
Overview

PDQ TRACKER

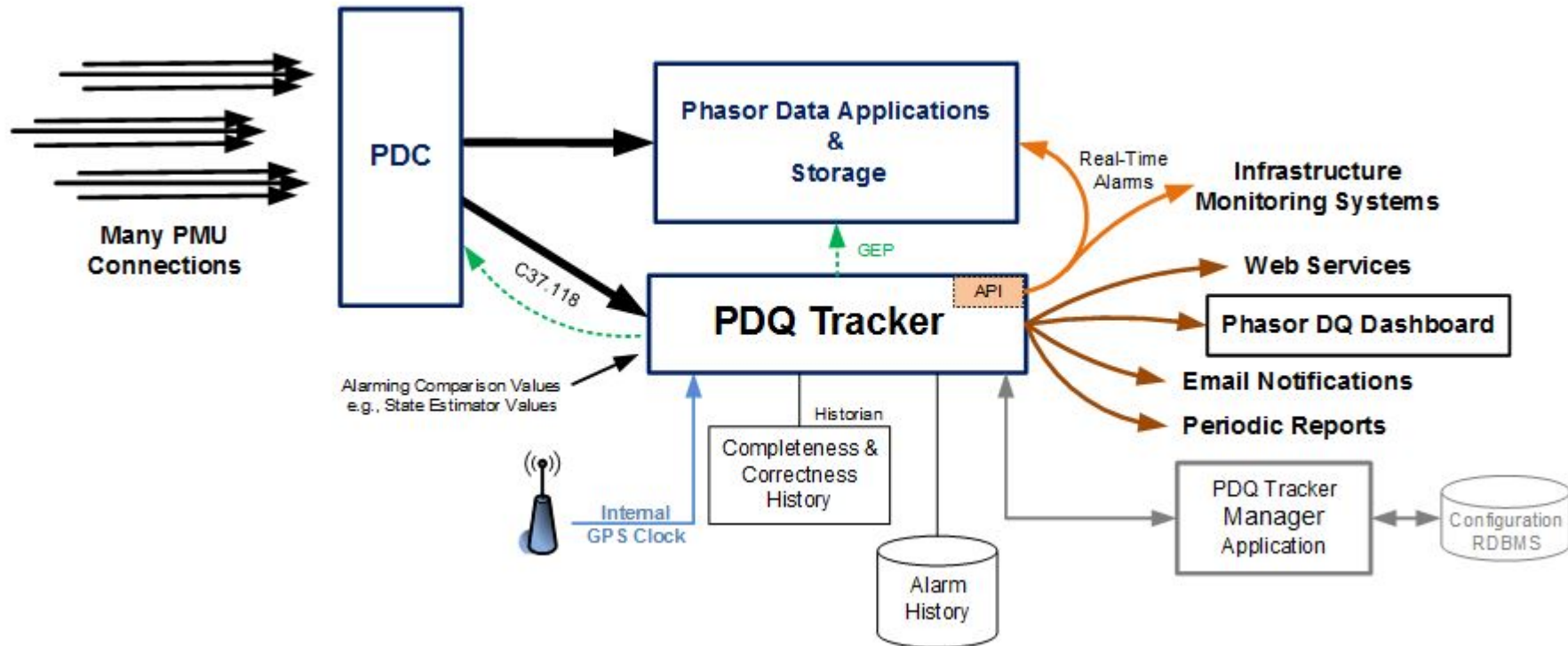
phasor data quality alarming & reporting

August 2014

Phasor Data Quality Needs Attention

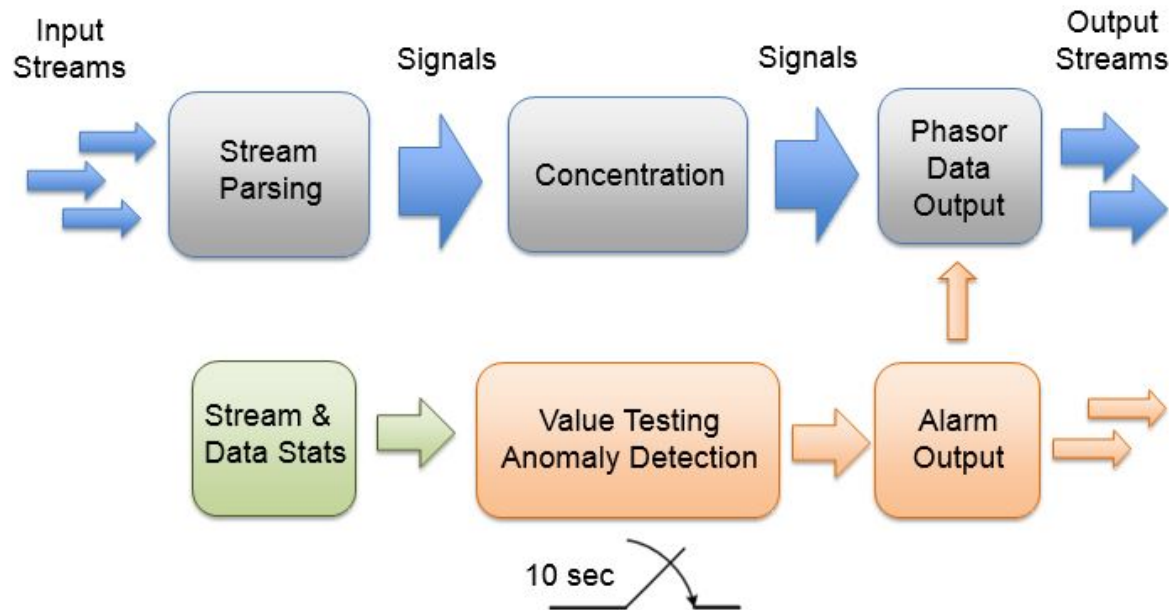
- **Data quality assurance is becoming increasingly important for successful integration of synchrophasor data into utility operations.**
 - Device (PMU) availability
 - Time quality issues
 - Value quality issues
- **Alarms are needed to alert real-time analytics and operators of bad or missing phasor data.**
- **Reports are needed to support businesses processes to improve data availability and data quality**

Typical Installation



PDQ Tracker is installed in parallel to existing infrastructure, can be used with any vendor's PDC.

Data Quality Tests



Completeness

- Bad CRC
- Out-of-Order Frames
- Missing Frames
- New Configuration

Correctness

- Latency
- Reasonableness
- Latched Value
- Signal to Noise

Leverages the Existing GSF Alarm Module

openPDC Manager - GPA-WS-1\swills

openPDC Manager

Current Node: Default

Home Monitoring Devices Adapters Manage

Manage Alarms

1 Tag Name *

2 Signal TVA_SHELBY:ABBS

3 Operation Equal to

4 Alarm Point

5 Tolerance

6 Delay seconds

7 Hysteresis

8 Severity None

9 Description

10 Load Order * 0

11 Enabled

12 Create Associated Measurement

Delete Clear Save

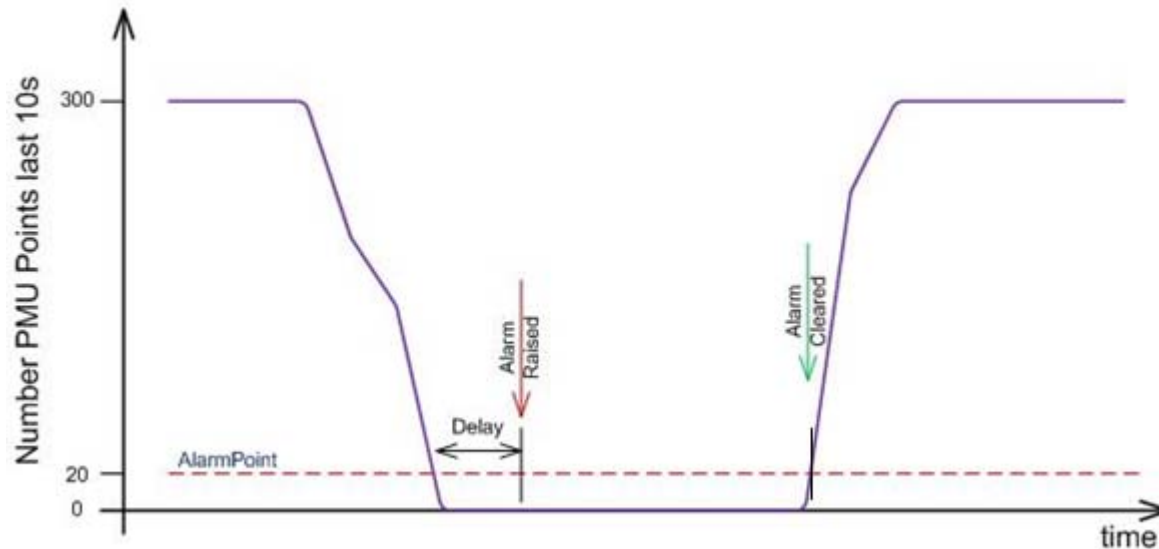
TagName	Operation	Severity	Description	Enabled
FREQ_ALARM	TVA_SHELBY:ABBF > 60.0	High	Frequency upper limit	<input checked="" type="checkbox"/>

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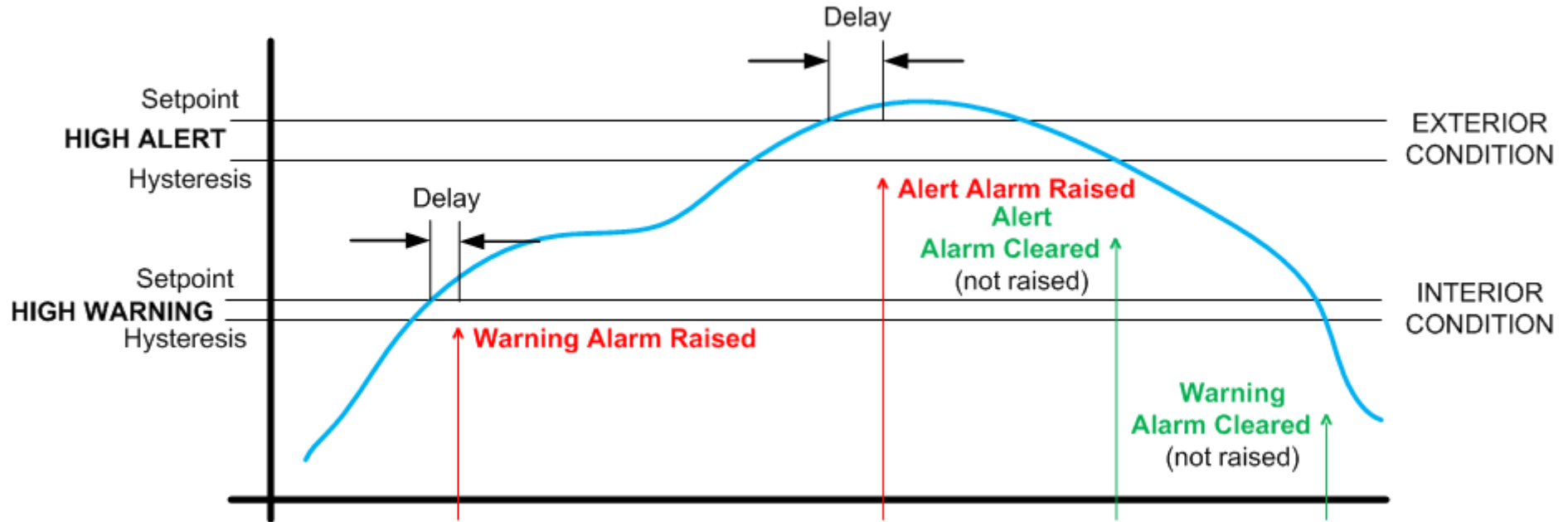
Alarms can be created on any measurement, calculated value or performance metric.

Simple Alarming Example



A “device disconnected” alarm is raised if the number of measurements counted by the performance historian every 10 seconds falls below the Alarm Point for a specified time, e.g., 30 seconds.

More Complex Alarming Example



Warning and Alert Alarms are raised at setpoints and are cleared only after falling below a specified hysteresis.

Alarm Repository

- **For display of current DQ status and for integration with other systems a collection of relational tables will house:**
 - Current Alarm State
 - Alarm History for each change of state

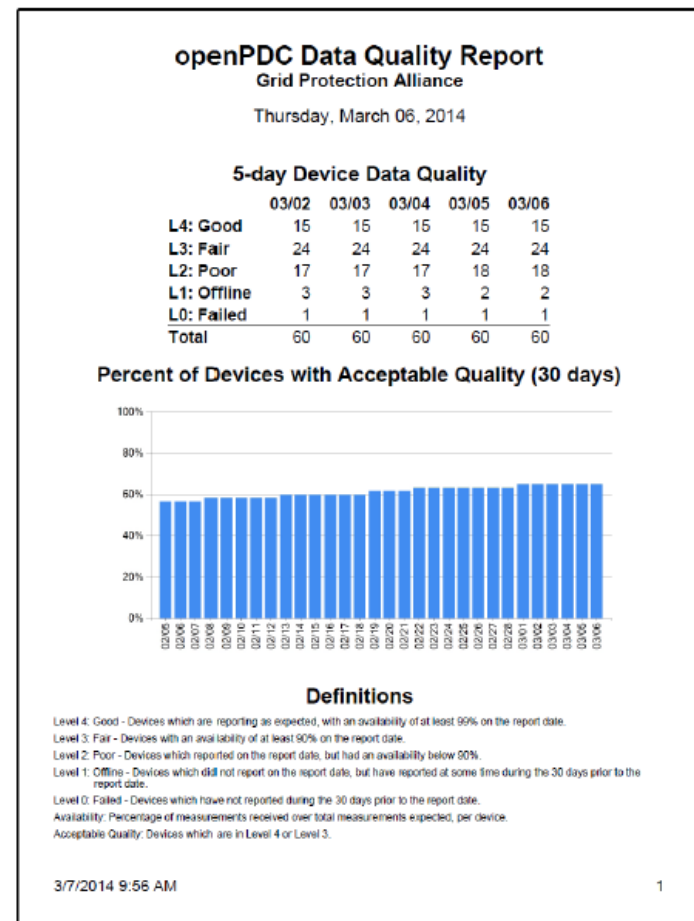
Candidate Alarm Repository Elements

- **Alarm GUID**
- **Alarm tag*** (a mnemonic that may not be unique)
- **Source signal GUID***
- **Date and time of alarm action**
- **Alarm Action** (raised / cleared / reset)
- **Measurement value**
- **Set-point value**
- **Condition text*** (short auto-generated description)
- **Condition description*** (optional user defined description)
- **Alarm category***
- **Alarm severity***

** Joined attributes based on the alarm definition ID*

Existing GSF Device Availability Reporting

- With the March 2014 release of the openPDC (*version 2.0.118 or later*) automated data availability reporting is included
- The report is structured to support a daily process for identifying and correcting out-of-service PMUs
- User's can configure the definition of "good, fair, and poor"



Automated DQ Reporting

- **Daily Reporting**

- Existing 5-day availability plus list of PMUs sorted by duration of outage
- Infrastructure summary stats – correctness and completeness
- Devices (PMUs) added / not-reporting / configuration changes
- Stream Latency Statistics

- **Monthly reporting**

- Worst performing devices (PMUs)
- Devices (PMUs) added
- Infrastructure summary stats – correctness and completeness
- Stream Latency Statistics



* *New reports would be vetted with Peak Reliability*

Email Notifications

- Through addition of an easy-to-maintain “notification” list, auto-generated daily and monthly reports would be bundled and emailed
- For real-time support personnel, alarms passing through an alarm filter would be emailed to a separately maintained list of email accounts. Multiple lists can be configured.

Embedded Web Server* for A Phasor Data Quality Dashboard

- **Alarm and report data would be available by pointing a web browser at the PDQ Tracker service*.**
- **Security (encryption & authentication) available**
- **The Phasor DQ Status Dashboard that would:**
 - Show / export alarm log for a selected day (including current day)
 - Show active alarms – filterable with clickable column sorting
 - View periodic reports
 - View the alarm configuration settings (Editing alarm settings only allowed via PDI Manager)



**This approach avoids the need to install the web-based DQ Status Dashboard on a web server, considerably simplifying installation*

Schedule

- **Phase 1 – Version 0.9 – October 2014**
 - The data layer with an Operational Core
 - Simple APIs for alarm integration
 - Installation package for beta testing
- **Phase 2 – Version 1.0 – January 2015**
 - PDQ Tracker Dashboard
 - Improved Alarm Configuration Management
 - Automated e-mails
 - Richer APIs
 - Integration with hardware GPS Clock