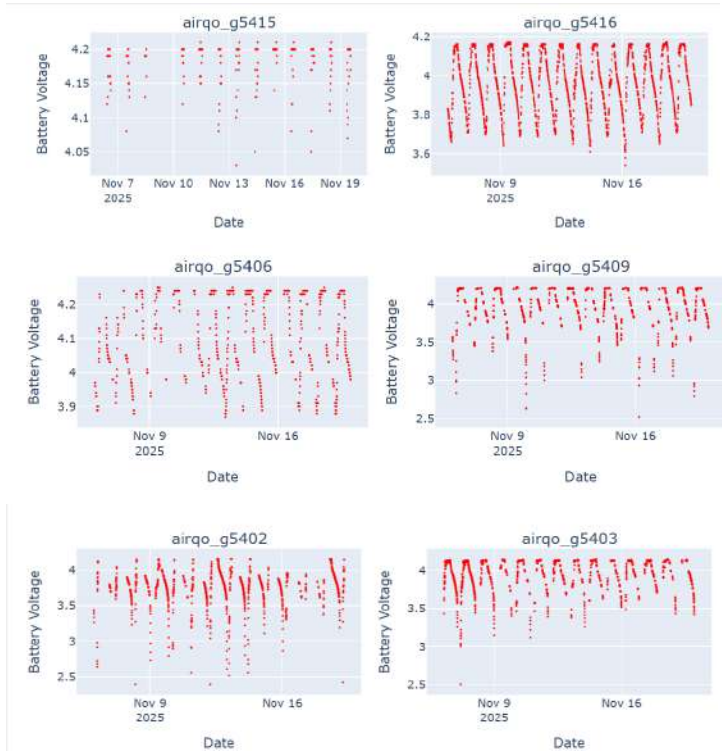
General Performance - Battery and Communication



- Daily active hours were used to understand how frequent the devices sent data. Approximately 10 devices had frequent outages with most of them active for at least 15 hours every day.
- Recommendations:
  - Review of the device communication and battery health to understand the frequency of the downtime
  - Firmware updates
  - Battery upgrades



Battery Health



- Several devices were flagged for communication and battery health issues - AIRQO_G5402, AIRQO_G5403, AIRQO_G5406, AIRQO_G5409 and AIRQO_G5415 had poor charge and discharge patterns. Issues related to solar charging or battery life.
- Recommendations:
  - Solar or battery check and replacement
  - GSM test and rectification for communication issues
  - Firmware update

3.0 Maintenance Activities

The comprehensive six-day preventive and corrective maintenance programme for the air quality network adhered to a rigorous three-stage protocol, encompassing a data-driven network analysis, physical maintenance execution, and subsequent post-maintenance repairs and analysis. The data-driven analysis was performed to accurately identify device malfunctions and categorize issues based on data trends for budgetary planning and the formulation of the maintenance strategy. Four primary categories of faults were identified through this analysis: offline status (attributable to theft and/or vandalism, loose connections, or site alterations such as new vegetative growth or building construction obstructing the devices), hardware failure (including casing, battery, PMS sensors, solar panels, mounting accessories, and SD Cards), software/firmware issues, and communication/GPRS network deficiencies (specifically relating to IoT SIM Cards).

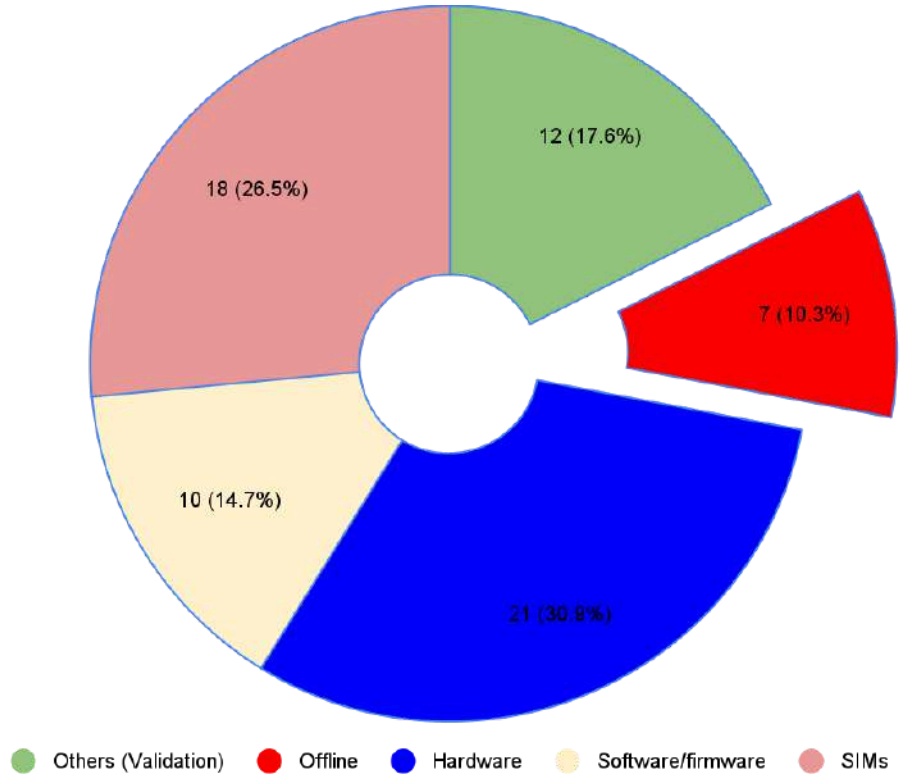


Figure 2. Categories of network issues. This figure shows the distribution of the recorded network issues as observed in the field. Note that some devices in the network had multiple issues and this count therefore does not reflect the total tally of locations visited.

Scheduled physical maintenance for the LCS air quality network involved inspection, on-site validation, and performance diagnostics across all fifty deployed sites. Preventive and corrective interventions were necessitated across at least 62% of the locations to re-establish optimal network functionality. The required interventions predominantly addressed three recurring

technical classifications: hardware component malfunctions, accounting for 21 instances, primarily associated with SD card failure issues; communication/ GPRS network connectivity deficiencies, totaling 18 instances related to inconsistent data transmission; and 10 instances of software/firmware anomalies. To augment network consistency and operational resilience, several critical remedial actions were executed. These actions involved the deployment of the most recent firmware (ver_42.76), which incorporates enhanced EEPROM protection designed to improve the reliability of Firmware Over The Air (FOTA) updates; comprehensive replacement and/or reformatting of compromised SD cards; and the optimization of IOT SIM network profiles, specifically by designating Safaricom as the default roaming profile to ensure more dependable data transmission.

Restoration of functionality was successfully completed for six out of seven devices that had gone offline. The causes for these outages varied, including hardware failure, site changes such as new buildings or vegetative growth obstructing sensors, and vandalism. Two incidents of device vandalism or removal were specifically recorded. In one case, the device had to be retrieved from the hosts, while the other required relocation to a more secure position within the same geographical area.

Below is a breakdown of the maintenance activities by date detailing the sites visited and corrective actions.

Day One (22/11/2025)

Location	Device ID	Issue(s)	Corrective Action(s)
Juja Primary School	AIRQO_G 5383	SD Card, Sensor & Firmware	SD Card replacement.
Githurai Secondary School	AIRQO_G 5396	SD Card & SIM Failure	New local Safaricom SIM inserted and SD Card replacement.
Hon John Njoroge Primary Sch	AIRQO_G 5386	One Sensor	Sensor replacement.
Njiru Health Centre	AIRQO_G 5403	Transmission/Communication	Roaming changed to Safaricom from Kencel.
Ushirika Primary School	AIRQO_G 5394	SD Issue	SD Card replaced & Roaming changed to Safaricom from Kencel
Tom Mboya Primary School	AIRQO_G 5400	One Sensor	Sensor replaced.
Dr. Mwenje Secondary School	AIRQO_G 5390	Vandalism Attempt & device removed	Device scheduled for recovery and redeployment.

Day Two (23/11/2025)

Location	Device ID	Issue(s)	Corrective Action(s)
Thawabu Primary School	AIRQO_G5 405	SD Card & Network	Firmware Update, GSM Voltage adjusted to 4.20V.

Mukuru Health Centre	AIRQO_G5416	Low Uptime	Firmware Update to 42.75.
Mukuru Community Centre	AIRQO_G5407	SD Card & 1 Sensor	SD Card & sensor replaced, Firmware Update to 42.75, GSM Voltage 3.5V to 4.2V$. Noted solar shading issue for next visit.
Langata Primary School	AIRQO_G5414	SD Card & Network	Firmware Update to 42.75, SD Card replaced & Network defaulted to Safaricom.
Ayany Primary School	AIRQO_G5404	SD Card & Network	SD Card replaced, Firmware Update to 42.75, Network defaulted to Safaricom.
Lavington Primary School	AIRQO_G5408	SD Card Missing, Network Jam	SD Card inserted, GSM 4.2V, Network defaulted to Safaricom, Firmware Update to 42.75. Posted.

Day Three (24/11/2025)

Location	Device ID	Issue(s)	Corrective Action(s)
Mutuini Primary School	AIRQO_G5384	Stopped Posting due to software attack	Reprogrammed, Firmware Update to 42.76 (with EEPROM protection).
Mbagathi Way Primary School	AIRQO_G5420	SD Card & Network (Kencel Roaming)	SD Card replaced, GSM Voltage 4.11V to 4.20V. The network defaulted to Safaricom.
Buruburu I Primary School	AIRQO-G533 UNIT ACTIVE	Poor uptime & Network roaming on Kencel	Firmware Update to 42.75, GSM 4.19V. The network defaulted to Safaricom.
Nairobi River Primary School	AIRQO_G5287	Poor uptime & Network roaming on Kencel	Firmware Update to 42.75, GSM 4.2V. The network defaulted to Safaricom.
Hon Dr. Mwenje High Sch	AIRQO_G5390	Device recovery (Security)	Device recovered. Firmware updated to 42.75. Allocating a new site ID from County Officials.
Heidemarie Primary School	AIRQO_G5390	Installation (Recovered Unit)	Device installed at a new location (security light post). Firmware 42.75, GSM 4.2V. Coordinates noted.

Day Four (25/11/2025)

Location	Device ID	Issue(s)	Corrective Action(s)

Cheleta Primary School	AIRQO_G5385	Poor uptime, Sensors & SD Failure	SD Card replaced, Firmware Update to 42.76 & Two sensors replaced.
Githurai Secondary School	AIRQO_G5396	SIM Card Malfunction	Local Safaricom SIM installed. Firmware Update to 42.76.
Kasarani Primary School	AIRQO_G5406	Poor uptime & SD card Failure	Firmware Update to 42.76, SD card formatted and inserted successfully.
Mihango Primary School	AIRQO_G5398	Roaming Network (Kencell Default)	Roaming moved to default Safcom. Firmware 42.76, SD card formatted.
Tumaini Primary School	AIRQO_G5402	Communication (Kencell Roaming)	Roaming changed to Safcom. Firmware 42.76, SD card formatted.

Day Five (26/11/2025)

Location	Device ID	Issue(s)	Corrective Action(s)
New Kuhumbuini Primary School	AIRQO_G5384	Poor uptime & SD card Failure	SD Card formatted, Firmware 42.76.
Karura Forest Primary School	AIRQO_G5381	Poor uptime & SD card Failure	SD Card formatted, Firmware 42.76.
Valley Bridge Primary School	AIRQO_G5389	Poor uptime & SD card Failure	Firmware 42.76, SD card formatted.
Martin Luther Primary School	AIRQO_G5423	Poor uptime & SD card Failure	Firmware 42.76, SD card formatted and inserted successfully.
Kiwanja Primary School	AIRQO_G5388	Poor uptime	Firmware 42.76.
Drumvale Primary School	AIRQO_G5412	SD card Failure & Kencel Roaming	SD card replaced. Roaming default to Safaricom. Firmware updated to 42.76.
Highway Manyatta Comprehensive School	AIRQO_G5413	SD card Failure & Kencel Roaming	SD card replaced. Roaming default to Safaricom. Firmware updated to 42.76.

Day Six (27/11/2025)

Location	Device ID	Issue(s)	Corrective Action(s)
ST. Mary's Karen Primary School	AIRQO_G5418	Loose Sensor, Low GSM voltage,	Sensor connection fixed. GSM 3.89 to 4.23V. Firmware 42.76. Note: Roaming on Kencel though performing well
Riruta Satellite Primary School	AIRQO_G5393	Poor uptime & Kencel Roaming	Firmware 42.76, SD card formatted.

ST. Georges Primary School	AIRQO_G 5414	Sensor, SD card Failure & Kencel Roaming	Sensor & formatted and inserted successfully. Firmware 42.76.
Uhuru Gardens Primary School	AIRQO_G 5409	SD Card Missing, Kencel Roaming	SD card inserted. Firmware updated to 42.76. Roaming network default to Safaricom
Nairobi West Day Nursery School	AIRQO_G 5410	Firmware update	Device not maintained (Access failure - gate locked, contact unreachable).
Fire Station (Tom Mboya)	AIRQO_G 5329 AIRQO_G 5338	Devices/Structure Vandalized	Casing, mountings, solar panels replaced. Firmware 42.76.

3.1 Key Problem Areas and Corrective Actions

Category	**Frequency**	**Action**	**Details**
SD Card Issues	High (21)	Replacement or Formatting	Normal maintenance procedure.
Network/Communication (SIM, Roaming, Transmission)	High (18)	Network Default Change	13 devices changed to or set as default Safaricom (from Kencel). 1 new Safcom SIM card deployed.
Inconsistent Data/Posting Failure	Medium (10)	Firmware Update, Network/SD fix	Firmware update from 42.74 to 42.75 or 42.76.
Sensor Issues (Faulty, Loose)	Low (4)	Sensor Replacement/Connection Fix	3 devices required sensor replacement.
Vandalism/Security	Low (3)	Recovery, Relocation, Component Replacement	Two incidents of removal/vandalism requiring recovery and structural replacement.
GSM Voltage	General Check	Adjustment to $4.20V - 4.24V$	To optimize GSM performance.

4.0 Performance Analysis

Device performance two weeks after maintenance (27th November 2025 - 11th December 2025) involved analysis of battery charge-discharge curves, intra-sensor correlation, and average hourly data points to quantify uptime. The graphs below show the uptime (calculated as a percentage of number of hours device was actively collecting and transmitting data), sensor health (calculated as a percentage of devices with desired sensor correlation and optimal error margins) and battery health (calculated as a percentage of online devices with optimal battery charge and discharge curves).

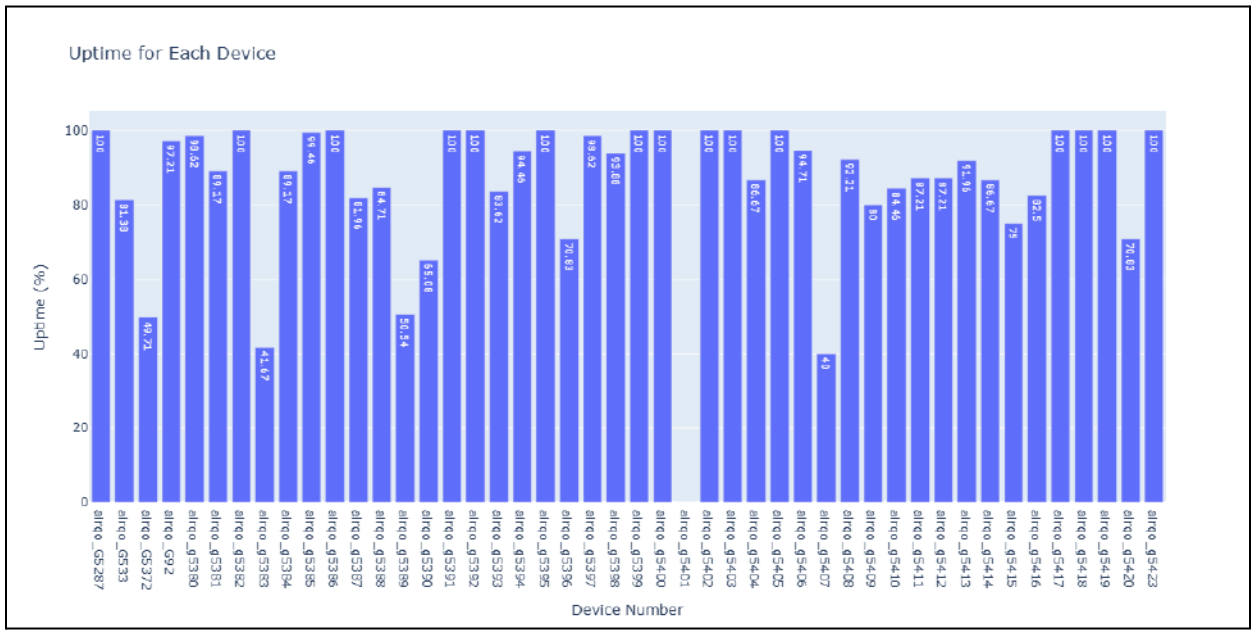


Figure 3. Network uptime trends after maintenance. This figure illustrates the device uptime two weeks after maintenance as a function of hours of the day with a record of entries transmitted by the device. Note that only one device in the network remained offline after maintenance due to location access restrictions.

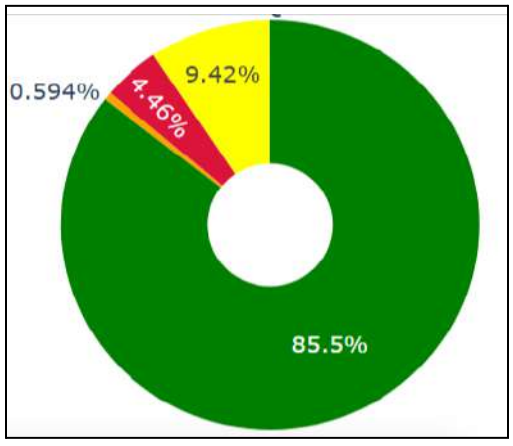


Figure 4a. Network sensor health

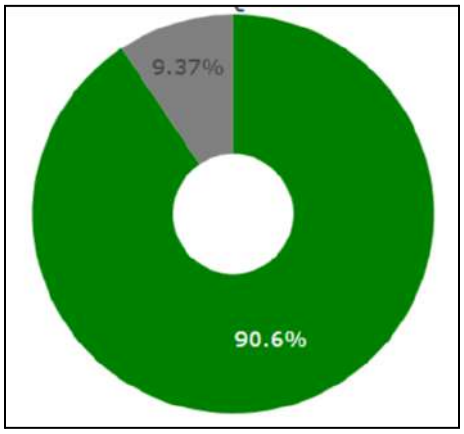


Figure 4b. Network battery health

Observations:

- Improved battery performance with over 90% of the network having optimal performance in relation to charge and discharge status of the batteries.
- Over 88% average network uptime corresponding to at least 85% data availability.
- High intra-sensor correlation and low error margins with over 85% of the network having ideal sensor health (error margin less than 5ug/m3 and correlation above 98.5%)
- The new firmware update improves overall battery performance and device uptime. Firmware update with 100% SPV setting leads to reduction in hourly data points. Observed drop from over 40 to 20 data points reported per hour.
- Only 1 device remained offline because of a restricted site access issue.

5.0 Quarterly Network Outlook

We analysed the network performance over the quarter using raw datasets (raw vs calibrated) to effectively plan for future management. In this analysis, we look at the network performance in terms of overall uptime (# hours in a day when the device transmits data), data quality (error margin representing the average difference between PM sensor 1 and PM sensor 2 since each device is equipped with 2 sensors) and completeness (# daily data points transmitted by the network). This analysis however does not include device level parameters which is conducted on a biweekly basis. Below is the quarterly summary of the network performance.

5.1 Quarterly Trends and Maintenance Impact

Figure 5 below shows the average daily offline percentage and error margin of the LCS. The network experienced higher average weekly offline percentages (up to ~25%) before the maintenance period (mid-November). Post-maintenance, it generally remained lower, fluctuating between approximately 13% and 21%, with a notable low point immediately after maintenance.

There is a clear and encouraging downward trend in the average weekly error margin throughout the entire quarter, starting from over 9µg/m3 in late September and consistently decreasing to around 4µg/m3 by late December. This suggests a continuous improvement in sensor data quality over time.

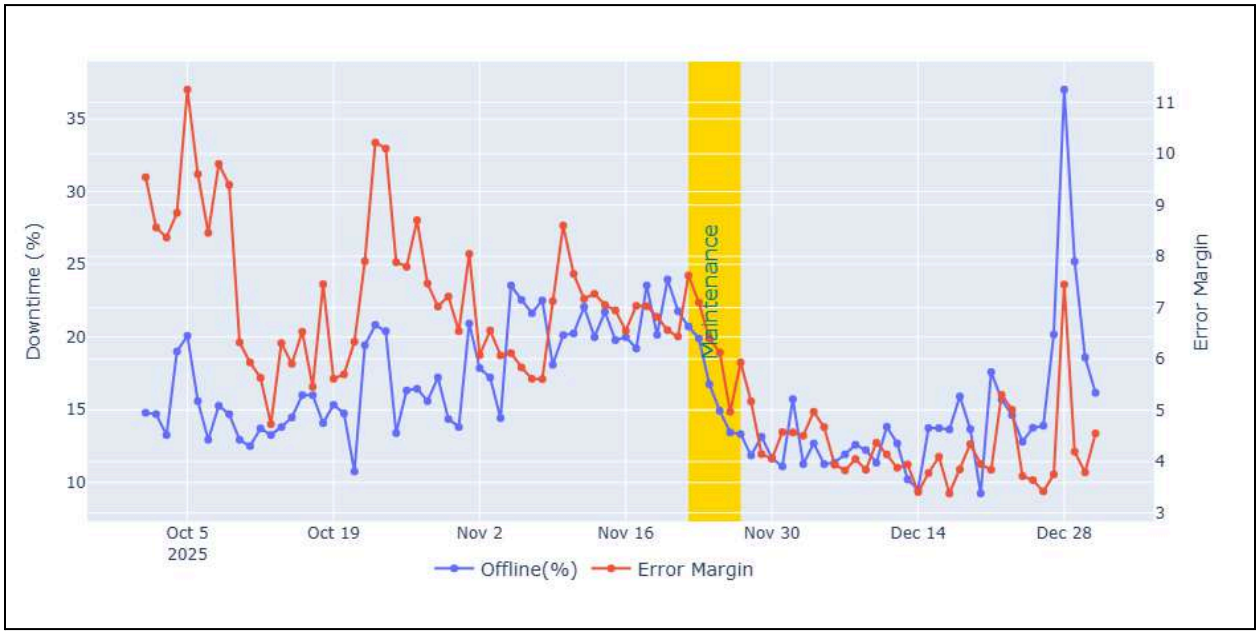


Figure 5. Average daily network downtime and intra-sensor error margin. The first axis of this figure illustrates the network daily offline status calculated as a percentage of hours in the day when a device fails to transmit a single data point. The second axis on the right is the mean intra-sensor error margin of the network computed as from the difference in readings between each of the two sensing elements onboard each device.

Correspondingly, the "Total Weekly Entries" (representing data completeness or activity) as shown in the figure 6 below experiences a noticeable dip during the maintenance week, followed by a strong recovery in the subsequent weeks, often surpassing pre-maintenance levels. This signifies a successful resumption of data collection.

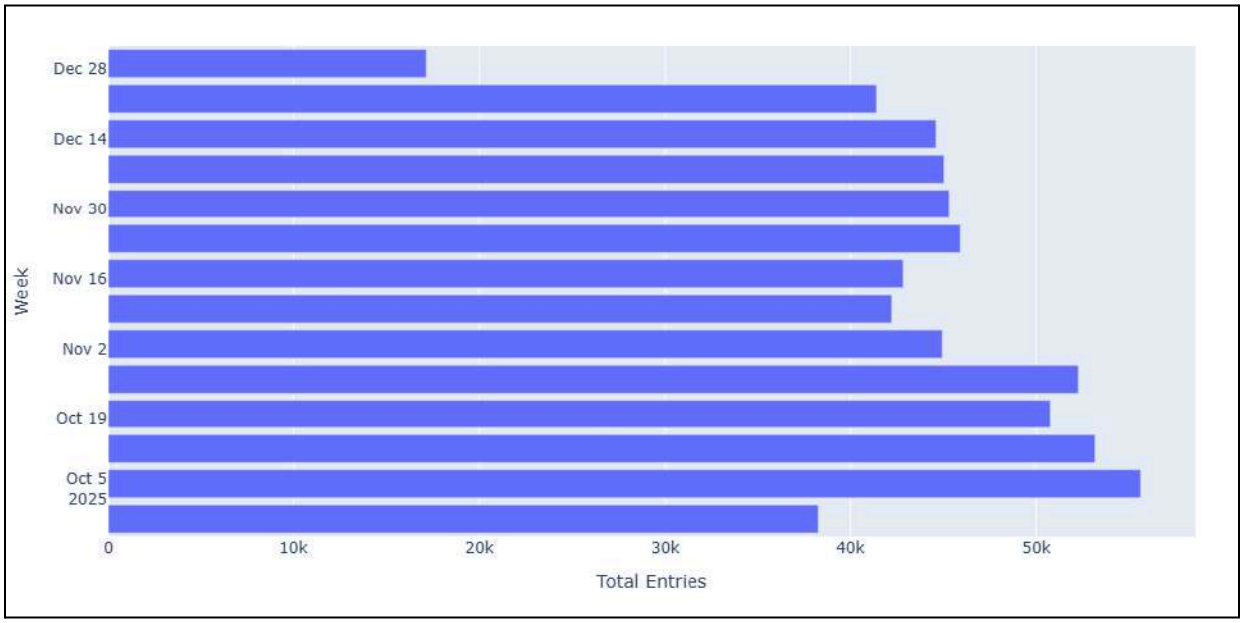


Figure 6. Total weekly count of data entries recorded by the devices on the network. This figure shows a count of the weekly data points transmitted by the device in the 4th quarter of 2025. Note that a device is expected to post at least 1 entry every hour for it to be considered active on the network but ideal cases range from 6 to 30 entries per hour.

An inverse relationship is generally observed between the average weekly offline percentage and total weekly entries as shown on figure below. Before maintenance, as total entries decreased, offline percentage tended to increase. Critically, after maintenance, the sharp recovery in total weekly entries is strongly associated with a sustained lower average weekly offline percentage. This indicates that better network uptime directly contributes to more data being collected.

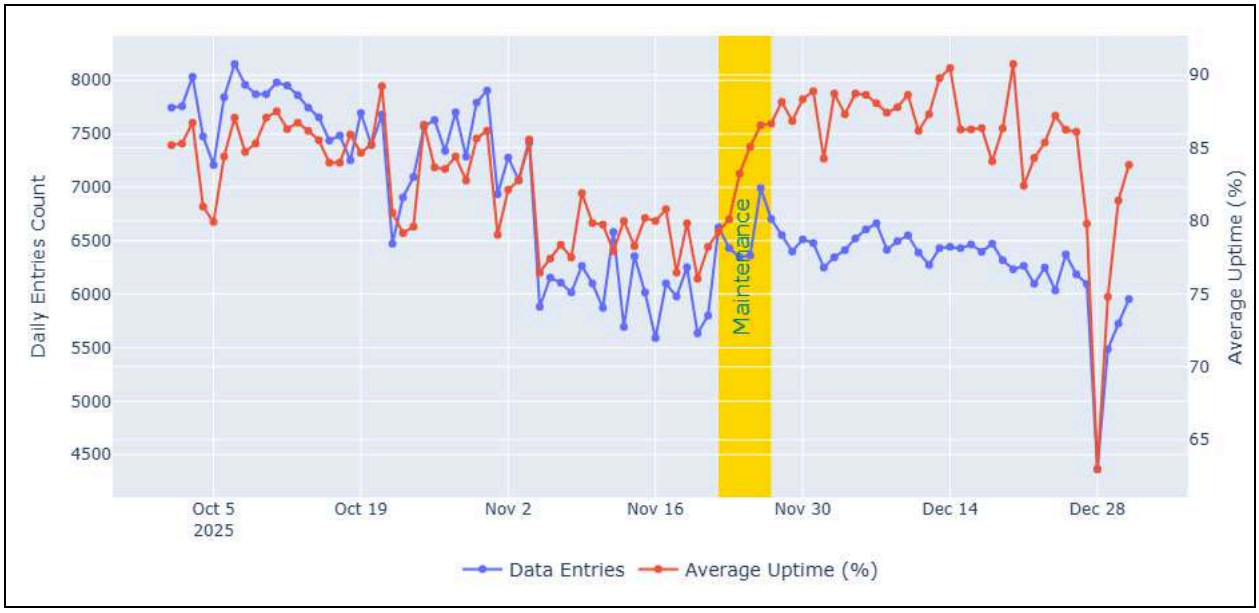


Figure 7. Average daily network uptime and total daily entries. The first axis of this figure illustrates the network daily count of entries transmitted by all active devices in the network. The second axis on the right is the mean daily uptime for the network computed as a mean of the percentage of total daily active hours for all devices in the network. Note that the computation considers both online and offline devices in the network with offline devices recorded as 0% uptime. The manufacturer recommends at least 85% daily uptime per device.

Based on figure 7, there was a decline in both uptime and total entries recorded across the network between 27 and 30 December. The manufacturer acknowledged the issue experienced across the network was due to high latency in IoT SIM card roaming. Since all the devices in the network are equipped with international IoT simcards, latency issues primarily result from home-routed roaming, where data from the devices in Nairobi is transmitted back to the SIM card operator's network before reaching the device cloud storage used by the device manufacturer. Besides, it was also noted during maintenance that the IoT SIM card roaming profiles in selected regions of the city defaulted to suboptimal network choice with weak signals forcing data transmission retries leading to failure in some cases.

5.2 Impact of Maintenance

A significant drop in the average weekly offline percentage was observed during the week of 2025-11-24, indicating improved network availability. The "Total Weekly Entries" (data completeness) experienced a noticeable dip during the maintenance week, followed by a strong recovery in subsequent weeks, often surpassing pre-maintenance levels. The average error margin did not show an immediate dramatic impact during maintenance, continuing its general downward trend or remaining stable, suggesting maintenance primarily addressed connectivity rather than sensor calibration.

6.0 Recommendations

1. **Hardware Vulnerability - SD Cards**

SD card issues remain the most frequent point of failure. However, this does NOT suggest a potential issue with the operation of the current SD cards. SD card check and replacement is one of the routine processes of maintenance. Only a few SD cards were noted as corrupted (disposed) but the majority required only formatting for successful operation.

2. **Network Standardization and Optimization**

A deliberate shift towards the Safaricom network was implemented in the majority of the sites/devices to resolve communication and roaming profile issues with Kencel/Airtel. However, a note at St. Mary's Karen suggests Kencel may be more reliable in specific areas.

- Continuous monitoring data completeness for all sites to map out grid-level network strengths. A regional network profile should be considered for optimal performance. In case of persisting network issues as noted, replacement of international IoT SIM cards with local (Safaricom or Airtel) for all the devices to eliminate the aspect of roaming network is recommended.

3. **Firmware Upgrade (Version 42.76)**

The new firmware version 42.76 was successfully deployed to the majority of the devices (20 locations). This is a significant preventive measure against future configuration failures and data loss.

- Plan for the remaining devices running version 42.75 (6 locations) to be upgraded to version 42.76 during the next maintenance cycle.

4. **Network Security**

Two sites experienced security issues (vandalism/removal), leading to component replacement at the Fire Station and device recovery/relocation from Hon Dr. Mwenje High School to Heidemarie Primary School.

- Nairobi City County and AQS officials to sensitize and create clear communication channels with the administrations or security personnel at the hosting sites for quick intervention and recovery of devices in such similar cases.

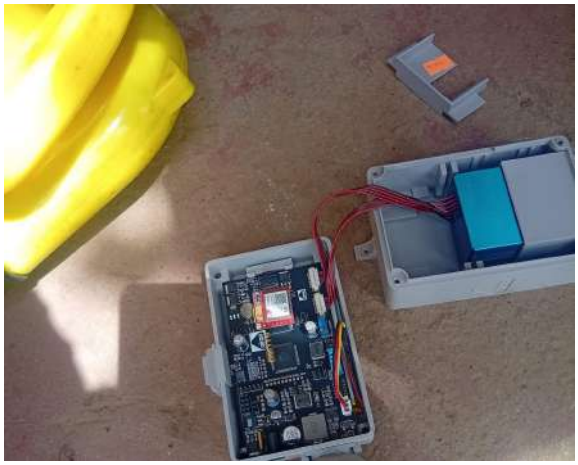
- At Mukuru Community Centre, the device should be relocated to a more optimal location with the facility because of the encroaching Solar-shading from a nearby wall. This has affected the battery cycle and uptime of the device.

7.0 Appendices

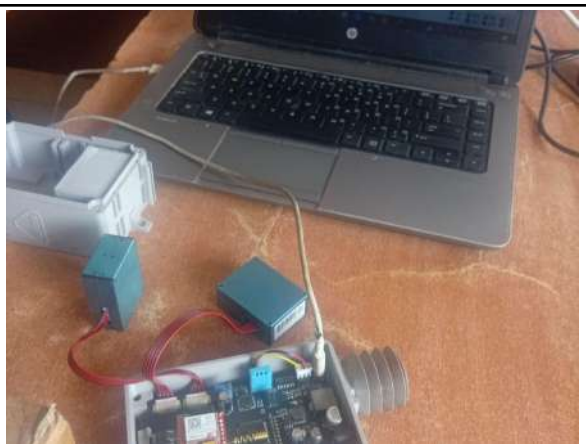
SITE SPECIFICATIONS	
SITE NAME	Tom Mboya Primary Sch Dandora Phase3
SITE NUMBER/ID	AQ_G5400
MAINTENANCE DETAILS:	
DATE: 23/11/2025	
REPORTED ISSUE	One Sensor failure
INTERVENTIONS & ACTION	Sensor Replacement
STATUS	Battery, GSM, Roaming network (Safaricom), and firmware were all confirmed as OKAY. Device posted well on thingspeak
SITE PHOTOGRAPHS	

RECOMMENDATIONS:
Consider Firmware Update to 42.76 in the next visit.

SITE SPECIFICATIONS	
SITE NAME	Hon John Njoroge Primary School
SITE NUMBER/ID	AQ_G5386
MAINTENANCE DETAILS:	
DATE: 23/11/2025	
REPORTED ISSUE	One Sensor failure
INTERVENTIONS & ACTION	Sensor Replacement
STATUS	Battery, GSM, Roaming network (Safaricom), and firmware were all confirmed as OKAY. Device posted well on thingspeak

SITE PHOTOGRAPHS
 
RECOMMENDATIONS: Consider Firmware Update to 42.76 in the next visit.

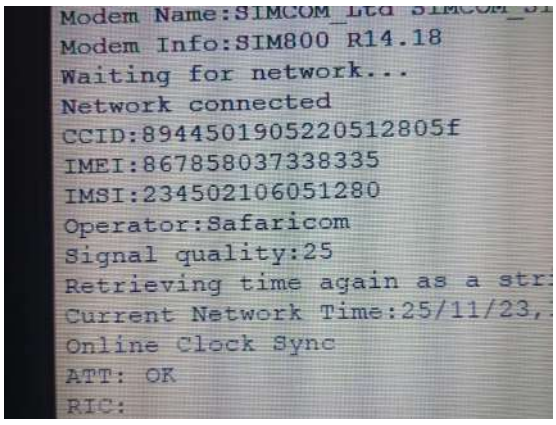
SITE SPECIFICATIONS	
SITE NAME	Mukuru Community Centre
SITE NUMBER/ID	AQ_G5407
MAINTENANCE DETAILS:	
DATE: 23/11/2025	
REPORTED ISSUE	SD Card & 1 Sensor
INTERVENTIONS & ACTION	SD Card & sensor replaced, Firmware Update to 42.75, GSM Voltage 3.5V to 4.2V$.
STATUS	Battery, GSM, Roaming network (Safaricom), and firmware were all confirmed as OKAY. Device posted well on thingspeak
SITE PHOTOGRAPHS	



RECOMMENDATIONS: Noted solar shading issue for next visit.

SITE SPECIFICATIONS	
SITE NAME	Mukuru Health Centre
SITE NUMBER/ID	AQ_G5416
MAINTENANCE DETAILS:	
DATE: 23/11/2025	
REPORTED ISSUE	Low Uptime
INTERVENTIONS & ACTION	SD Card formatted, Firmware Update to 42.75, GSM Voltage at 4.2V.
STATUS	Battery, GSM, Roaming network (Safaricom) all confirmed as OKAY. Device posted well on thingspeak

SITE PHOTOGRAPHS



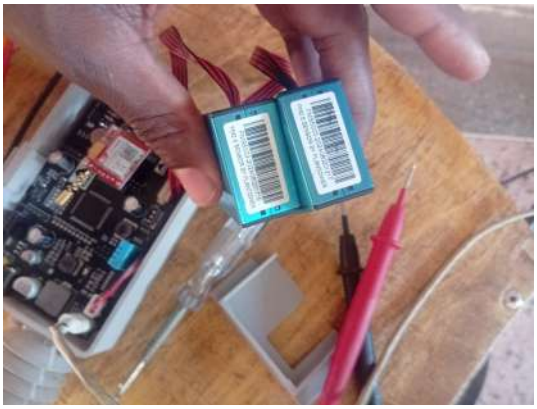
RECOMMENDATIONS: Noted solar shading issue for next visit.

SITE SPECIFICATIONS	
SITE NAME	Langata Road Primary School
SITE NUMBER/ID	AQ_G5411
MAINTENANCE DETAILS:	
DATE: 23/11/2025	
REPORTED ISSUE	SD card issue and difficulty with roaming network selection (Kencel as default)
INTERVENTIONS & ACTION	Firmware Update to 42.75, SD Card replaced & Network defaulted to Safaricom
STATUS	The battery and GSM Module were functioning correctly. The device connected successfully on Thingspeak.
SITE PHOTOGRAPHS	

RECOMMENDATIONS:
…….

SITE SPECIFICATIONS	
SITE NAME	Ayany Primary School
SITE NUMBER/ID	AQ_G5404
MAINTENANCE DETAILS:	
DATE: 23/11/2025	
REPORTED ISSUE	SD card issue and network
INTERVENTIONS & ACTION	Firmware Update to 42.75, SD Card replaced
STATUS	The battery and GSM Module were functioning correctly. The roaming network defaulted to Safaricom. The device connected successfully on Thingspeak.

SITE PHOTOGRAPHS

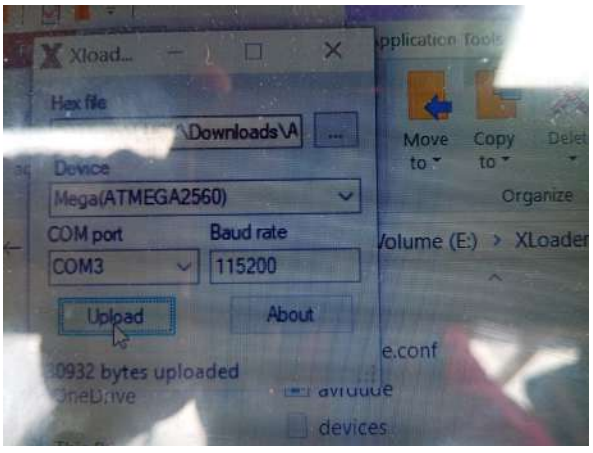


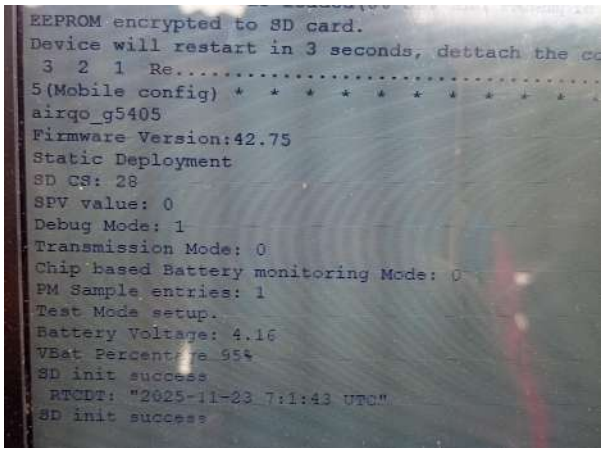
RECOMMENDATIONS:

……

SITE SPECIFICATIONS	
SITE NAME	Thawabu Primary School
SITE NUMBER/ID	AQ_G5405
MAINTENANCE DETAILS:	
DATE: 23/11/2025	
REPORTED ISSUE	SD card issue and difficulty with roaming network selection (Kencel as default)
INTERVENTIONS & ACTION	The device received a comprehensive Firmware Update to V42.75. The GSM Voltage was adjusted to 4.20V, and the roaming network set to a default of Safaricom.
STATUS	The battery and GSM Module were functioning correctly.

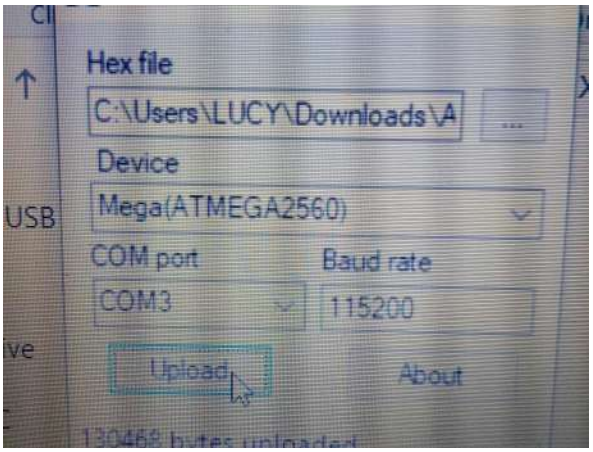
SITE PHOTOGRAPHS

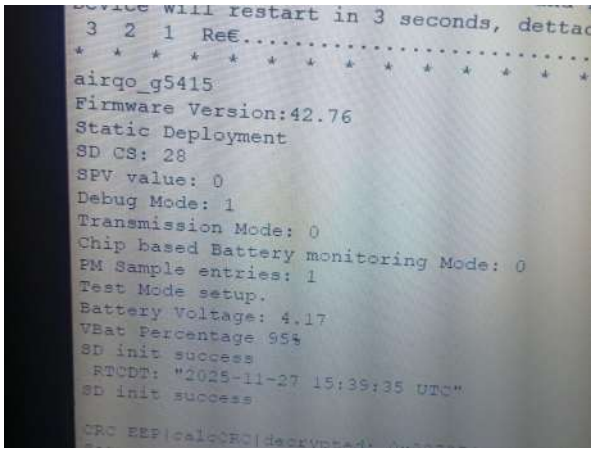




RECOMMENDATIONS: ……..

SITE SPECIFICATIONS	
SITE NAME	Westlands Primary School
SITE NUMBER/ID	AQ_G5415
MAINTENANCE DETAILS:	
DATE: 23/11/2025	
REPORTED ISSUE	Roaming network issue (device defaulted to Kencell). GSM Voltage at 3.75
INTERVENTIONS & ACTION	The roaming network setting was set to a default of Safaricom. The firmware updated to the v42.76 version. GSM Voltage adjusted to 4.20V. SD card formatting was successful, and the device posted data successfully
STATUS	Battery, SD Card were noted okay.
SITE PHOTOGRAPHS	

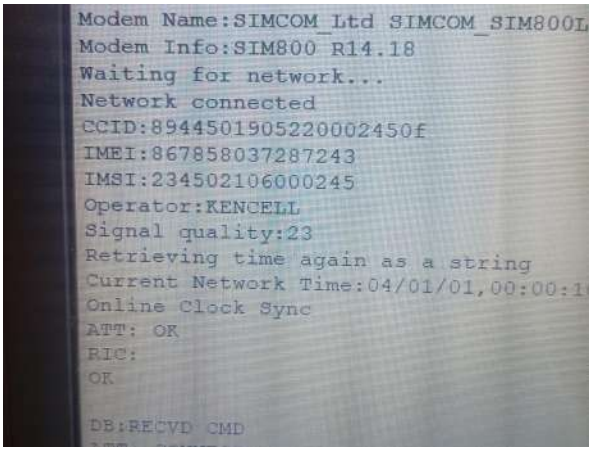




RECOMMENDATIONS: Installation .

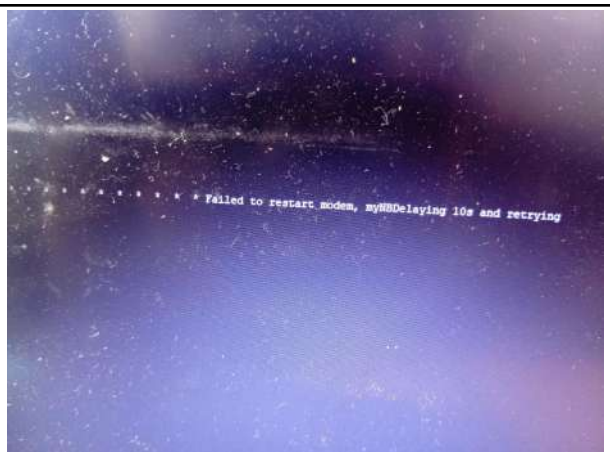
SITE SPECIFICATIONS	
SITE NAME	Mihango Primary School
SITE NUMBER/ID	AQ_G5398
MAINTENANCE DETAILS:	

DATE: 23/11/2025	
REPORTED ISSUE	Roaming network issue (device defaulted to Kencell).
INTERVENTIONS & ACTION	The roaming network setting was set to a default of Safaricom. The firmware updated to the v42.76 version. SD card formatting was successful, and the device posted data successfully
STATUS	Battery, SD Card, and GSM Voltage (confirmed at 4.24V) were noted okay.
SITE PHOTOGRAPHS	



RECOMMENDATIONS: Installation .

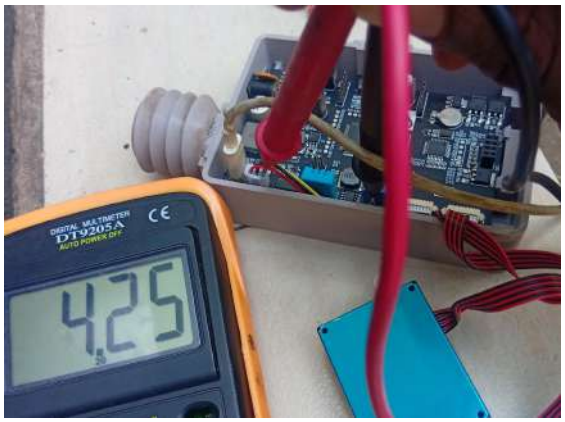
SITE SPECIFICATIONS	
SITE NAME	Ushirika Primary School
SITE NUMBER/ID	AQ_G5394
MAINTENANCE DETAILS:	
DATE: 23/11/2025	
REPORTED ISSUE	SD card issue and difficulty with roaming network selection (Kencel as default).
INTERVENTIONS & ACTION	The SD card was replaced. The roaming network was changed from Kencel to a default of Safaricom network
STATUS	Battery, GSM Module (Voltage 4.2V), and firmware (42.75) were verified as fully functional.
SITE PHOTOGRAPHS	

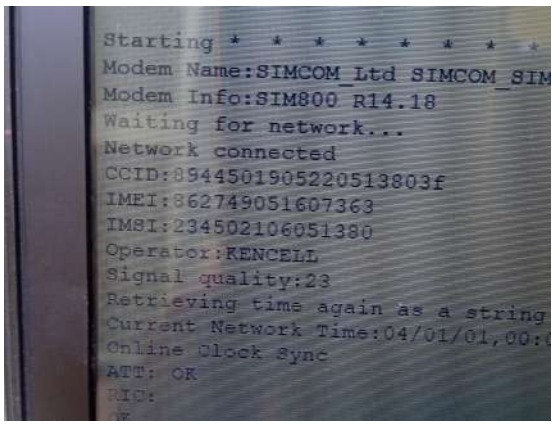


RECOMMENDATIONS:
Installation

SITE SPECIFICATIONS	
SITE NAME	Buruburu 1 Primary School
SITE NUMBER/ID	AQ_G533
MAINTENANCE DETAILS:	
DATE: 23/11/2025	
REPORTED ISSUE	Inconsistent data posting, linked to a default Kencel roaming profile (Network).
INTERVENTIONS & ACTION	Firmware Update to v42.75, and the GSM Voltage was confirmed at 4.19V. The roaming network was set default to Safaricom.
STATUS	Battery and SD card were verified as functional

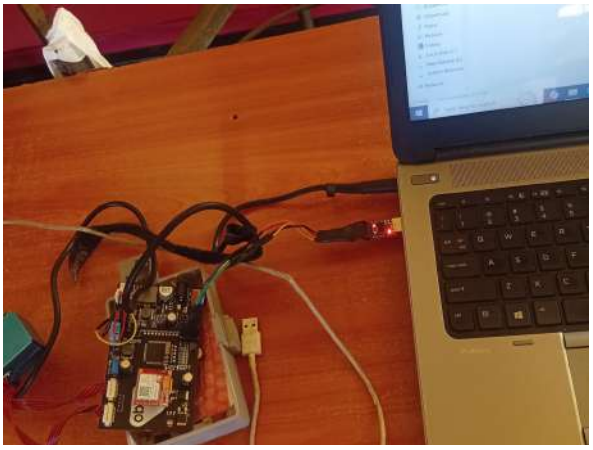
SITE PHOTOGRAPHS

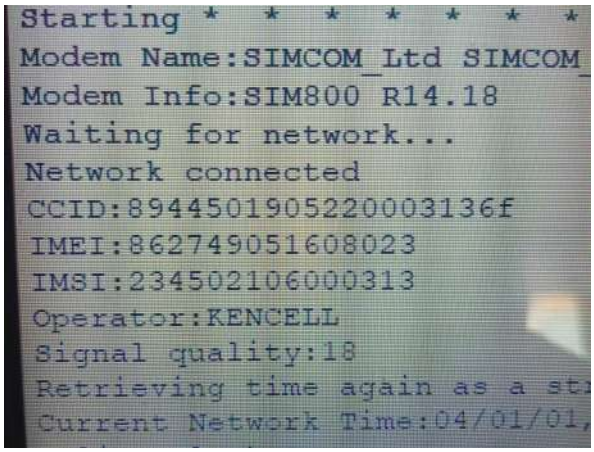




RECOMMENDATIONS: Installation

SITE SPECIFICATIONS	
SITE NAME	Nairobi River Primary School
SITE NUMBER/ID	AQ_G5287
MAINTENANCE DETAILS:	
DATE: 23/11/2025	
REPORTED ISSUE	Inconsistent data posting, linked to a default Kencel roaming profile (Network).
INTERVENTIONS & ACTION	Firmware Update to v42.75, and the GSM Voltage was confirmed at 4.19V. The roaming network was set default to Safaricom.
STATUS	Battery and SD card were verified as functional
SITE PHOTOGRAPHS	

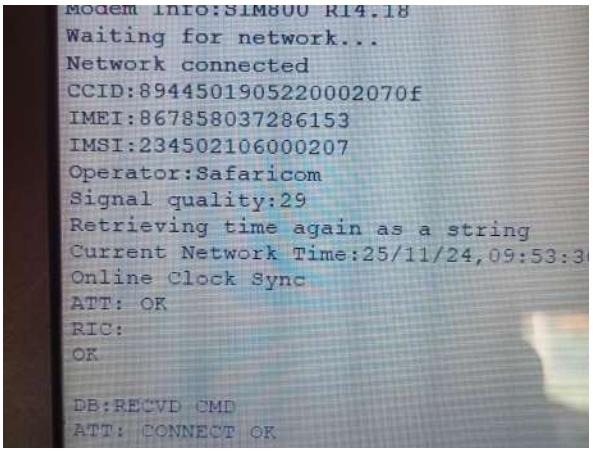


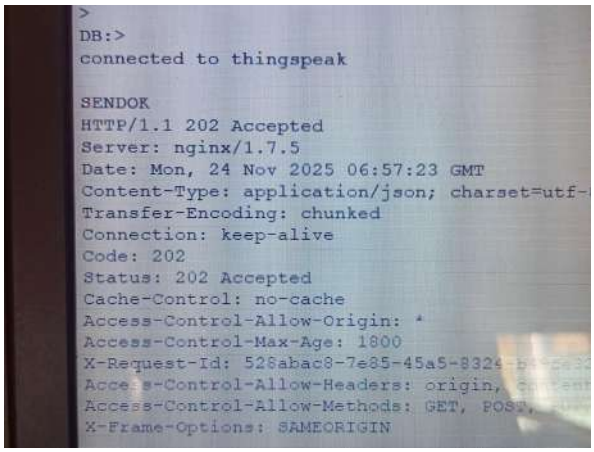


RECOMMENDATIONS: SIM network signal strength is low. Use local SIM (Safaricom)

SITE SPECIFICATIONS	
SITE NAME	Dr. Mwenje Primary School
SITE NUMBER/ID	AQ_G5390
MAINTENANCE DETAILS:	
DATE: 23/11/2025	
REPORTED ISSUE	The device had been removed following a security alert concerning its safety
INTERVENTIONS & ACTION	All components were verified as functional upon inspection.

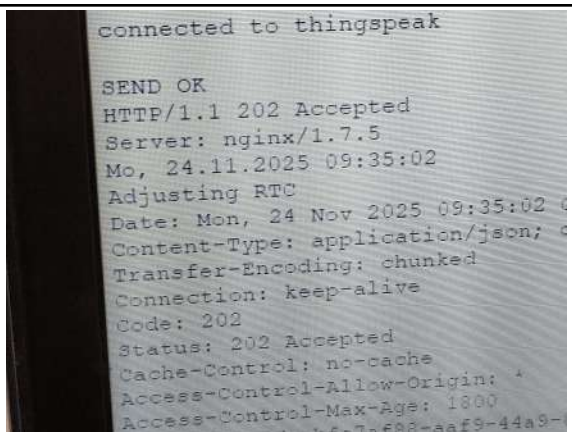
STATUS	The device was successfully recovered by the maintenance team. Firmware updated to v42.75. Devices are mounted at a different location, with a Count Official facilitating the identification of the secure new site.
SITE PHOTOGRAPHS	





RECOMMENDATIONS: SIM network profile swap

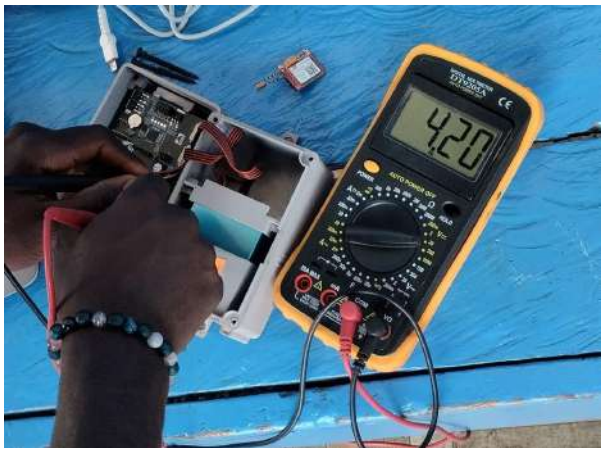
SITE SPECIFICATIONS	
SITE NAME	Tumaini Primary School
SITE NUMBER/ID	AQ_G5402
MAINTENANCE DETAILS:	
DATE: 23/11/2025	
REPORTED ISSUE	Communication issue due to the Roaming Network defaulting to Kencell.
INTERVENTIONS & ACTION	The roaming network was permanently changed to Safaricom. The firmware was updated to the latest v42.76 version with EEPROM protection. The SD card was successfully formatted and operated correctly.
STATUS	Battery, SD Card, and GSM Voltage (confirmed at 4.24V.) noted as okay. Device posted successfully.
SITE PHOTOGRAPHS	



RECOMMENDATIONS:
SD card format, firmware update

SITE SPECIFICATIONS	
SITE NAME	Njiru Level 4 Hospital.
SITE NUMBER/ID	AQ_G5403
MAINTENANCE DETAILS:	
DATE: 23/11/2025	
REPORTED ISSUE	Intermittent Transmission or persistent communication failure.
INTERVENTIONS & ACTION	The communication issue was resolved by setting the roaming network from Kencel to the Safaricom network, enabling stable data posting.
STATUS	Battery, GSM Module, and firmware were verified okay.

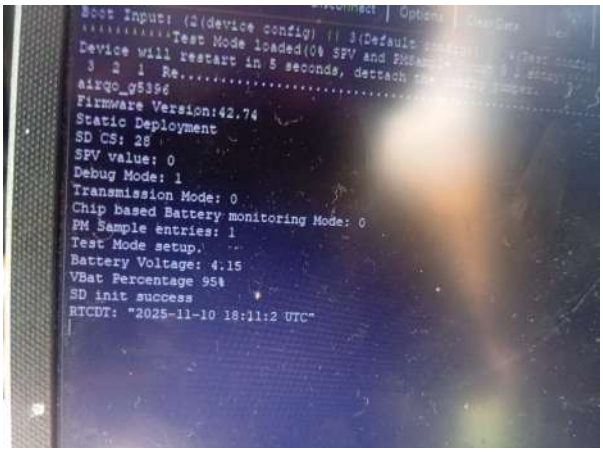
SITE PHOTOGRAPHS

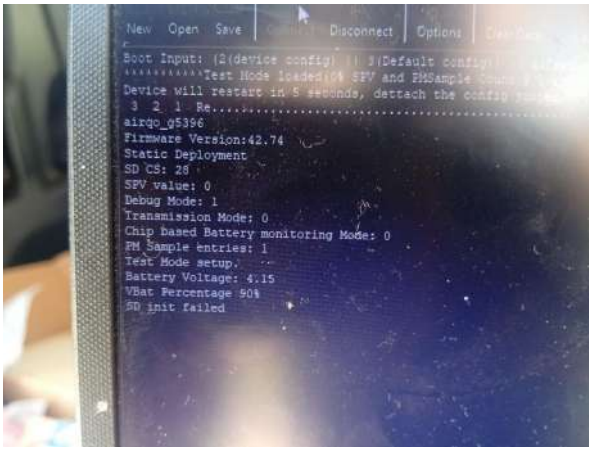


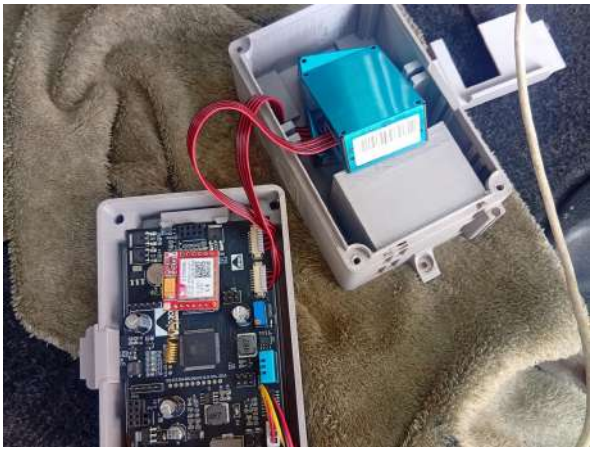
RECOMMENDATIONS: Local SIM

SITE SPECIFICATIONS	
SITE NAME	Githurai Secondary School
SITE NUMBER/ID	AQ_G5396
MAINTENANCE DETAILS:	
DATE: 23/11/2025	
REPORTED ISSUE	SD card issue and a critical communication failure.
INTERVENTIONS & ACTION	A new Safaricom SIM card was installed and Firmware updated to V42.76
STATUS	The battery, GSM Module, and firmware were operating correctly.

SITE PHOTOGRAPHS







RECOMMENDATIONS: SD Card formatting or swap

SITE SPECIFICATIONS	
SITE NAME	Lavington Primary School
SITE NUMBER/ID	AQ_G5408
MAINTENANCE DETAILS:	
DATE: 23/11/2025	
REPORTED ISSUE	SD card was physically missing and there was Network Jam.(Network Roaming profile on Kencel)
INTERVENTIONS & ACTION	The roaming network was set to a default of Safaricom, and the latest Firmware Update to v42.75 was applied.
STATUS	Battery and GSM Voltage (4.2V) were confirmed as stable. The device successfully posted data on Thingspeak.

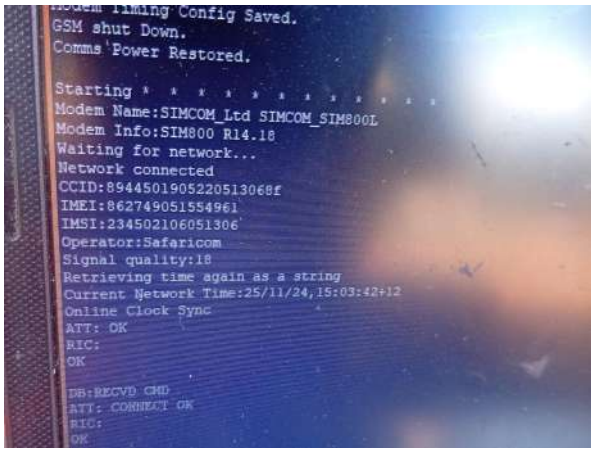
SITE PHOTOGRAPHS

RECOMMENDATIONS:

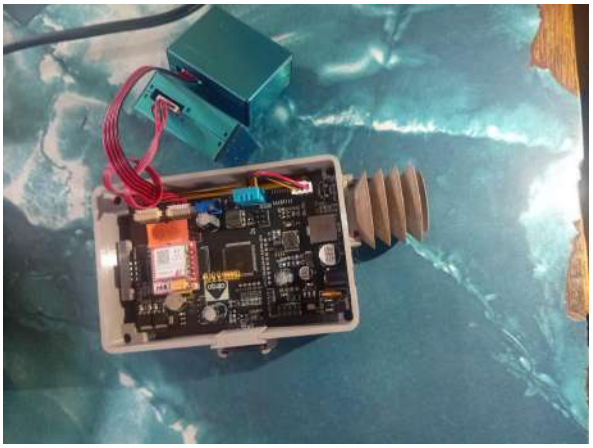
Persistence of the poor network and communication of the device can be solved by purchasing Local Sim Card (Safaricom) to reduce the possibility of roaming to Kencel especially in an area with low local network.

SITE SPECIFICATIONS	
SITE NAME	Mutuini Primary School
SITE NUMBER/ID	AQ_G5372
MAINTENANCE DETAILS:	
DATE: 23/11/2025	
REPORTED ISSUE	The device had stopped posting for almost 100 days due to a configuration transmission failure
INTERVENTIONS & ACTION	The device was reprogrammed to restore configuration integrity and successfully posted data. Crucially, the firmware was updated

	to version 42.76, which incorporates a third-tier protection capability for the EEPROM to prevent future transmission configuration failures
STATUS	Battery, GSM (Voltage 4.2V), and sensor components were verified as functional
SITE PHOTOGRAPHS	



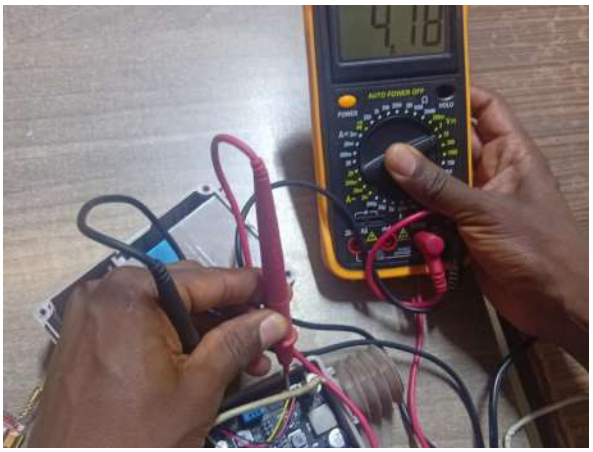
RECOMMENDATIONS: Monitor the Up-time or interference on the device in case of any configuration failure. The experienced case is common in network restricted areas (Proximity to high security areas).	
SITE SPECIFICATIONS	
SITE NAME	Juja Road Primary School
SITE NUMBER/ID	AQ_G5383
MAINTENANCE DETAILS:	
DATE: 23/11/2025	
REPORTED ISSUE	SD Card failure and Sensor malfunction
INTERVENTIONS & ACTION	The faulty SD card and Sensor were replaced with new units.
STATUS	Battery, GSM Module, Roaming network (Safaricom) and current firmware (V42.75) were functional. Post-replacement, the device successfully initiated communication and posted data on Thingspeak platform
SITE PHOTOGRAPHS	



RECOMMENDATIONS:
Monitor the Up-time of the device and Roaming network

SITE SPECIFICATIONS	
SITE NAME	Cheleta Primary School
SITE NUMBER/ID	AQ_G5385
MAINTENANCE DETAILS:	
DATE: 23/11/2025	
CURRENT REPORTED ISSUE	Inconsistent data readings (Uptime), Sensors malfunction and SD CARD failure.
INTERVENTIONS & ACTION	Two sensors and SD card were replaced. The firmware was updated to the latest v42.76 version.
STATUS	Battery and GSM were functional; GSM Voltage confirmed at 4.19V. Roaming network automatically picked Safaricom.

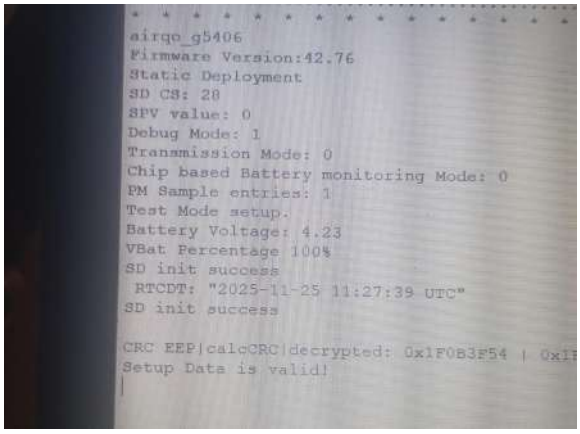
SITE PHOTOGRAPHS



RECOMMENDATIONS:
Monitor the Up-time of the device

SITE SPECIFICATIONS	
SITE NAME	Kasarani Primary School
SITE NUMBER/ID	AQ_G5406
MAINTENANCE DETAILS:	
DATE: 23/11/2025	
CURRENT REPORTED ISSUE	Poor uptime & SD card Failure
INTERVENTIONS & ACTION	SD Card formatted, Firmware 42.76.
STATUS	Bat, GSM Voltage 4.2 Roaming network is Safcom GSM okay.

SITE PHOTOGRAPHS

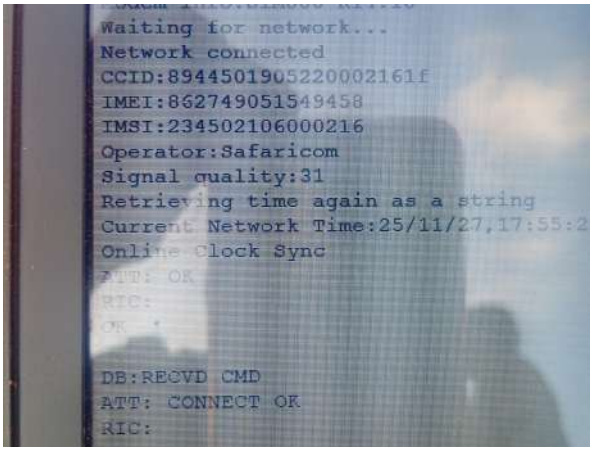


RECOMMENDATIONS:

Monitor the uptime of the device

SITE SPECIFICATIONS	
SITE NAME	NEW Kuhumbuini Primary Sch
SITE NUMBER/ID	AQ_G5384
MAINTENANCE DETAILS:	
DATE: 23/11/2025	
CURRENT REPORTED ISSUE	Poor uptime & SD card Failure
INTERVENTIONS & ACTION	SD Card formatted, Firmware 42.76.

STATUS	Bat, GSM Voltage 4.2 Roaming network is Safcom GSM okay.
SITE PHOTOGRAPHS	



RECOMMENDATIONS: Monitor the Up-time of the device

SITE SPECIFICATIONS	
SITE NAME	Karura Forest Primary Sch
SITE NUMBER/ID	AQ_G5381
MAINTENANCE DETAILS:	
DATE: 23/11/2025	
CURRENT REPORTED ISSUE	Poor uptime & SD card Failure
INTERVENTIONS & ACTION	SD Card formatted, Firmware 42.76.
STATUS	Bat, GSM Voltage 4.2 Roaming network is Safcom GSM okay.
SITE PHOTOGRAPHS	

RECOMMENDATIONS:

Monitor the Up-time of the device

SITE SPECIFICATIONS	
SITE NAME	Valley Bridge Primary Sch
SITE NUMBER/ID	AQ_G5389
MAINTENANCE DETAILS:	
DATE: 23/11/2025	
CURRENT REPORTED ISSUE	Poor uptime & SD card Failure
INTERVENTIONS & ACTION	SD Card formatted, Firmware 42.76.
STATUS	Bat, GSM Voltage 4.2 Roaming network is Safcom GSM okay.

SITE PHOTOGRAPHS

RECOMMENDATIONS:
Monitor the Up-time of the device

SITE SPECIFICATIONS	
SITE NAME	Martin Luther Primary Sch
SITE NUMBER/ID	AQ_G5323
MAINTENANCE DETAILS:	
DATE: 23/11/2025	
CURRENT REPORTED ISSUE	Poor uptime & SD card Failure
INTERVENTIONS & ACTION	SD Card formatted, Firmware 42.76.
STATUS	Bat, SD card (though formatted) GSM Voltage to 4.24, Roaming network is Safcom & GSM okay.

SITE PHOTOGRAPHS

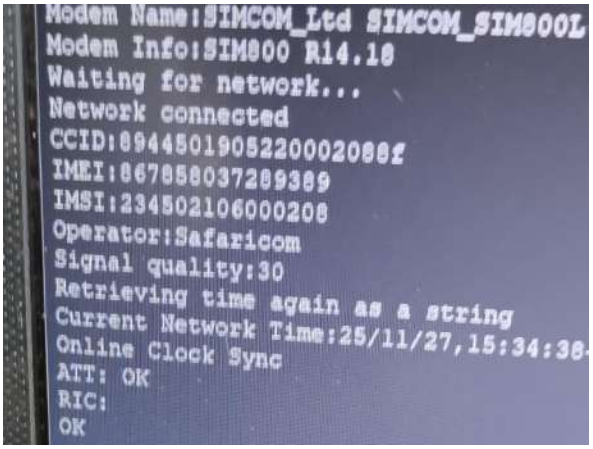
RECOMMENDATIONS: Monitor the Up-time of the device

SITE SPECIFICATIONS	
SITE NAME	Kiwanja Primary School
SITE NUMBER/ID	AQ_G5388
MAINTENANCE DETAILS:	
DATE: 23/11/2025	
CURRENT REPORTED ISSUE	Poor uptime
INTERVENTIONS & ACTION	SD Card formatted, Firmware 42.76.
STATUS	Bat, SD card, GSM Voltage at 4.2v, Roaming network is Safcom & GSM okay.
SITE PHOTOGRAPHS	

RECOMMENDATIONS: Monitor the Up-time of the device

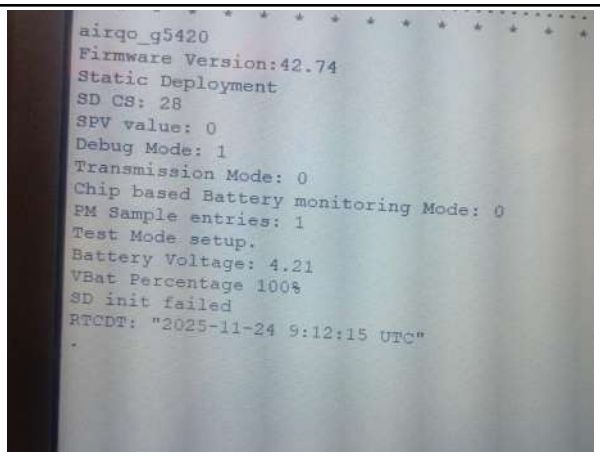
SITE SPECIFICATIONS	
SITE NAME	Drumvale Primary School
SITE NUMBER/ID	AQ_G5412

MAINTENANCE DETAILS:	
DATE: 23/11/2025	
CURRENT REPORTED ISSUE	Poor uptime
INTERVENTIONS & ACTION	SD card replaced, Roaming default to Safaricom.& Firmware updated to 42.76
STATUS	Bat, SD card and GSM Voltage at 4.24v & GSM okay
SITE PHOTOGRAPHS	



RECOMMENDATIONS:
Monitor the Up-time of the device

SITE SPECIFICATIONS	
SITE NAME	Mbagathi Road Primary School
SITE NUMBER/ID	AQ_G5420
MAINTENANCE DETAILS:	
DATE: 23/11/2025	
CURRENT REPORTED ISSUE	Poor uptime & Kencel Roaming
INTERVENTIONS & ACTION	Firmware 42.76, SD card formatted.
STATUS	Bat, GSM Voltage at 4.19v
SITE PHOTOGRAPHS	



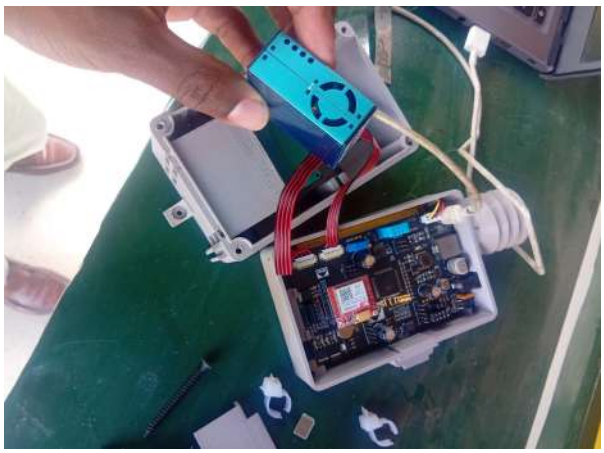
RECOMMENDATIONS:
Monitor the Up-time of the device

SITE SPECIFICATIONS	
SITE NAME	Manyatta Primary School
SITE NUMBER/ID	AQ_G5413
MAINTENANCE DETAILS:	
DATE: 23/11/2025	
CURRENT REPORTED ISSUE	Poor uptime
INTERVENTIONS & ACTION	SD card replaced, Roaming default to Safaricom. Firmware updated to 42.76
STATUS	Bat, SD card and GSM Voltage at 4.24v & GSM okay

SITE PHOTOGRAPHS

RECOMMENDATIONS: Monitor the Up-time of the device

SITE SPECIFICATIONS	
SITE NAME	ST. Mary's Karen Primary Sch
SITE NUMBER/ID	AQ_G5418
MAINTENANCE DETAILS:	
DATE: 23/11/2025	
CURRENT REPORTED ISSUE	Loose Sensor, Low GSM voltage
INTERVENTIONS & ACTION	Sensor connection fixed. GSM 3.89 to 4.23V. Firmware 42.76. Note: Roaming on Kencel though performing well
STATUS	Bat, SD card and GSM Voltage at 4.24v & GSM okay
SITE PHOTOGRAPHS	



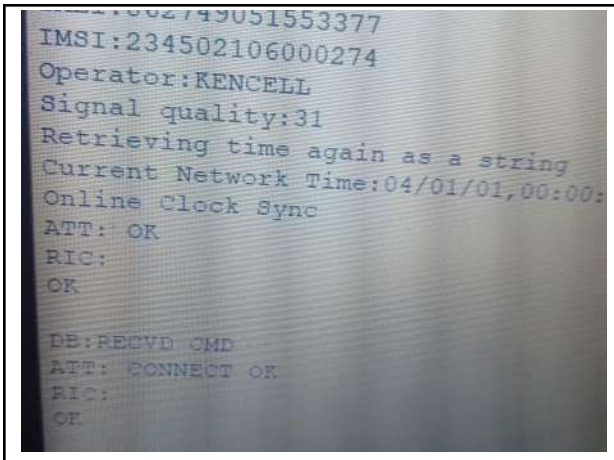
RECOMMENDATIONS: Monitor the Up-time of the device

SITE SPECIFICATIONS	
SITE NAME	Riruta Satellite Primary Sch
SITE NUMBER/ID	AQ_G5393
MAINTENANCE DETAILS:	

DATE: 23/11/2025	
CURRENT REPORTED ISSUE	Poor uptime & Kencel Roaming
INTERVENTIONS & ACTION	Firmware 42.76, SD card formatted.
STATUS	Bat, GSM Voltage at 4.19v
SITE PHOTOGRAPHS	

RECOMMENDATIONS:
Monitor the Up-time of the device

SITE SPECIFICATIONS	
SITE NAME	ST. Georges Primary School
SITE NUMBER/ID	AQ_G5414
MAINTENANCE DETAILS:	
DATE: 23/11/2025	
CURRENT REPORTED ISSUE	Sensor, SD card Failure & Kencel Roaming
INTERVENTIONS & ACTION	Sensor replaced &SD Card formatted and inserted successfully. Firmware 42.76.
STATUS	Bat, GSM Voltage at 4.19v Okay
SITE PHOTOGRAPHS	



RECOMMENDATIONS:
Monitor the Up-time of the device

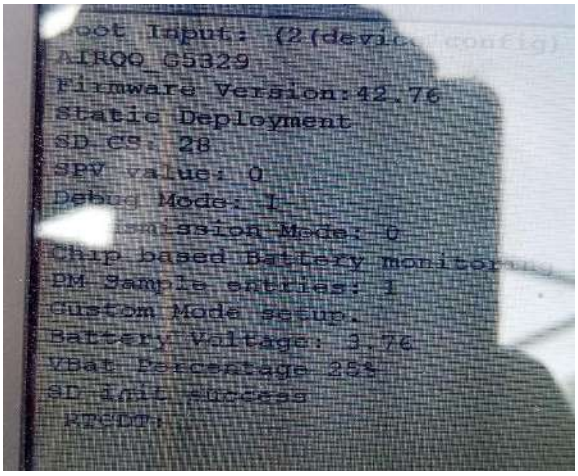
SITE SPECIFICATIONS	
SITE NAME	Uhuru Gardens Primary School
SITE NUMBER/ID	AQ_G5409
MAINTENANCE DETAILS:	
DATE: 23/11/2025	
CURRENT REPORTED ISSUE	SD Card Missing & Kencel Roaming network
INTERVENTIONS & ACTION	SD card inserted. Firmware updated to 42.76. Roaming network default to Safaricom
STATUS	Bat, GSM Voltage at 4.19v Okay

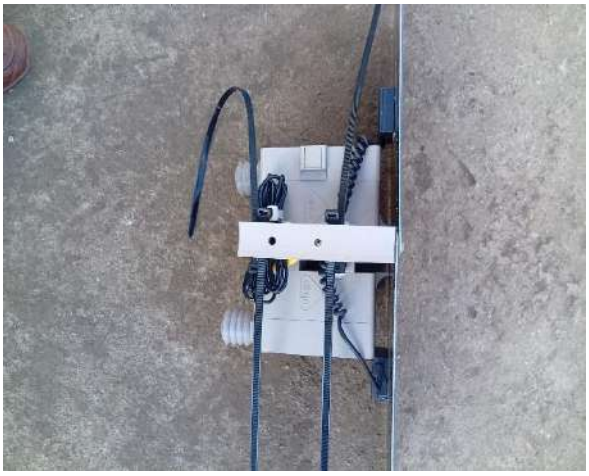
SITE PHOTOGRAPHS

RECOMMENDATIONS: Monitor the Up-time of the device

SITE SPECIFICATIONS	
SITE NAME	Fire Station (Tom Mboya)
SITE NUMBER/ID	AQ_G5399 and AQ_G5399
MAINTENANCE DETAILS:	
DATE: 23/11/2025	
CURRENT REPORTED ISSUE	Devices/Structure Vandalized & SD Card Missing
INTERVENTIONS & ACTION	SD card inserted. Casing, mountings, solar panels replaced. Firmware 42.76.
STATUS	Bat, GSM Voltage at 4.19v Okay

SITE PHOTOGRAPHS





RECOMMENDATIONS:
Monitor the uptime of both devices and security of the site