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PQ Dashboard User's Group - 2021

What's new with PQ at GPA

Grid Protection Alliance



GPA is a not-for-profit corporation established in 2010.

- Specializes in software and services for the electric utility industry
- All software is open-source, published under the permissive MIT license
- Focus is on a robust, reliable and resilient grid

<https://gridprotectionalliance.org>

Products in GPA's Suite of Open-Source PQ Tools

open **XDA**

open **MIC**

open **SEE**

open **EAS**

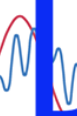
dD Tools

 **PQDIF** *Explorer*

PQ  **Dashboard**

Trend  **DAP**

SE  **Browser**

POWER
QUALITY  **Digest**

SOE Tools

System Center

miMD

PQio

open **XDA**{API}

 **XDA**
BATCH TRANSFER

( **SPC Tools**)

Product Index on GPA's Web Site

GPA Grid Protection Alliance
Open Source Software & Services for Electric Utilities

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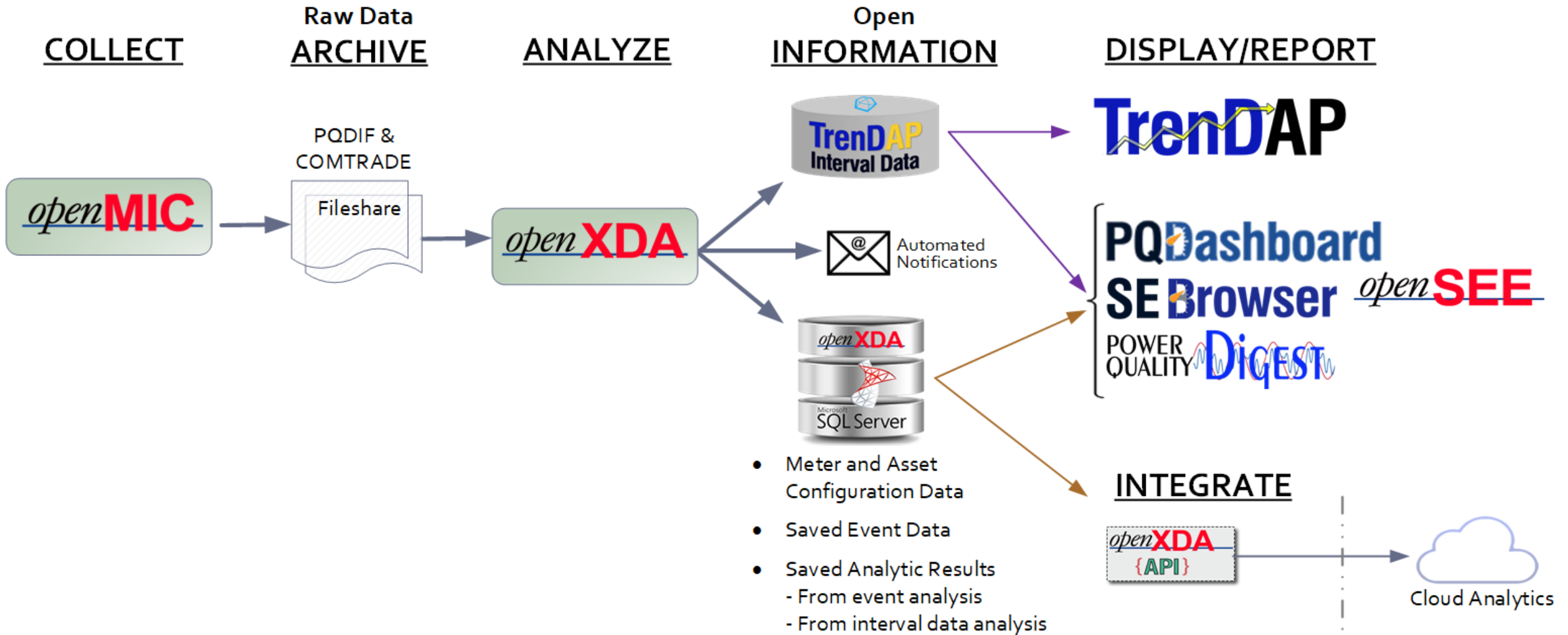
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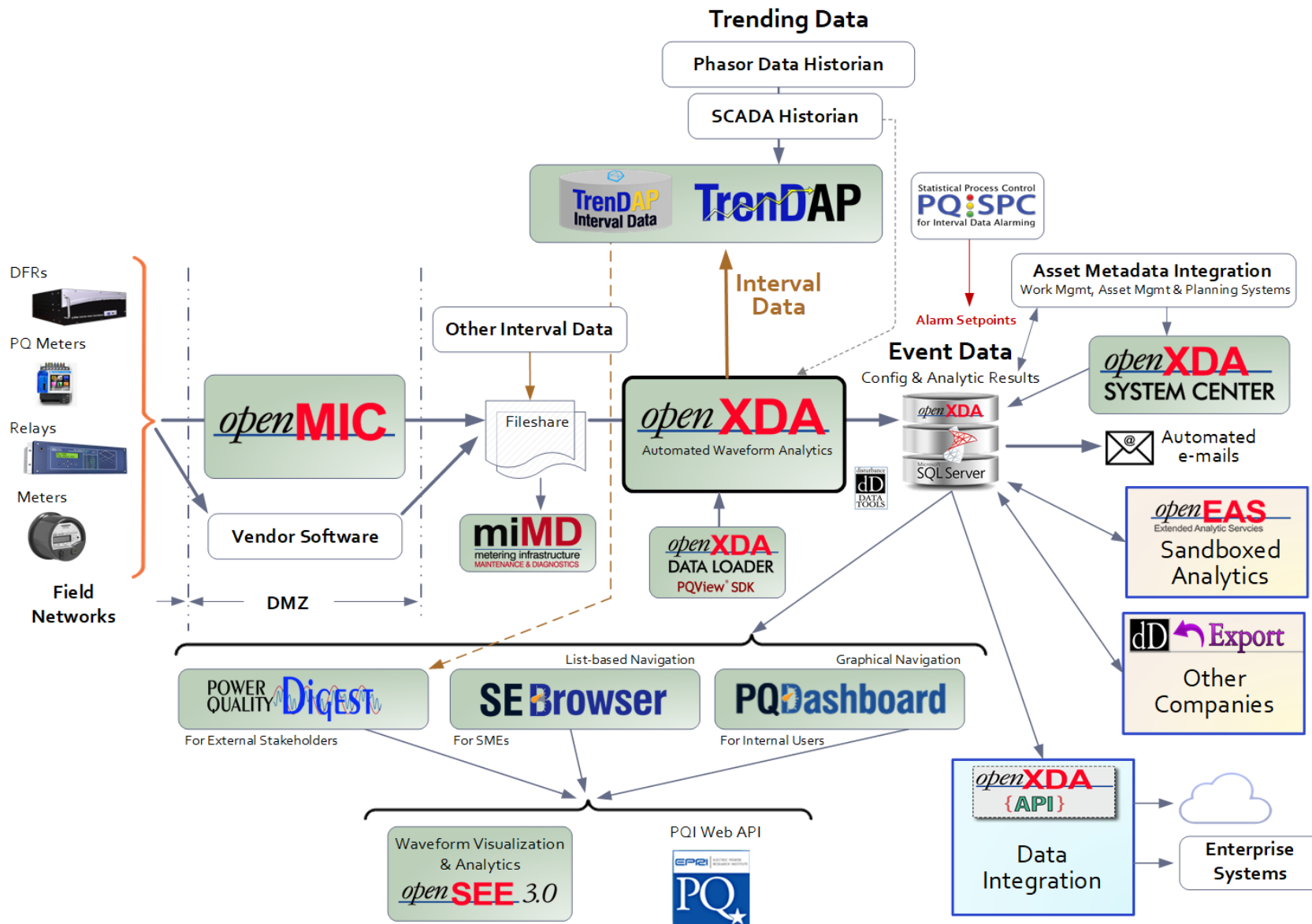
This list includes most GPA named applications and code components. Many products have their own GitHub repositories and others share repositories with other products.

Name	Type	Description	Repository
- A -			
ARMORE	security		
Azure Cloud Adapter	interface		

PQ Data Flows



More Detailed PQ Data Flows



Summary of the Most Recent Feature Additions

- SE Browser 1.0
- TrenDAP database / TrenDAP Application (Beta – Summer 2021)
- EPRI SPC Tools
- PRC-002 Compliance Tools for MiMD
- openMIC EE
 - Multi-node capability
 - ION meter polling
 - Dranetz meter polling
- Event type in openXDA for metering errors
- Common navigation and filtering pattern across applications

System Event Browser

Features

- A power tool for PQ SME's
- Functions like an email client with a comprehensive preview window
- Allows quick navigation to events through multiple filtering options.
- Provides links to openSEE for detailed event waveform study
- The launch point for reports that aggregate historical event data

The screenshot displays the System Event Browser interface. On the left is a navigation menu with 'Event Search' selected. The main area features a search bar and a table of events. The table has columns for Time, Asset, Asset Type, kV, Event Class, and Breaker Operation. One event is highlighted in yellow. To the right of the table are several filter panels for Time Window, Event Types, Asset Types, Voltage Class, and Meter Types. Below the table is a 'Waveform Analysis' window showing a detailed waveform plot with a 'Fault Evolution Summary' table below it. The summary table lists fault events with their inception and end times and durations.

Evolution	Inception	End	Duration (c)
CN Fault	23:13:30.550	23:13:30.862	18.7
BCG Fault	23:13:30.862	23:13:31.068	12.4

Disturbance Type	Phase	Magnitude (%)	Duration (ms)	Start Time
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Common Navigation Features

- Improved usability
 - Additional error messages
 - Additional description on inputs
 - Convenient Search feature
- Simplified workflow
 - Various Wizards
 - Clear instructions
- Improved protection from accidental mis-configuration
 - Warning messages
 - Tooltips

The screenshot displays the 'New Meter Wizard' interface, which is a multi-step form for adding a new meter. The current step is 'Step 1: General information about the new meter'. The form includes several input fields: 'Asset Key' (with a blue dot icon and a note 'A unique key of less than 50 characters is required.'), 'Name' (with a note 'Name must be less than 200 characters and is required.'), 'Short Name', 'Alias', 'Make' (with a note 'Make must be less than 200 characters.'), 'Model' (with a note 'Model must be less than 200 characters.'), 'Time Zone' (a dropdown menu currently set to 'None Selected'), and 'Description'. A 'Clear Data' button is located in the top right corner of the form. Below the form, a search results snippet is visible, showing 'Search Name' and 'Found 1 Meters'. In the foreground, a 'Delete Meter MeterA' dialog box is open, displaying the warning: 'This will permanently Delete this meter and can not be undone.' The dialog has 'Confirm' and 'Cancel' buttons. Other UI elements like 'Add Filter', 'Add New Meter to PR...', and 'Remove' are also visible in the background.

What's Coming Soon

- openXDA 3.0
 - New asset model
 - Multi-node
 - Data conditioning/scaling
- PQ Dashboard 3.0
 - Works with openXDA 3.0
 - New “circle” display to replace heat maps
- PQ Digest 1.0
 - Event data
 - Interval data
- Device Summary Web Page
 - Device metadata
 - Device Comm Status
 - Device Configuration Status
 - Data Errors
- Data Maintenance Utilities
 - Event and Interval Data Rescue Tools
 - Event and Interval Data “Delete / Merge” Tools
- openMIC EE Additions
 - Dranetz Master Meter Capability
 - SATEC meter functionality
- openXDA interface with Elspec Sapphire system

The Progression of GPA PQ and Disturbance Monitoring Tools

		2017	2018	2019	2020	(planned)	(planned)	
openMIC	1.0	1.2	1.2	1.2	1.3	1.3	1.4	openMIC
openXDA	2.0	2.2	2.3	2.5	2.6	3.0	3.1	openXDA
PQ Dashboard	1.0.5	2.0	2.1	2.5	2.6	3.0	3.1	PQ Dashboard
openSEE	1.0	1.0	2.0	3.0	3.0	3.0	3.0	openSEE
SE Browser	-	-	-	0.8	0.9	1.0	1.1	SE Browser
System Center	-	-	-	-	0.9	1.0	1.1	System Center
miMD	-	-	-	-	0.9	1.0	1.1	miMD
PQ Digest	-	-	-	-	0.9	1.0	1.1	PQ Digest
TrenDAP	-	-	-	-	-	0.9	1.0	TrenDAP
	<ul style="list-style-type: none"> Multiple fault location algorithms Breaker Timing dD Tools PQI Support openSEE 	<ul style="list-style-type: none"> Granular time filtering Add/edit event notes openAPIs & more ways to integrate info Data exchange capabilities 	<ul style="list-style-type: none"> PQView Data Integration File-watcher improvements Data storage reductions Fault detection improvements PQ-Mark 	<ul style="list-style-type: none"> Fault Cause Analytics openSEE Analytics SE Browser LSCVS and Voltage Reg Reports 	<ul style="list-style-type: none"> Asset Centric Data Structure System Center miMD openMIC EE - ION meters PQDS Format 	<ul style="list-style-type: none"> openXDA 3.0 PQ Digest Device Summary openMIC EE - Dranetz openMIC EE - SATEC 	<ul style="list-style-type: none"> TrenDAP Continued product feature growth 	
	2012 - 2016	2017	2018	2019	2020	2021	2022	

openXDA 3.0
PQ Dashboard 3.0

Extra Slides

GPA's Disturbance Monitoring/PQ Product Suite

<https://github.com/GridProtectionAlliance>

Daily updates available at <https://gridprotectionalliance.org/NightlyBuilds/>

<p>Configure</p> <p>System Center for configuration of GPA's PQ Tool Suite</p> <p>Statistical Process Control PQ:SPC for Interval Data Alarming</p> <p>dD disturbance DATA Engineering Helper Tools</p>	<p>Acquire</p> <p><i>open</i>MIC</p> <p><i>open</i>MIC EE Enterprise Edition</p> <p>XDAPQView DATA LOADER</p>	<p>Analyze & Notify</p> <p><i>open</i>XDA EXTENSIBLE DISTURBANCE ANALYTICS</p> <p><i>open</i>EAS Extended Analytic Services</p> <p>Microsoft SQL Server</p> <p>TrenDAP Interval Data</p>	<p>Study</p> <p><i>open</i>SEE 3.0</p> <p>TrenDAP</p>
<p>Display</p> <p>System Event Browser</p> <p>POWER QUALITY Digest</p> <p>SOE Tools</p> <p>PQDashboard</p>	<p>Report</p> <p>PQ Monthly Report</p> <p>LSCVS Large Sensitive Customer VOLTAGE SAG REPORT</p> <p>PQ Trending Data Voltage Regulation Report</p>	<p>Share</p> <p>PQio POWER QUALITY DATA CONVERTER</p> <p><i>open</i>XDA {API}</p>	<p>Utilities</p> <p>PQDIF Explorer</p>

Highlights of 2020 Changes – System Center

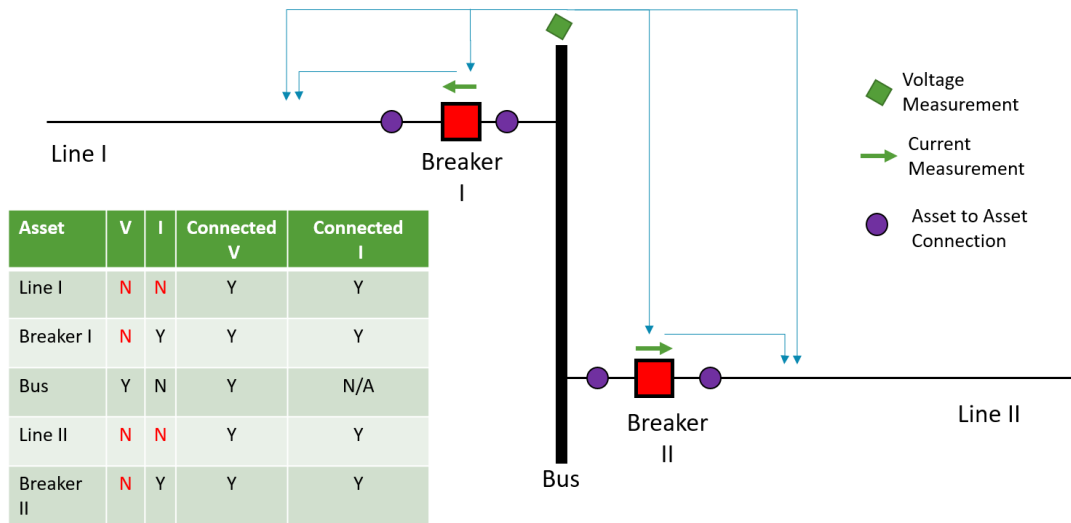


The screenshot shows the openXDA System Center interface. At the top left is the openXDA logo and a "Sign out" link. Below the logo is a navigation menu with categories: MONITORS AND ASSETS (Meters, Substations, Transmission Assets), EXTERNAL LINKS (PQView Customer Access, PQView Sites), SYSTEM SETTINGS (Value Lists), and USER SETTINGS (User Statistics, Users). The main content area has a search bar with a "Key" dropdown and a "Search..." input field. To the right of the search bar are buttons for "Add Parameter", "New Meter", and "Update Search". Below the search bar is a table with columns: Key, Name, Substation, Assets, Make, and Model. The table contains several rows of data, including entries for DEB, FL1, FL2, and FL3.

Key	Name	Substation	Assets	Make	Model
DEB	DEB	DEB	2	Test	Test
FL1	FL1	FL1	1	TEST	TEST
FL2	FL2	FL2	1	TEST	TEST
ForDelete	ForDelete	ForDelete	1	ForDelete	ForDelete
Mar	Mar	Mar	1	test	test
FL3	FL3	Substation1	2	test	test

- For the integrated management of configuration for all applications in the openXDA suite of tools
- Includes a “configuration change” alarm for substation measurement devices
- Provides integration with other corporate tools to reduce configuration burden and improve configuration quality
 - Work Management (Maximo) for asset attributes (e.g., structure locations)
 - Planning (FAWG) for equipment electrical characteristics
 - Active Directory for contact management

openXDA 3.0 Improvement – Asset Modeling



Currently, these assets can be modeled:

- Line
- Breaker
- Bus
- Transformer
- Capacitor Bank

- An asset-centric model has been implemented in openXDA
- Provides the ability to designate spare breakers and switch out breakers serving lines
- Allows voltage measurements to be associated with all equipment attached to the bus
- Also includes modeling of line segments – each with their individual impedance characteristic
 - Each segment can be connected:
 - To another segment
 - To 2 other segments (a tap)
 - To the substation

GPA Helper Tools – PQio, PQwdp and PQDIF Explorer

PQDIF Explorer

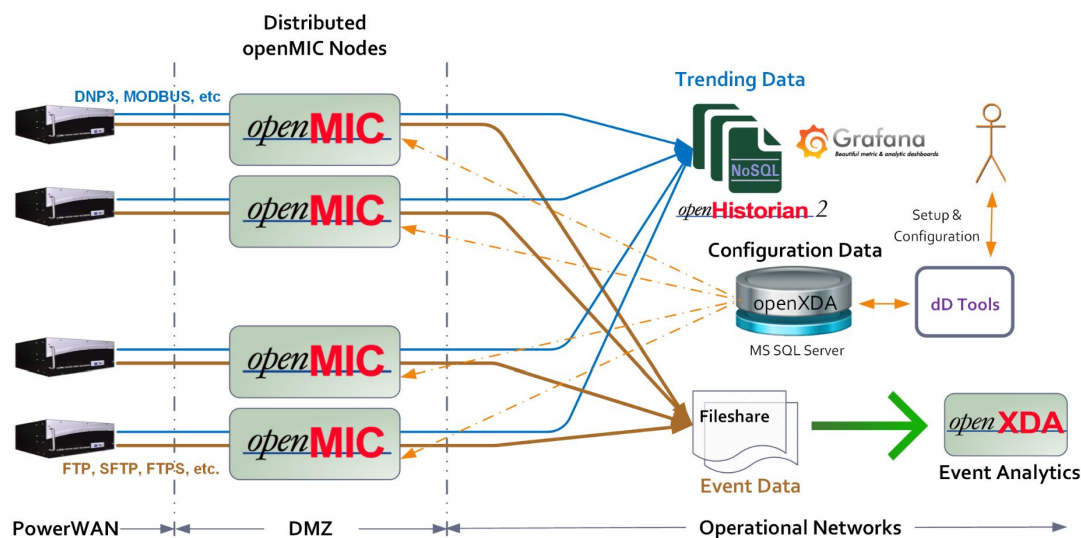
PQwdp

Left Charting Pad
To add data select an Asset and a Channel and drag and drop an Event from the Disturbance Event list in here

- PQDIF Explorer
 - Verifies PQDIF Files
 - Displays Meta-data in PQDIF files for investigation
- PQ waveform data parser
 - Can read COMTRADE, SEL and PQDIF files
 - Displays waveforms for visual analysis
- PQio
 - Converts data from PQDIF to PQDS format
 - EPRI PQDS format is easy to read, csv-like file format for PQ data

Highlights of 2020 Changes – Data Acquisition

*open***MIC***EE* Meter Information Collector ENTERPRISE EDITION



- Ability to interrogate substation devices using vendor specific, proprietary protocols
 - ION meters
 - Dranetz 61000s
 - SATEC

FTP-based polling is included in the open-source version of openMIC.

- Ability to horizontally scale into a high-availability, load-balanced system
- Ability place devices in a substation where there has been a breaker operation at the top of polling queue
- Available at the cost of standard maintenance for openMIC

Supported Substation Devices

- Devices where data can be downloaded via FTP in standard PQDIF or COMTRADE format.
- Non-standard files that openXDA can parse:
 - EMAX event files
 - APP trending data files
 - SEL CEV and SEL EVE -- for most relay models
 - SEL Trending Data Files
- openMIC EE
 - Dranetz 61000s
 - ION Meters
 - SATEC
- Plus, openMIC also supports real-time protocols
 - DNP3
 - Modbus