GRID PROTECTION ALLIANCE

PQDashboard User's Group

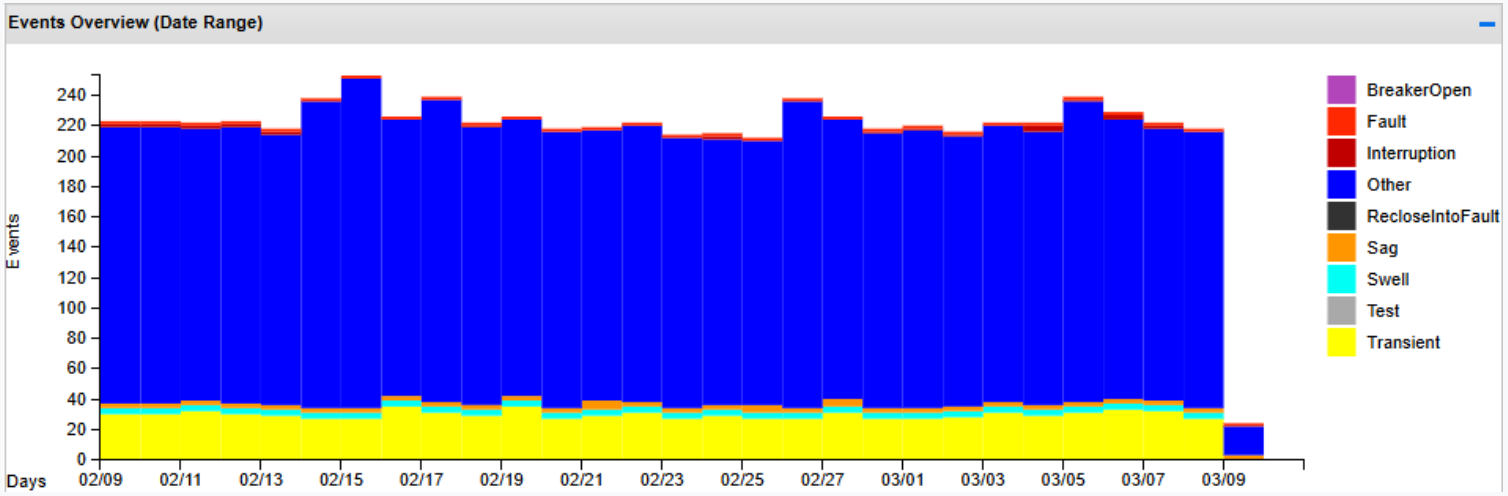
openMIC openXDA System Center miMD openSEE System Event Browser TrenDAP POWER QUALITY DIGEST

openXDA Event Classification

Events in openXDA

openXDA uses algorithms to categorize disturbances into one of the following event types:

- Fault
- Interruption
- Transient
- Reclose into Fault
- Sag
- Other
- Breaker Open
- Swell
- Test

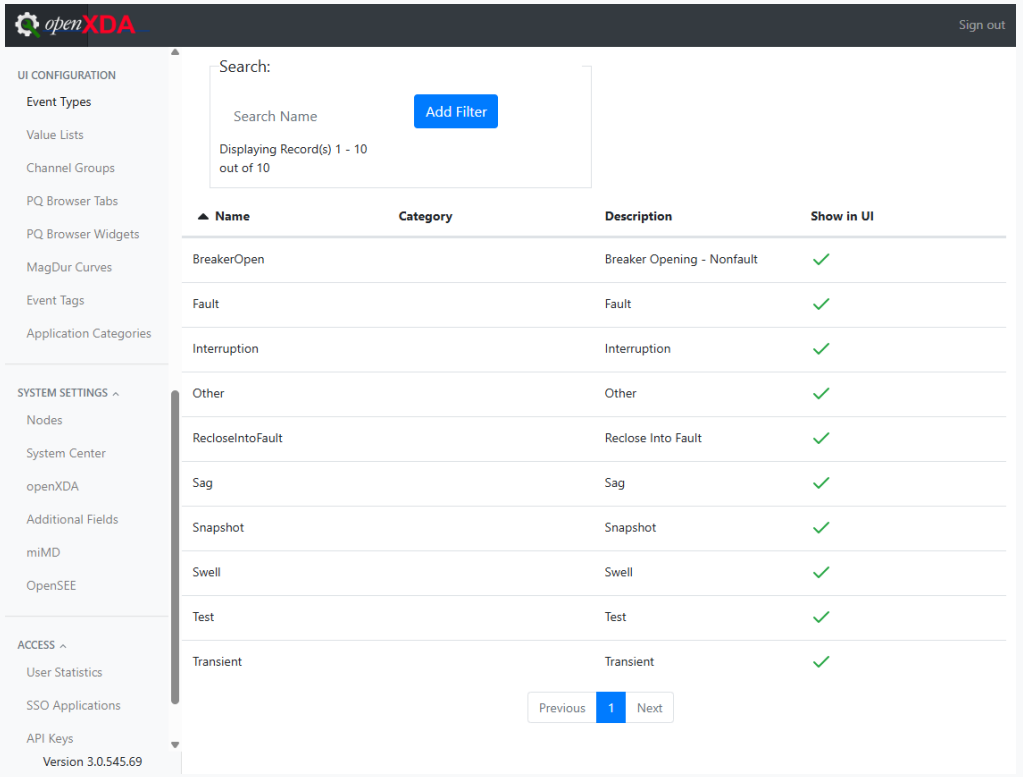


Event Categorization

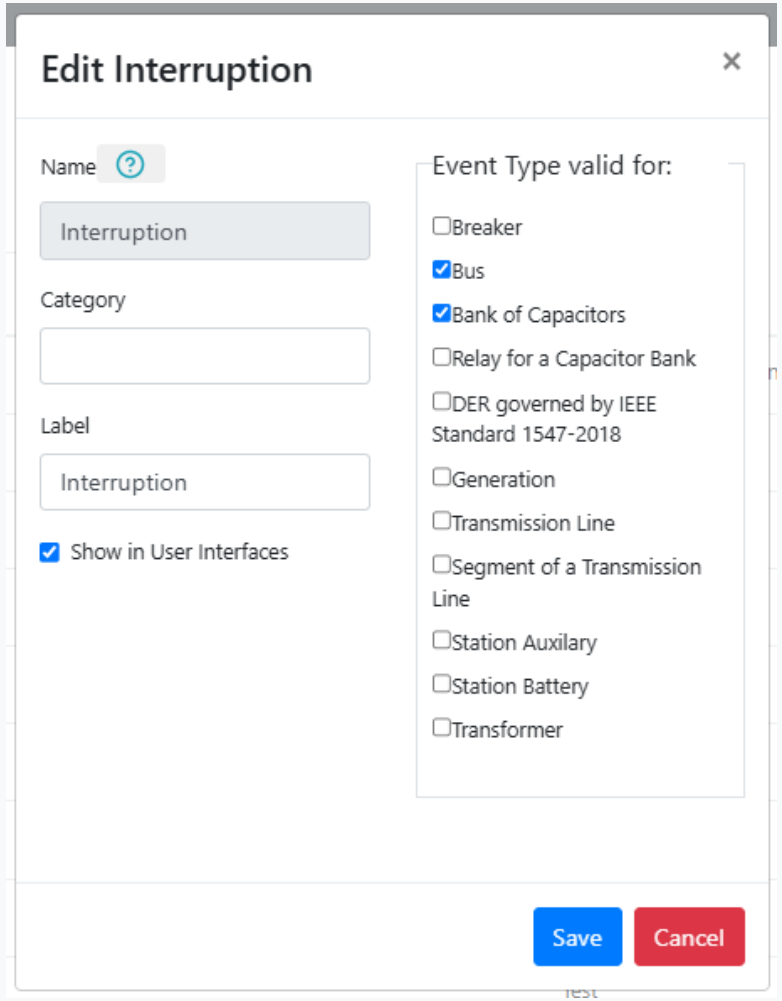
openXDA uses a combination of a hard-coded algorithms, priority assignment, and configurable settings to assign an event to a given type.

openXDA Settings categories:

- `DataAnalysis.*`
- `FaultLocation.*`
- `Breakers.*`
- Assets



Assets



By default, each event type has a pool of asset types that are assigned to it. Disturbances coming from specific asset types can only be categorized as the given event type if the asset type is assigned to it.*

The “assigned” assets along with event type visibility can be adjusted in System Center.

** “Fault” events must have occurred on a line or transformer asset, “Reclose into Fault” must have occurred on a breaker asset, “Other” and “Test” events can be assigned to disturbances from any asset type, which cannot be changed.*

Other / Test

Other is a catch-all event type that is assigned to any event that openXDA cannot categorize with the given settings, asset, and algorithm result.

*If you find that events your organization would normally classify in a certain way are being placed in the **Other** category, check your settings and asset configuration.*

Test is assigned to any disturbance that occurs on a meter that has been placed in a maintenance window in System Center. This allows events recorded by a meter that is undergoing or awaiting maintenance to be filtered out of visualization app displays.

Fault / Reclose into Fault

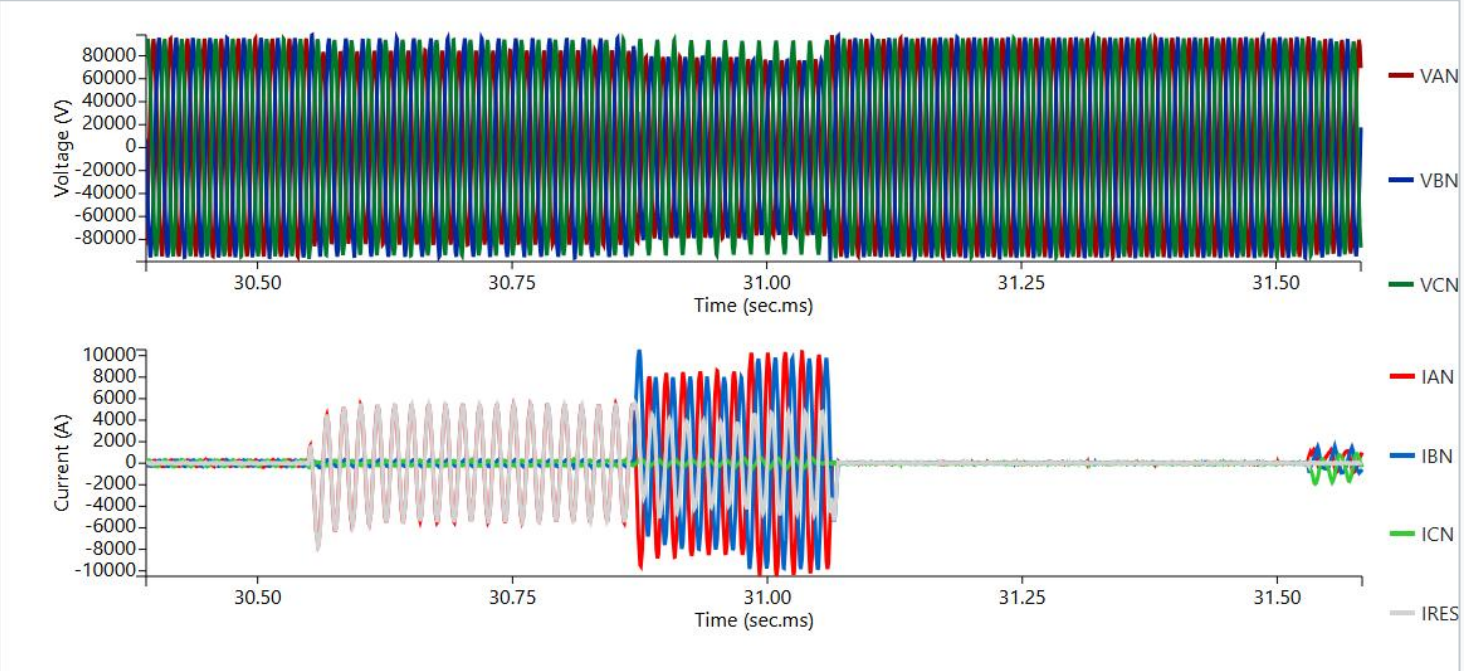
Fault is given precedence over all other event types.* If a disturbance is categorized as a fault, no other algorithm is run.

Faults require:

- At least 3 neutral voltage channels
- At least 3 current channels + a residual channel
- Defined impedances
- Recorded values must be within engineering reasonability

The disturbance must have occurred on a line or transformer asset to be considered a fault.

If the disturbance occurred on a breaker asset and includes a reclose, this is a **Reclose into Fault**.



Breaker Open

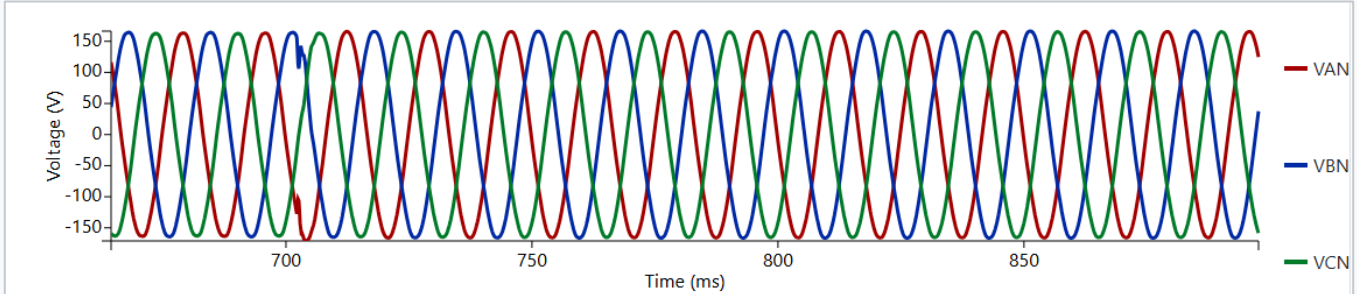
Breaker Open requires:

- The `Breakers.BreakerOpenEventTypeEnabled` setting set to `true`.
- The event must have occurred on a breaker.
- A breaker trip was detected.

The `Breakers.*` openXDA settings allow configuration of various thresholds and other aspects of this event type

Interruption

- An **Interruption** is when the per-unit voltage dips below the `DataAnalysis.InterruptionThreshold` value (default `0.1`)

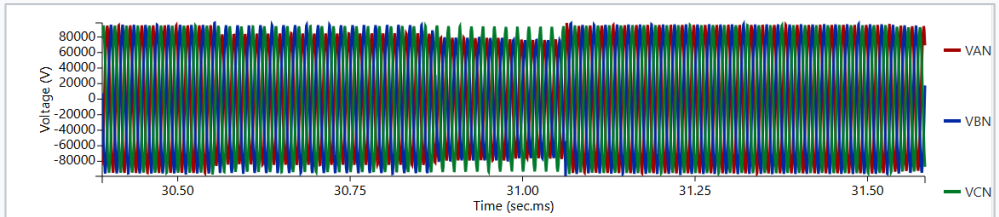


Voltage Disturbance in Waveform:

Disturbance Type	Phase	Magnitude (%)	Duration (ms)	Start Time	Severity
Interruption	AN	1.5	216.67	11:35:30.664	3
Interruption	BN	1.5	216.67	11:35:30.664	3
Interruption	CN	1.5	216.67	11:35:30.664	3
Interruption	AB	1.5	216.67	11:35:30.664	3
Interruption	BC	1.6	216.67	11:35:30.664	3
Interruption	CA	1.5	216.67	11:35:30.664	3

Sag

- A **Sag** is when the per-unit voltage dips below the `DataAnalysis.SagThreshold` value (default `0.9`) but remains above the `DataAnalysis.InterruptionThreshold` value.

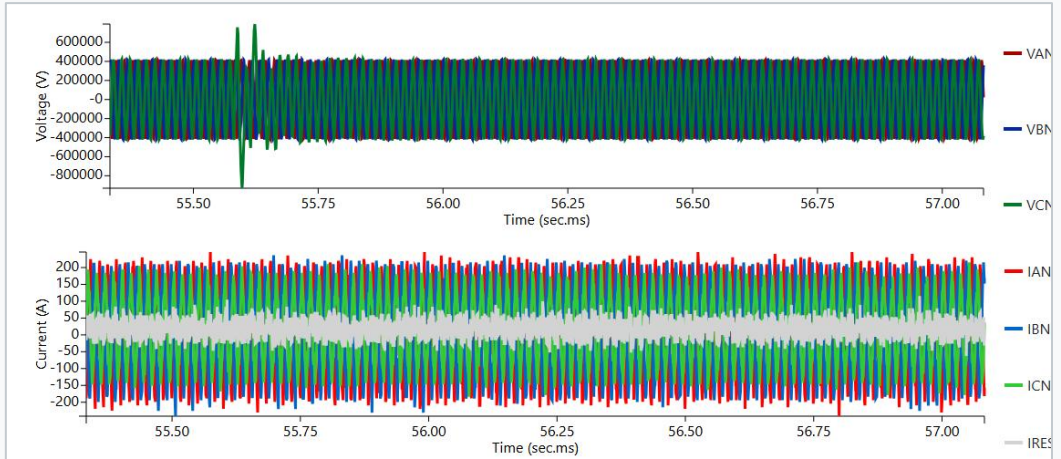


Voltage Disturbance in Waveform:

Disturbance Type	Phase	Magnitude (%)	Duration (ms)	Start Time	Severity
Sag	AN	57.3	1176.25	19:13:30.390	2
Sag	BN	57.6	1176.25	19:13:30.390	2
Sag	CN	70.3	1176.25	19:13:30.390	1
Sag	AB	55.0	1176.25	19:13:30.390	2
Sag	BC	65.4	1176.25	19:13:30.390	1
Sag	CA	65.7	1176.25	19:13:30.390	1
Transient	BN	54.7	3.75	19:13:31.062	0
Transient	AB	74.7	4.58	19:13:31.062	0

Swell

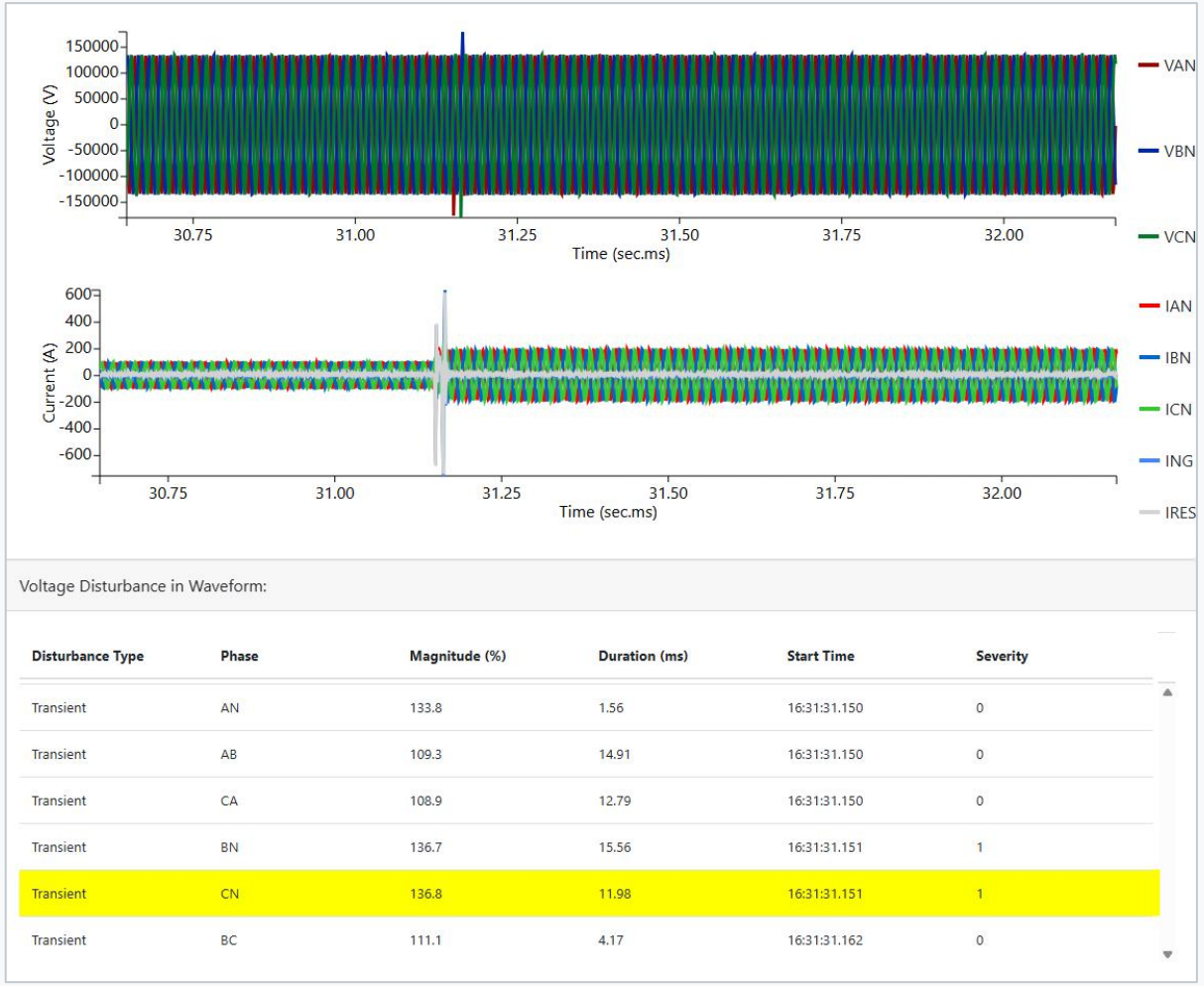
A **Swell** is when the per-unit voltage rises above the `DataAnalysis.SwellThreshold` value (default `1.1`).



Voltage Disturbance in Waveform:

Disturbance Type	Phase	Magnitude (%)	Duration (ms)	Start Time	Severity
Swell	CA	174.0	28.84	20:39:55.569	3
Swell	CA	174.0	28.84	20:39:55.569	3
Swell	CN	212.3	29.49	20:39:55.570	5
Swell	CN	212.3	29.49	20:39:55.570	5
Swell	BC	140.6	17.58	20:39:55.581	2
Swell	BC	140.6	17.58	20:39:55.581	2
Transient	CN	228.0	130.79	20:39:55.582	5
Transient	CN	228.0	130.79	20:39:55.582	5
Transient	BC	158.3	126.63	20:39:55.582	2

Transient



Voltage Disturbance in Waveform:

Disturbance Type	Phase	Magnitude (%)	Duration (ms)	Start Time	Severity
Transient	AN	133.8	1.56	16:31:31.150	0
Transient	AB	109.3	14.91	16:31:31.150	0
Transient	CA	108.9	12.79	16:31:31.150	0
Transient	BN	136.7	15.56	16:31:31.151	1
Transient	CN	136.8	11.98	16:31:31.151	1
Transient	BC	111.1	4.17	16:31:31.162	0

A **Transient** is a voltage disturbance that is very short-lived, identified by comparing a single sample to its counterpart in the previous cycle and flagging differences greater than 10% of nominal.

Disturbance Severity

- Disturbances are assigned a severity on a scale of 0-5, with 0 being the least severe, and 5 being the most severe.
- The most severe disturbance in a waveform record determines the openXDA event type assigned to the record.
- Compares the magnitude and duration to the ITIC curve.