MDMS UPDATE

~ METER DATA MANAGEMENT SYSTEM ~

US Army Corps of Engineers®

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FROM THE PROGRAM MANAGER

Welcome to our August - September 2021 issue of the *Meter Data Management System Update (MDMS),* designed to keep you informed on the growth and latest developments of the Meter Data Management System and the Army Metering Program.

Network interruptions and outages continue to be a concern for Army Leadership, as well as local DPW and Energy Managers alike. The "Addressing Meter Data Loss" training session continues to be well-attended, with Energy Managers asking how to get help in troubleshooting longtime offline meters.

Our first article, "Checking Meter Status" focuses on the tools within MDMS to evaluate the connectivity status of meters at an installation or site. This article details each of the modules and their purpose.

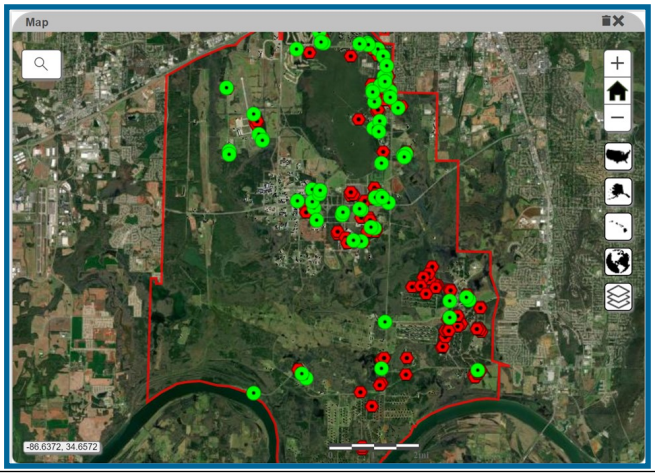
The second article, "Troubleshooting Meter Network Outages" provides tips on how the Installation Energy Manager can assist the troubleshooting effort and expedite the restoration of meters reporting to MDMS.

As always, our mission is to improve the MDMS experience for end users. Your input is valuable, and we welcome your feedback via the Army Meter Service Desk (AMSD) at: usarmy.coe-huntsville.cehnc.mbx.armymeterhelp@mail.mil

CHECKING METER STATUS

During the last few months, the MDMS Outreach Team has spent more time working with sites on meter data analysis. While there are many new Energy Managers (EMs) and Resource Efficiency Managers (REMs) joining the Army's Metering Program (AMP), their challenge of analyzing the MDMS data and troubleshooting offline meters has been apparent. One such EM stated that he was "drinking from the firehose." There are many causes for data loss – whether in the form of missing or corrupt data – such as network outages, wrong meter multipliers, repeating readings, non-reporting (offline) and unassigned meters. In this article, we will review the steps to assess meter connectivity and data quality.

When assessing the connectivity of the meters, there are several aspects to monitor: Is it currently connected and reporting? How often has it been connected? If it's not connected, or has been intermittently connected, what is causing the problem? MDMS provides many tools to investigate and get answers to these questions: GIS Map, Meter Status Rollup, Meter Status Details, Interval Usage Data Quality Report, Meters Reporting Trends and Offline Meter Email Notification. We will brief each of these modules below.



GIS Map

The GIS Map gives an immediate overview of the health and status of the meter connectivity at the site or installation. Color-coded icons represent metered buildings and their reporting status, based on the following thresholds:

- Green: Meters last reported <= 36 hours.
- Yellow: Meters last reported > 36 hours but < 1 week.
- Red: Meters last reported > 1 week or never reported.

Clicking on any of the color-coded meter status icons will launch the building details in a pop-up window displaying the building name and number, RPA UID, CAT code, CAT code description, square footage (SF) of the building, *(Continued on pg. 2)*

CHECKING METER STATUS (CONT. FROM PG. 1)

climate code, built date, and a list of meters associated with that building, along with the date and time of the last meter reading received. The symbol to the left of the meter status icon indicates the type of meter commodity.

Meter Status Rollup

The Meter Status Rollup is a tabular report for meter network operations and maintenance (O&M) and provides visibility of meter network reliability metrics from the individual meter level to the rollup summary total for HQDA. Consistency in meter data is provided for the last 30 and 60 days. The longer a meter stays offline, the lower the consistency percentage.

Under the Organization column, clicking on the + symbol allows the user to expand and drill down to the desired Region, Installation and Site, as shown below. Once at the Site level, clicking on the hyperlink site name will launch the site's Meter Status Details report in a separate browser tab. This report is discussed next.

Organization	All Meters	Electric Meters	Gas Meters	Water Meters	Steam Meters	Metered Buildings	Metered SF	Renewable Energy Meters	Metered Renewable Energy Sources	Total Meters Assigned to Buildings	Total Meters Assigned to Site Only	Most Recent	Data Source/MDMS Status	Connectivity Report	% Last 30 Days Reporting Consistency	% Last 60 Days Reporting Consistency
Gateway/Smart Server Meters																
HQDA	9067 of 15436 current	5945 of 10483 current	1563 of 2639 current	1541 of 2296 current	18 of 18 current	7481	271,370,058	0	0	13944	1492	2021-10-13 09:45		N/A	50.8	51.9
IMCOM	6322 of 10752 current	4091 of 7339 current	1042 of 1720 current	1185 of 1689 current	4 of 4 current	5570	199,720,510	0	0	10212	540	2021-10-13 09:45		N/A	49.3	51.2
TRAINING	840 of 1329 current	518 of 851 current	153 of 237 current	165 of 237 current	4 of 4 current	672	36,709,800	0	0	1288	41	2021-10-13 09:45		N/A	58.8	58.6
READINESS	4159 of 6199 current	2457 of 3709 current	844 of 1333 current	858 of 1157 current	0 of 0 current	3224	104,043,430	0	0	6093	106	2021-10-12 11:30		N/A	58.0	61.6
FORT BLISS	630 of 706 current	388 of 410 current	156 of 190 current	86 of 106 current	0 of 0 current	338	15,835,379	0	0	704	2	2021-10-12 11:15		Edit	38.0	60.4
FORT BRAGG	1486 of 1879 current	692 of 855 current	153 of 215 current	641 of 809 current	0 of 0 current	874	21,893,298	0	0	1861	18	2021-10-12 00:00		Edit	74.5	77.7
FORT CAMPBELL	36 of 76 current	36 of 76 current	0 of 0 current	0 of 0 current	0 of 0 current	62	3,596,724	0	0	75	1	2021-10-12 06:45		Edit	46.2	49.2
FORT CARSON	464 of 490 current	254 of 271 current	210 of 219 current	0 of 0 current	0 of 0 current	291	11,274,768	0	0	489	1	2021-10-12 11:30		Edit	90.1	88.7
FORT CARSON	464 of 490 current	254 of 271 current	210 of 219 current	0 of 0 current	0 of 0 current	291	11,274,768	0	0	489	1	2021-10-12 11:30	MDMS and data source operational	Edit	90.1	88.7

Meter Status Details

The Meter Status Details is a tabular report of meters for a site. It allows fast identification of which meters on which buildings (or other metered assets) have lost connection to MDMS. Consistency in meter data is provided for the last 30 and 60 days. The longer a meter stays offline, the lower the consistency percentage. It also shows quality metrics for the last 30 and 60 days. The quality metrics provide a clearer picture of the meter's status beyond the last reading received.

Site	Building	Meter	Description	Commodity	Most Recent	Reporting Interval	% Last 30 Days Reporting Consistency	% Last 60 Days Reporting Consistency	Last Reading	30-Day Data Quality	60-Day Data Quality
FORT CARSON	9091 - BATTALION HQ'S EOD	CARS_BLDG_9091_GAS		Gas	9/28/2021 3:30:00 PM	15	52.6	73.5	5694261.5	Fail	Pass
FORT CARSON	1352 - BN HQ BLDG/ORG CLSROOM	CARS_BLDG_1352		Electricity	9/30/2021 11:15:00 AM	15	58.6	76.4	1251925.63	Fail	Fail
FORT CARSON	2765P - HEAD START	CARS_BLDG_2765		Electricity	9/30/2021 11:15:00 AM	15	58.6	76.2	791261.5625	Fail	Fail
FORT CARSON	6236 - ADM GEN PURP	CARS_BLDG_6236		Electricity	9/30/2021 3:45:00 PM	15	59.3	76.8	1212647.5	Pass	Pass
FORT CARSON	1000 - ENLISTED UPH	CARS_BLDG_1000		Electricity	10/12/2021 11:30:00 AM	15	98.4	75.8	3116380.25	Fail	Fail
FORT CARSON	1000 - ENLISTED UPH	CARS_BLDG_1000_GAS		Gas	10/12/2021 11:30:00 AM	15	98.4	75.8	18807118	Fail	Fail
FORT CARSON	1005 - ENLISTED UPH	CARS_BLDG_1005		Electricity	10/12/2021 11:30:00 AM	15	98.4	96.4	6219961	Pass	Pass
FORT CARSON	1005 - ENLISTED UPH	CARS_BLDG_1005_GAS		Gas	10/12/2021 11:30:00 AM	15	98.4	96.4	21613460	Pass	Pass

Showing 1 to 100 of 490 entries — First Previous 1 2 3 4 5 Next La

394 30-Day Data Quality Pass
96 30-Day Data Quality Fail
0 30-Day Data Quality N/A
Total Meters: 490

391 60-Day Data Quality Pass
99 60-Day Data Quality Fail
0 60-Day Data Quality N/A

464 Last Reported <= 36 hours
0 Last Reported > 36 hours and <= 1 week
26 Last Reported > 1 week or Never Reported

A meter being online does not necessarily mean it is providing quality data to support energy management efforts. In order for the meter to pass the data quality, the following two criteria must be met: *(Continued on pg. 3)*

CHECKING METER STATUS (CONT. FROM PG. 2)

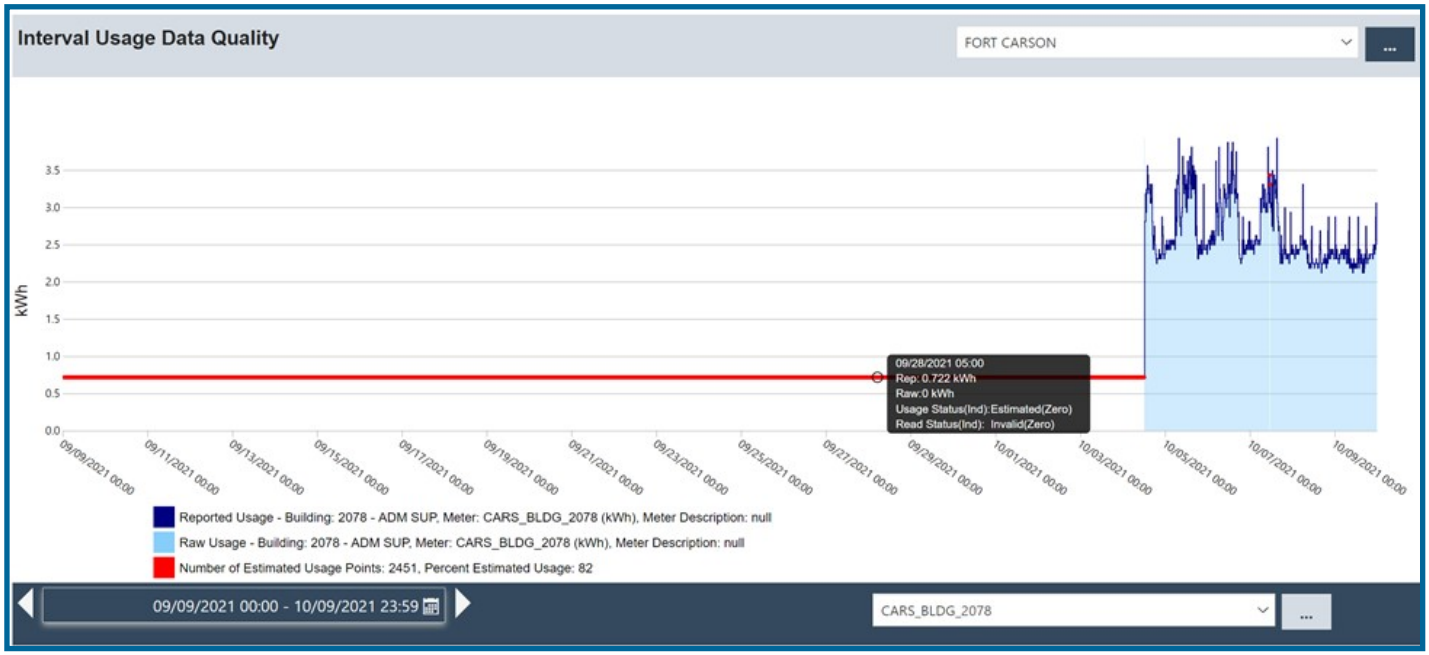
- No more than 35% estimated usage of the interval calculations fail the data quality algorithm, which considers repeated readings, missing readings, negative usage, excessive spikes, 0 meter readings, etc. We also refer to this as the smoothed rate.
- The ratio of the difference in end-to-end readings divided by the sum of the interval usage is within 15% tolerance.

This is just an indicator of quality and further investigation should be done to assess the quality of the meter data. Clicking on the hyperlink meter name will launch the corresponding Interval Usage Data Quality report for that meter for the last 30 days in a new browser tab. This report is discussed next.

Interval Usage Data Quality

The Interval Usage Data Quality Report provides a graphical comparison of reported usage, raw meter usage, and estimated usage points. This report can be found on the Energy Management page under the Usage Details sub-menu. Once launched the report will display the graph for the first meter on the first building for the user's default site populated with meter data for the last 30 days, if available.

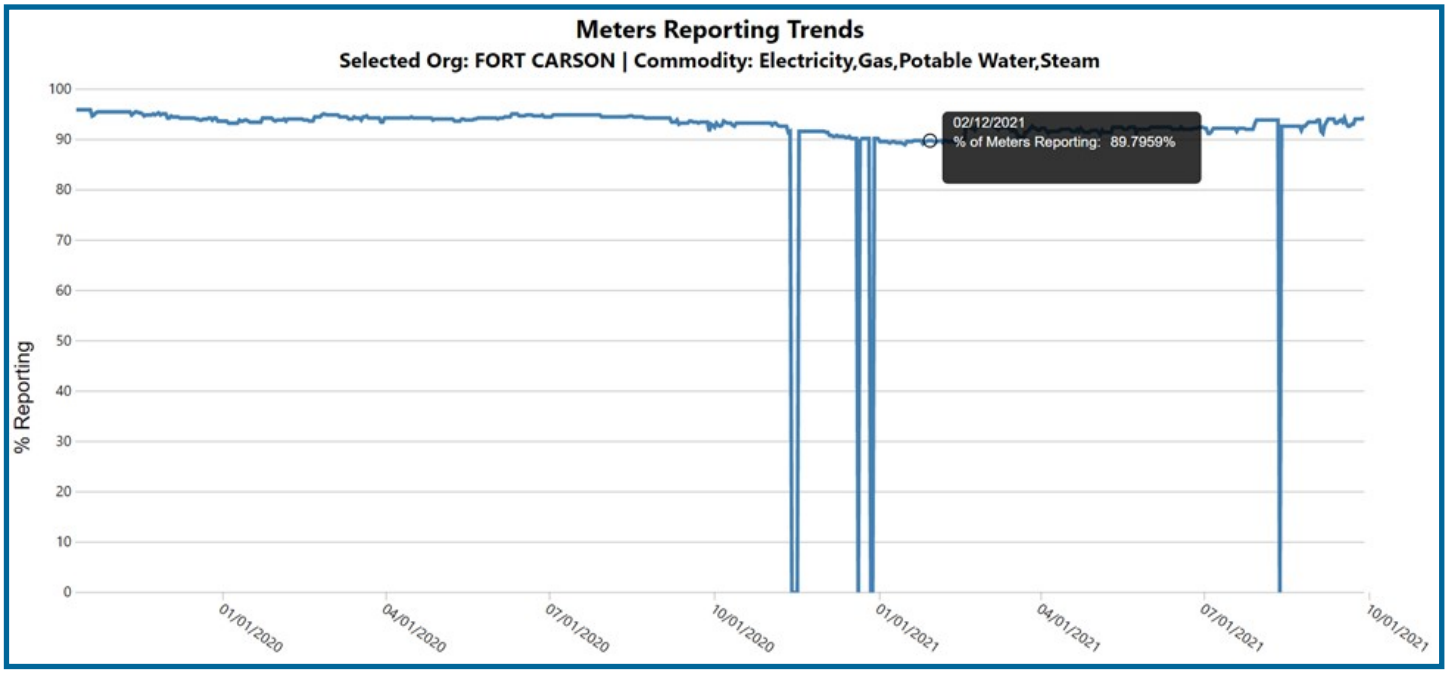
The meter reading information is included to provide further insight because the usage values are calculated from the readings. Also, displayed in red are the estimated usage points, for intervals that failed data quality. There is a summary in the legend below the graph of the total number of estimated usage points and the percent of the displayed usage data that the estimated usage represents. A high number of estimated usage points and thus a high percent estimated usage is not good, as it indicates heightened periods of network interruptions for that particular meter. If the percent estimated usage is greater than 35%, the accuracy of the usage data is unreliable and therefore not usable by the Energy Manager.



Meters Reporting Trends

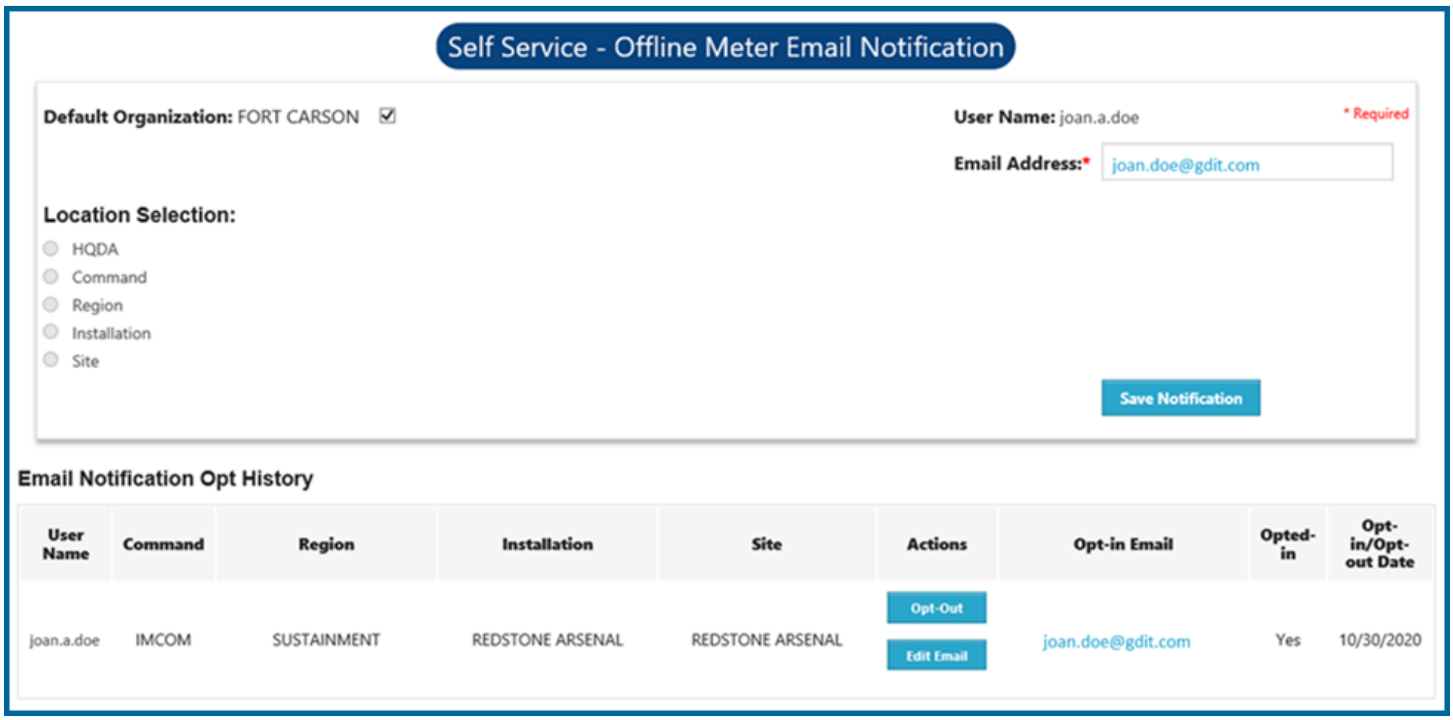
The Meters Reporting Trends report displays a graphical view of meter reporting trends for the selected organization over time. This data is sourced from daily snap shots of the meter status rollup captured since October 2019. This report may be run at the HQDA, Command, Region, Installation or Site level. Any dips indicate network disruptions, regardless of whether they were planned or unplanned outages. Hovering the mouse over particular points in the graph will provide a popup with the actual percentage of meters reporting for that date, as shown in the Fort Carson example below. *(Continued on pg. 4)*

CHECKING METER STATUS (CONT. FROM PG. 3)



Offline Meter Email Notification

The Offline Meter Email Notification module can be found on the MDMS Self Service page under the Email Notifications sub-menu. This report enables users to set up email notifications for offline meters and may be run for your default organization (as shown below), or at the HQDA, Command, Region, Installation or Site level. A notification is triggered when a meter goes 5 days without a reading.



An example of the email notification for offline meters, which comes from support@mdms.army.mil, is shown below. *(Continued on pg. 5)*

CHECKING METER STATUS (CONT. FROM PG. 4)

Consistency of meter data reporting is important to your energy use metrics and analysis. And the longer a meter stays offline, the more smoothing and interpolation is required to fill in missing data. This is probably acceptable if your consistency is fairly high. If your consistency is mid-to-low range, then the validity and reliability of the interpolated data is questionable.

If there is valid reason for a non-reporting meter to remain off-line from the MDMS, e.g., the building was demolished, please notify the AMSD via the Feedback/Help Request option under the Support menu in MDMS or you may e-mail them at: usarmy.coe-huntsville.cehnc.mbx.armymeterhelp@mail.mil so that we can correct our records within MDMS. We will preserve the historical meter data for reference, but we don't want to continue reporting that building as being offline and have it reflected in the Army's metric for meter network reliability.

From: support@mdms.army.mil <support@mdms.army.mil>
Sent: Tuesday, December 1, 2020 3:00 AM
To: Jane Doe <jane.doe@gdit.com>
Subject: Offline Meters as of 12/01/2020

See below for all meters that are offline for REDSTONE ARSENAL as of 12/01/2020.
Total Offline Meter Count for REDSTONE ARSENAL: 252

Meter: REDS_BLDG_3465_METER_1 Last Reading: 9/1/2020 4:45:00 AM
Meter: REDS_BLDG_3465_METER_2 Last Reading: 9/1/2020 4:45:00 AM
Meter: REDS_BLDG_3466_METER_1 Last Reading: 11/23/2020 3:30:00 PM
Meter: REDS_BLDG_3670_METER_1 Last Reading: 11/13/2017 2:45:00 PM
Meter: REDS_BLDG_3687_METER_1 Last Reading: 11/23/2020 3:30:00 PM
Meter: REDS_BLDG_3775S_METER_2 Last Reading: 6/18/2020 5:15:00 AM
Meter: REDS_BLDG_4424_METER_1 Last Reading: 11/23/2020 3:30:00 PM
Meter: REDS_BLDG_4459_METER_1 Last Reading: 2/2/2018 8:30:00 AM
Meter: REDS_BLDG_4459_METER_2 Last Reading: 2/2/2018 8:30:00 AM
Meter: REDS_BLDG_4506_METER_1 Last Reading: 11/23/2020 3:45:00 PM

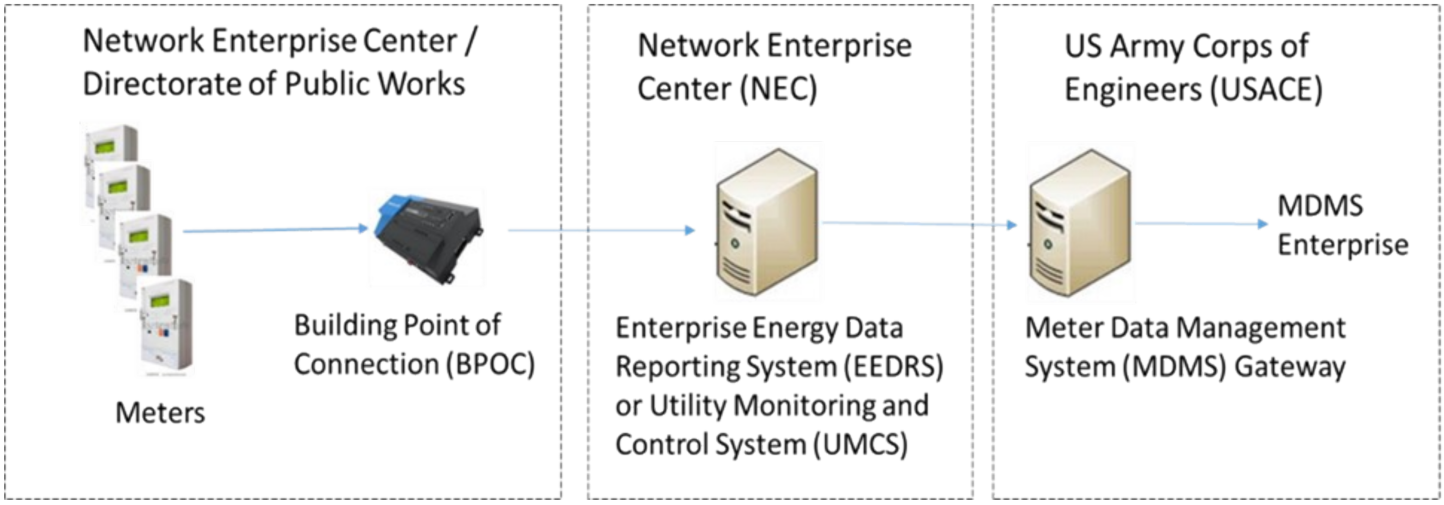
We hope this article has given greater insight into the steps to assess meter connectivity to MDMS. We encourage you to attend the MDMS Training Webinar, "Addressing Meter Data Loss," to further understand how to investigate and assess the frequency and quality of meter data reporting to MDMS. After attending that session if you require further assistance in analyzing the meter data at your site or installation, please reach out to the AMSD to request a one-on-one session with the MDMS Outreach Team.

TROUBLESHOOTING METER NETWORK OUTAGES

Maintaining the Army's meter network requires a team effort. This article provides tips on how the Installation Energy Manager can assist the troubleshooting effort and expedite the restoration of meter data reporting to the Meter Data Management System.

The data source for MDMS is a locally hosted server used to consolidate meter data for transfer to the MDMS gateway. That server is called the Enterprise Energy Data Reporting System (EEDRS). At some installations, a Utility Monitoring and Control System (UMCS) server functions as the meter data source for the MDMS gateway.

Analogous to a three-link chain, the Directorate of Public Works (DPW), the Network Enterprise Center and the Corps of Engineers each have operations and maintenance responsibility for their respective parts of the Army's network that connects a building's meter to the enterprise MDMS. Cybersecurity requirements limit each party's access and visibility for troubleshooting the source of a network failure to their respective area of O&M responsibility. *(Continued on pg. 6)*



TROUBLESHOOTING METER NETWORK OUTAGES (CONT. FROM PG. 5)

The DPW Energy Manager can assist the troubleshooting effort and by doing so, help expedite the restoration of meter data reporting to the MDMS.

The first indication for a meter outage is obtainable from the Meter Status Roll-up and Meter Status Details reports within MDMS (briefed in the previous article). These reports are found on the Network Status page, accessible from the main, green navigational pulldown menu. When looking at the “most recent” date/time stamp, there are some important deductions that can be made. Typically, when all or most of the meters at a building level share the same “most recent” date/time stamp on the Meter Status Details report, the connection failure is most likely associated with a building point of connection (BPOC). If it is more than a building, it could be a NEC switch.

Troubleshooting the loss of connection downstream from the EEDRS, i.e., at the BPOC or the meter itself requires a little more investigation. One of the biggest indicators of a BPOC issue is when every meter associated with the building went offline at the same time and have the same “Last Reported” date/time stamp. Copy down the building number where the meters are installed go to the building and locate the BPOC, usually in the network communications storage room/closet. Once you have located the device, power cycle (power-off and back on again) to re-set the BPOC to attempt a connectivity restore. While there, physically trace the network cable on the BPOC to the network switch it’s plugged into and record both the switch and port number. Note: If it isn’t plugged into anything, you may have found the problem — contact your NEC!

After the power cycle reset of the BPOC, check the EEDRS/UMCS workstation again to see if that restored connectivity. If it did, you should see the change within MDMS within 2-3 hours. If that did not do the trick, the next step would be to confirm that the BPOC is on the correct local energy network with the local NEC. This step is very important and quite possibly the issue at hand if both the physical connection has been confirmed and power-cycling the devices and/or meters doesn’t restore connectivity. Upon contacting the NEC, they will likely ask you for the switch and port number you copied down. The NEC should be able to reconfigure the switch/port with the correct local energy network and it should restore connectivity. If the NEC has confirmed that the specific device is on the correct local energy network and meter data is still not flowing “upstream” to the EEDRS/UMCS or MDMS data source, the other possibility is that the EEDRS/UMCS is not configured to communicate with the particular meter device(s) or a larger network issue has occurred. This would also require communication with your NEC and potentially the meter integrator or EEDRS/UMCS support vendor.

If the outage is associated with the MDMS data source and the MDMS Gateway server cannot communicate with the EEDRS/UMCS, the status on the Meter Status Roll-up will show “MDMS operational. No recent meter data available from data source.” If you see this for your site, check to see if meter data is reporting to the EEDRS or UMCS after the ”Most Recent” date/time stamp shown in MDMS and validate this data is being exported to the SQL trend database. This can be checked by logging into the Energy Manager’s EEDRS/UMCS workstation. If meter data exists at a later date than MDMS, the MDMS contractor has the action to investigate, troubleshoot and resolve the MDMS Gateway server and/or its interface with the EEDRS. If the EEDRS has also stopped recording meter data about the same time as shown within the MDMS meter status dashboard, the problem most likely resides within or downstream from the EEDRS.

While this article focuses on various ways the DPW Energy Manager can assist the troubleshooting efforts and expedite the restoration of meter data reporting to the MDMS, if assistance is required, please notify the AMSD via the Feedback/ Help Request option under the Support menu in MDMS or you may e-mail them at: usarmy.coe-huntsville.cehnc.mbx.armymeterhelp@mail.mil so that a trouble ticket may be created and assigned to the appropriate personnel.