

{B48D85A3-F5F5-11CF-9D89-0080C72E70A3}

{B48D85A4-F5F5-11CF-9D89-0080C72E70A3}

{89738623-F1C3-11CF-9D89-0080C72E70A3}

{8973860F-F1C3-11CF-9D89-0080C72E70A3}

{89738618-F1C3-11CF-9D89-0080C72E70A3}

{62F28191-F9C4-11CF-9D89-0080C72E70A3}

{62F28190-F9C4-11CF-9D89-0080C72E70A3}

{62F2818E-F9C4-11CF-9D89-0080C72E70A3}

{62F2818F-F9C4-11CF-9D89-0080C72E70A3}

{62F28192-F9C4-11CF-9D89-0080C72E70A3}

{62F2818D-F9C4-11CF-9D89-0080C72E70A3}

{B48D858F-F5F5-11CF-9D89-0080C72E70A3}

{B48D858D-F5F5-11CF-9D89-0080C72E70A3}

# IEEE P1159.3 PQDIF Task Force Meeting

Dan Sabin

Electrotek Concepts, Inc.

[d.sabin@ieee.org](mailto:d.sabin@ieee.org)

January 13, 2009

Calgary, Alberta, Canada



# IEEE Std 1159.3 Task Force

## IEEE

### IEEE Power & Energy Society

- IEEE Transmission and Distribution Committee
  - IEEE Power Quality Subcommittee
    - IEEE P1159 Working Group on Power Quality Monitoring
      - IEEE P1159.3 Task Force on Power Quality Data Interchange

# IEEE Std 1159.3 PQDIF History

- The IEEE P1159.3 Task Force was formed in 1996 by the IEEE P1159 Working Group
- The first version of the standard was completed in 2002 and affirmed by vote in 2003
- A reaffirmation or revision and its vote was due in October 2008.

# IEEE Std 1159.3 PQDIF Reaffirmation

- We initiated a reaffirmation ballot in September 2008.
- The ballot was open from October 15 to November 14
- Ballot Pool Size: 65
  - Number of Votes: 54
    - Accept: 52
    - Reject: 0
    - Abstain: 2
- The reaffirmation was completed at the March 2008 meeting of the Standards Board.

# What Next for IEEE P1159.3?

## Proposed 2009-2010 Work

- Complete editorial corrections to 2002 document
- Add new ID and GUID lookup values
- Add new annex on storing PQDIF records in XML
- Solicit feedback from vendors using PQDIF

## Proposed 2011-2012 Work

- Add new annex on storing PQDIF records in a relational database

# Example 4-Byte Integer ID Values

- tagPhaseID
  - ID\_PHASE\_AN, ID\_PHASE\_BN, ID\_PHASE\_CN, etc.
- tagQuantityMeasuredID
  - ID\_QM\_ENERGY, D\_QM\_MFIELD, ID\_QM\_CURRENT, etc.
- tagQuantityUnitsID
  - ID\_QU\_AMPS, ID\_QU\_PERUNIT, ID\_QU\_RPM, etc.

# Example 32-Byte GUIDID Values

- tagVendorID, tagEquipmentID
- tagQuantityCharacteristicID
  - ID\_QC\_Q\_FUND, ID\_QC\_DF, ID\_QC\_RMS, etc.
- tagDisturbanceCategoryID
  - ID\_DISTURB\_1159\_SHORTDUR\_MOMENT, ID\_DISTURB\_1159\_SHORTDUR, etc.
- tagQuantityTypeID
  - ID\_QT\_WAVEFORM, ID\_QT\_PHASOR, ID\_QT\_MAGDUR, etc.

# New Web Site for Submitting New Tags and IDs



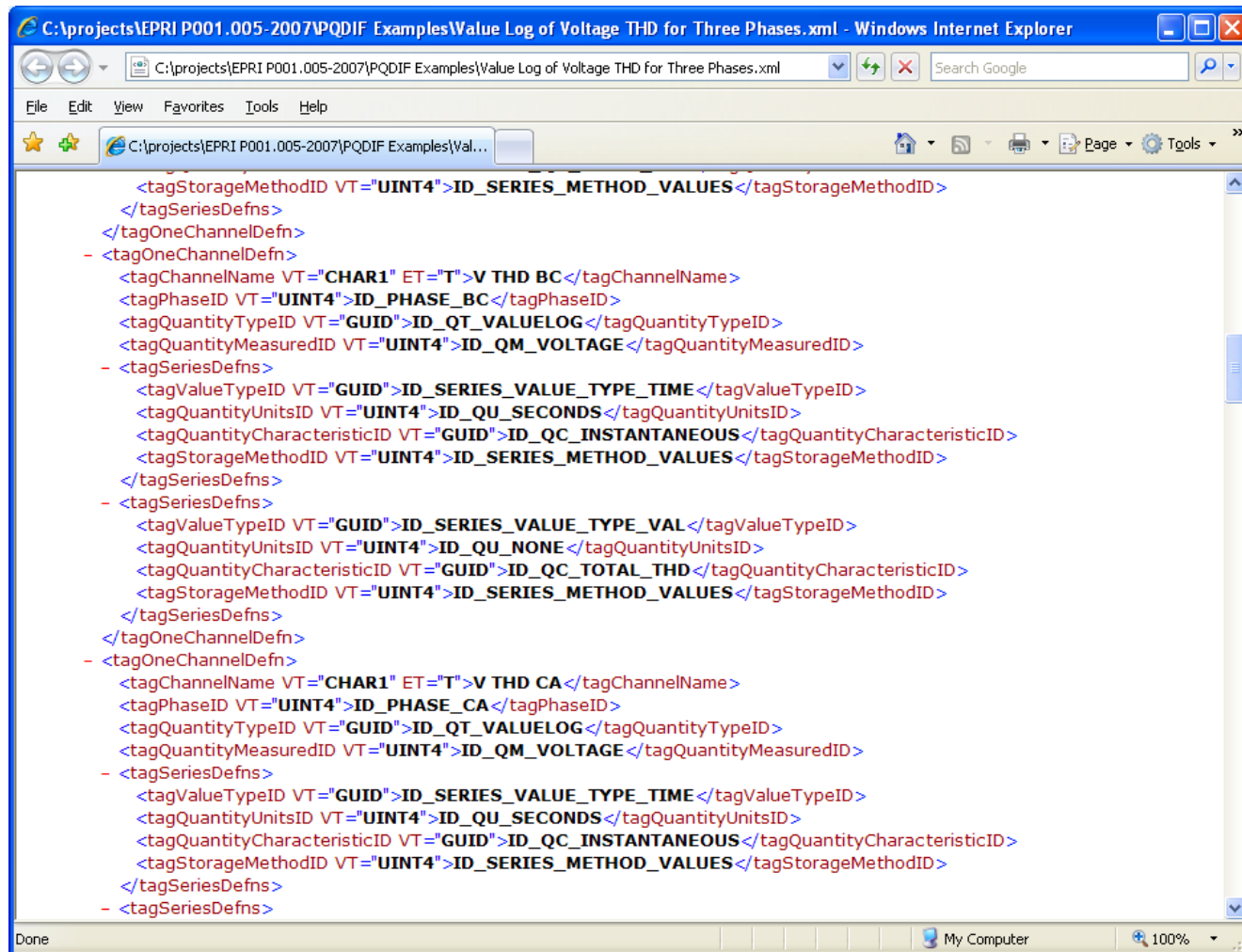
# Example of Dictionary File for the Proposed XML Format

```
<?xml version="1.0" ?>
- <Dictionary>
- <Standard>
- <tags>
  <Blank value="{89738618-F1C3-11CF-9D89-0080C72E70A3}" />
  <Container value="{89738606-F1C3-11CF-9D89-0080C72E70A3}" />
  <RecDataSource value="{89738619-F1C3-11CF-9D89-0080C72E70A3}" />
  <RecMonitorSettings value="{B48D858C-F5F5-11CF-9D89-0080C72E70A3}" />
  <RecObservation value="{8973861A-F1C3-11CF-9D89-0080C72E70A3}" />
  <VersionInfo value="{89738607-F1C3-11CF-9D89-0080C72E70A3}" />
  <FileName value="{89738608-F1C3-11CF-9D89-0080C72E70A3}" />
  <Creation value="{89738609-F1C3-11CF-9D89-0080C72E70A3}" />
  <LastSaved value="{8973860A-F1C3-11CF-9D89-0080C72E70A3}" />
  <TimesSaved value="{8973860B-F1C3-11CF-9D89-0080C72E70A3}" />
  <Language value="{8973860C-F1C3-11CF-9D89-0080C72E70A3}" />
  <Title value="{8973860D-F1C3-11CF-9D89-0080C72E70A3}" />
  <Subject value="{8973860E-F1C3-11CF-9D89-0080C72E70A3}" />
  <Author value="{8973860F-F1C3-11CF-9D89-0080C72E70A3}" />
  <Keywords value="{89738610-F1C3-11CF-9D89-0080C72E70A3}" />
  <Comments value="{89738611-F1C3-11CF-9D89-0080C72E70A3}" />
  <LastSavedBy value="{89738612-F1C3-11CF-9D89-0080C72E70A3}" />
  <Application value="{89738623-F1C3-11CF-9D89-0080C72E70A3}" />
  <Security value="{89738613-F1C3-11CF-9D89-0080C72E70A3}" />
  <Owner value="{89738614-F1C3-11CF-9D89-0080C72E70A3}" />
  <Copyright value="{89738615-F1C3-11CF-9D89-0080C72E70A3}" />
  <Trademarks value="{89738616-F1C3-11CF-9D89-0080C72E70A3}" />
  <Notes value="{89738617-F1C3-11CF-9D89-0080C72E70A3}" />
  <CompressionStyleID value="{8973861B-F1C3-11CF-9D89-0080C72E70A3}" />
  <CompressionAlgorithmID value="{8973861C-F1C3-11CF-9D89-0080C72E70A3}" />
  <CompressionChecksum value="{8973861D-F1C3-11CF-9D89-0080C72E70A3}" />
  <Name value="{B48D85A2-F5F5-11CF-9D89-0080C72E70A3}" />
  <Address1 value="{B48D85A3-F5F5-11CF-9D89-0080C72E70A3}" />
```

# Example of Proposed XML Format

```
<?xml version="1.0" ?>
- <records>
- <tagContainer>
- <tagVersionInfo VT="UINT4" ET="V" NP="4">
  <d>1 5 1 5</d>
</tagVersionInfo>
<tagFileName VT="CHAR1" ET="T">C:\projects\EPRI P001.005-2007\PQDIF Examples\Value Log of Voltage THD
  for Three Phases.xml</tagFileName>
<tagCreation VT="DT">2008-02-18T21:36:33.468750</tagCreation>
<tagLastSaved VT="DT">2008-02-18T21:36:33.468750</tagLastSaved>
<tagTimesSaved VT="UINT4">1</tagTimesSaved>
<tagLanguage VT="CHAR1" ET="T">US English</tagLanguage>
<tagTitle VT="CHAR1" ET="T">PQView</tagTitle>
<tagSubject VT="CHAR1" ET="T">N/A</tagSubject>
<tagAuthor VT="CHAR1" ET="T">dsabin</tagAuthor>
<tagKeywords VT="CHAR1" ET="T">N/A</tagKeywords>
<tagComments VT="CHAR1" ET="T">Exported from ODBC;DATABASE=PQVIEW_DEMO</tagComments>
<tagLastSavedBy VT="CHAR1" ET="T">dsabin</tagLastSavedBy>
<tagApplication VT="CHAR1" ET="T">PQView Power Quality Data Manager</tagApplication>
<tagSecurity VT="CHAR1" ET="T">No Security</tagSecurity>
<tagOwner VT="CHAR1" ET="T">N/A</tagOwner>
<tagCopyright VT="CHAR1" ET="T">N/A</tagCopyright>
<tagTrademarks VT="CHAR1" ET="T">PQView is a registered trademark of Electrotek Concepts, Inc. EPRI is a
  registered service mark of the Electric Power Research Institute.</tagTrademarks>
<tagNotes VT="CHAR1" ET="T">N/A</tagNotes>
<tagName VT="CHAR1" ET="T">PQView</tagName>
<tagAddress1 VT="CHAR1" ET="T">3420 Hillview Avenue</tagAddress1>
<tagCity VT="CHAR1" ET="T">Palo Alto</tagCity>
<tagState VT="CHAR1" ET="T">CA</tagState>
<tagPostalCode VT="CHAR1" ET="T">94304</tagPostalCode>
<tagCountry VT="CHAR1" ET="T">USA</tagCountry>
<tagPhoneVoice VT="CHAR1" ET="T">+1-650-855-2121</tagPhoneVoice>
```

# Example of Proposed XML Format



The screenshot shows a Windows Internet Explorer browser window with the following details:

- Address bar: C:\projects\EPRI P001.005-2007\PQDIF Examples\Value Log of Voltage THD for Three Phases.xml
- Search bar: Search Google
- Menu bar: File, Edit, View, Favorites, Tools, Help
- Navigation bar: Home, Back, Forward, Stop, Refresh, Print, Page, Tools
- Content area: XML code for a Value Log of Voltage THD for Three Phases. The code is color-coded and includes tags such as <tagStorageMethodID, <tagSeriesDefns, <tagOneChannelDefn, <tagChannelName, <tagPhaseID, <tagQuantityTypeID, <tagQuantityMeasuredID, <tagValueTypeID, <tagQuantityUnitsID, <tagQuantityCharacteristicID, and <tagStorageMethodID. The code is structured as follows:

```
<tagStorageMethodID VT="UINT4">ID_SERIES_METHOD_VALUES</tagStorageMethodID>
</tagSeriesDefns>
</tagOneChannelDefn>
- <tagOneChannelDefn>
  <tagChannelName VT="CHAR1" ET="T">V THD BC</tagChannelName>
  <tagPhaseID VT="UINT4">ID_PHASE_BC</tagPhaseID>
  <tagQuantityTypeID VT="GUID">ID_QT_VALUELOG</tagQuantityTypeID>
  <tagQuantityMeasuredID VT="UINT4">ID_QM_VOLTAGE</tagQuantityMeasuredID>
  - <tagSeriesDefns>
    <tagValueTypeID VT="GUID">ID_SERIES_VALUE_TYPE_TIME</tagValueTypeID>
    <tagQuantityUnitsID VT="UINT4">ID_QU_SECONDS</tagQuantityUnitsID>
    <tagQuantityCharacteristicID VT="GUID">ID_QC_INSTANTANEOUS</tagQuantityCharacteristicID>
    <tagStorageMethodID VT="UINT4">ID_SERIES_METHOD_VALUES</tagStorageMethodID>
  </tagSeriesDefns>
  - <tagSeriesDefns>
    <tagValueTypeID VT="GUID">ID_SERIES_VALUE_TYPE_VAL</tagValueTypeID>
    <tagQuantityUnitsID VT="UINT4">ID_QU_NONE</tagQuantityUnitsID>
    <tagQuantityCharacteristicID VT="GUID">ID_QC_TOTAL_THD</tagQuantityCharacteristicID>
    <tagStorageMethodID VT="UINT4">ID_SERIES_METHOD_VALUES</tagStorageMethodID>
  </tagSeriesDefns>
</tagOneChannelDefn>
- <tagOneChannelDefn>
  <tagChannelName VT="CHAR1" ET="T">V THD CA</tagChannelName>
  <tagPhaseID VT="UINT4">ID_PHASE_CA</tagPhaseID>
  <tagQuantityTypeID VT="GUID">ID_QT_VALUELOG</tagQuantityTypeID>
  <tagQuantityMeasuredID VT="UINT4">ID_QM_VOLTAGE</tagQuantityMeasuredID>
  - <tagSeriesDefns>
    <tagValueTypeID VT="GUID">ID_SERIES_VALUE_TYPE_TIME</tagValueTypeID>
    <tagQuantityUnitsID VT="UINT4">ID_QU_SECONDS</tagQuantityUnitsID>
    <tagQuantityCharacteristicID VT="GUID">ID_QC_INSTANTANEOUS</tagQuantityCharacteristicID>
    <tagStorageMethodID VT="UINT4">ID_SERIES_METHOD_VALUES</tagStorageMethodID>
  </tagSeriesDefns>
  - <tagSeriesDefns>
```
- Status bar: Done, My Computer, 100%

# Implementing PQDIF in XML Files

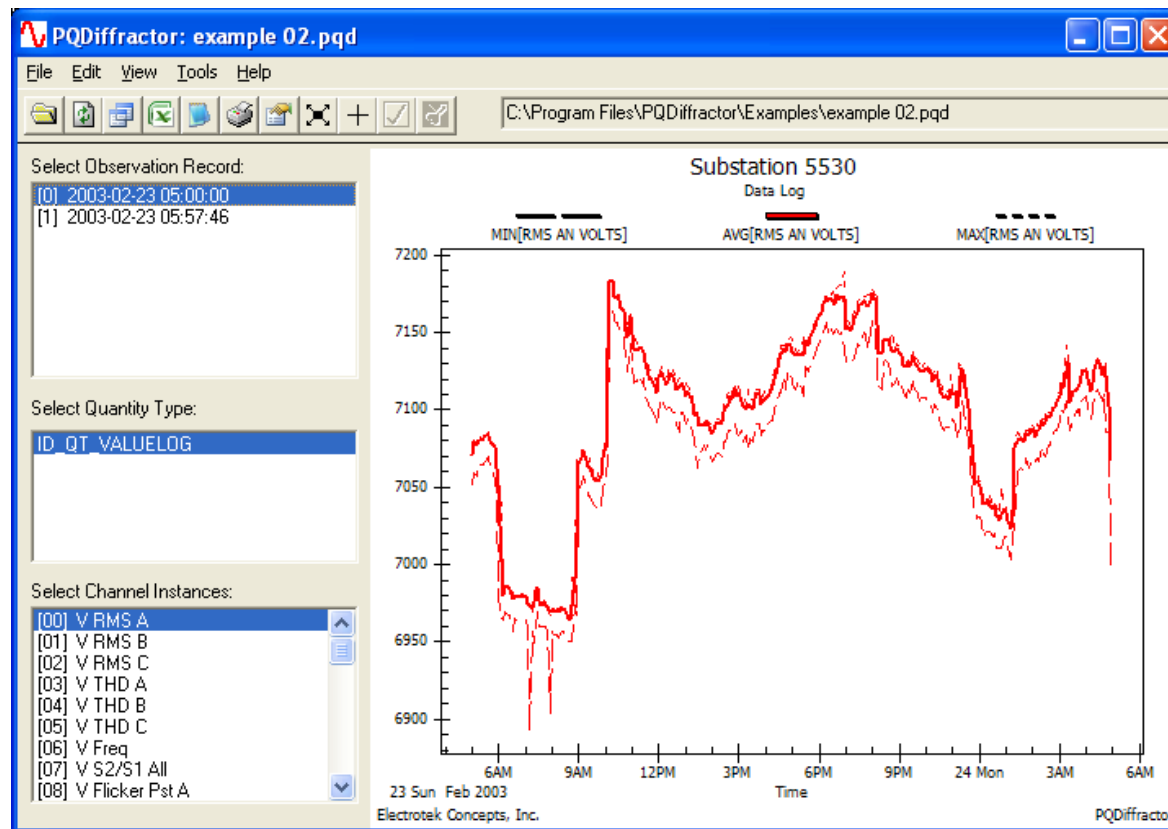
- The IEEE task force has worked on an XML specification for storing PQDIF files since 2004.
- The advantages to this format include easier reading and writing, compatibility with arbitrary XML applications, and the ability to provide documentation and examples of proper file structure to other software engineers.
- The disadvantage to this format is increased file size (~10x) and processing time due to text parsing.
  - File size can be reduced by compressing the XML file (for example, zip or rar)

# New PQDIF Resources on Internet

- <http://www.pqview.com/pqdif/>
  - Example PQDIF Files
    - Zip archive contains example of PQDIF files in the native binary (PQD) format
  - Example PQDIF XML Files
    - Zip archive contains example of PQDIF files in the proposed XML format
  - PQDiffractor
    - A free PQDIF file viewer and diagnostics utility

# PQDiffactor

- PQDiffactor is a free PQDIF file viewer utility developed for browsing, diagnosing, and converting PQDIF files.



# PQDiffractor Functions

- Read binary PQDIF Files
- View lists of data source records in each PQDIF file
- View list of observation records stored in each PQDIF file
- View lists of quantity types associated with each observation record
- View list of channel instances associated in each observation record
- View tags and values from records, definitions, and instances stored in PQDIF files as tables

# PQDiffraction Export Functions

- Export charts to numerous graphical formats
  - Enhanced metafile (EMF)
  - Windows metafile (WMF)
  - Windows bitmap (BMP)
  - JPEG Image (JPG)
  - Portable Network Graphics (PNG)
- Export displayed observations as text files
  - Direct export to Microsoft Excel
  - Export as CSV file



# PQDiffraction Conversion Functions

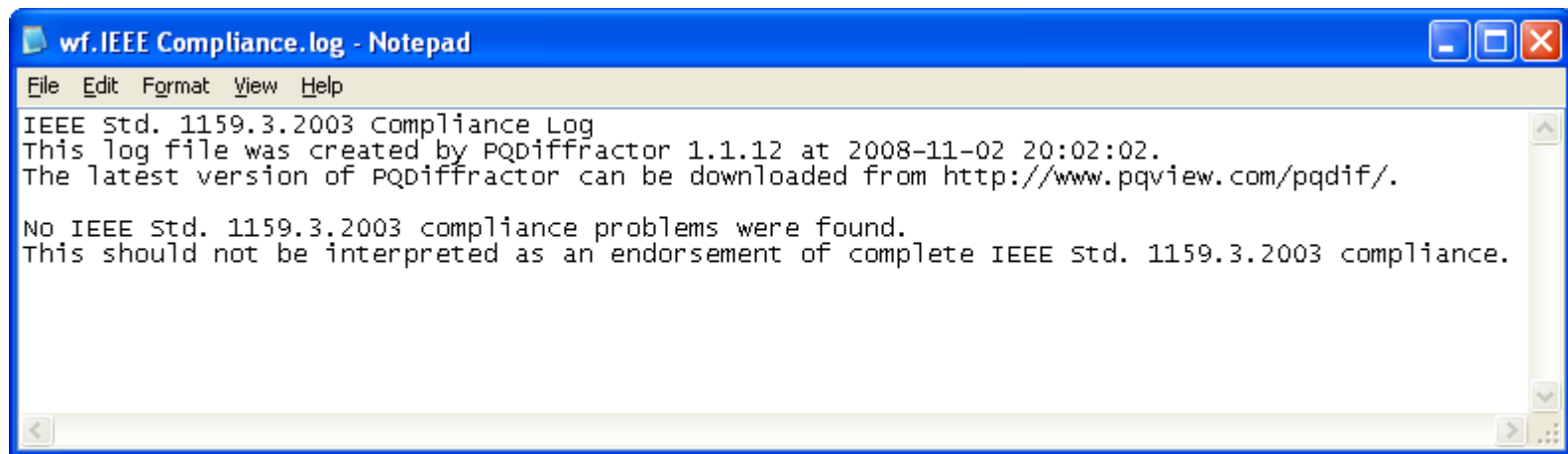
- Convert from native binary PQD to XML
- Convert from native binary PQD to XML Structure

# PQDiffractor Utility Functions

- Delete one or more observation records
- Delete one or more channel instances

# More PQDiffactor Tool Strip Commands

- Opens the IEEE 1159.3 Compliance Log Text file if created by using the menu command **Tools|Log IEEE Compliance** when the file was read.



# PQDiffraction Availability and Installation

- The latest version of PQDiffraction can be downloaded from the following PQView web sites:
  - [www.pqview.com](http://www.pqview.com)
  - [www.pqview.net](http://www.pqview.net)
- PQDiffraction is redistributable and has been downloaded by about thirty different companies since last November

# PQDiffractor Downloads

- Downloaded by more than twenty different companies
- Building mailing list for new task force members