IEEE P1159.3 PQDIF Task Force Web Meeting

Chair: Daniel Sabin
Electrotek Concepts, Inc.
d.sabin@ieee.org

January 9, 2017
New Orleans, Louisiana, USA
Meeting Overview

• Overview of IEEE P1159.3 Revision Project
• Review of IEEE P1159.3 D15
• Approval of New PQDIF IDs
• Update on Software Resources
• Next Meeting
Participants, Patents, and Duty to Inform

- All participants in this meeting have certain obligations under the IEEE-SA Patent Policy.
  - Participants [Note: Quoted text excerpted from IEEE-SA Standards Board Bylaws subclause 6.2]:
    - "Shall inform the IEEE (or cause the IEEE to be informed)" of the identity of each
      holder of any potential Essential Patent Claims of which they are personally aware
      if the claims are owned or controlled by the participant or the entity the participant is
      from, employed by, or otherwise represents
    - "Personal awareness" means that the participant "is personally aware that the
      holder may have a potential Essential Patent Claim," even if the participant is
      not personally aware of the specific patents or patent claims
    - "Should inform the IEEE (or cause the IEEE to be informed)" of the identity of "any
      other holders of such potential Essential Patent Claims" (that is, third parties that
      are not affiliated with the participant, with the participant’s employer, or with anyone
      else that the participant is from or otherwise represents)
    - The above does not apply if the patent claim is already the subject of an Accepted Letter
      of Assurance that applies to the proposed standard(s) under consideration by this group
    - Early identification of holders of potential Essential Patent Claims is strongly
      encouraged
    - No duty to perform a patent search

Call for Potentially Essential Patents

- If anyone in this meeting is personally aware of the holder of any patent claims that are potentially
  essential to implementation of the proposed standard(s) under consideration by this group and
  that are not already the subject of an Accepted Letter of Assurance (LOA):
  - Either speak up now, or
  - Provide the chair of this group with the identity of the holder(s) of any and all such claims as soon as
    possible, or
  - Cause an LOA to be submitted

Patent Related Links

- All participants should be familiar with their obligations under the IEEE-SA Policies & Procedures for standards development.
- Patent Policy is stated in these sources:
  - IEEE-SA Standards Boards Bylaw
  - Material about the patent policy is available at
    - [http://standards.ieee.org/about/sasb/patcom/materials.html](http://standards.ieee.org/about/sasb/patcom/materials.html)

If you have questions, contact the IEEE-SA Standards Board Patent Committee Administrator at patcom@ieee.org or visit

This slide set is available at [https://development.standards.ieee.org/myproject/Public/mytools/mob/slideset](https://development.standards.ieee.org/myproject/Public/mytools/mob/slideset)

Other Guidelines for IEEE WG Meetings

- All IEEE-SA standards meetings shall be conducted in compliance with all
  applicable laws, including antitrust and competition laws.
  - Do not discuss the interpretation, validity, or essentiality of patents/patent
    claims.
  - Do not discuss specific license rates, terms, or conditions.
    - Relative costs, including licensing costs of essential patent claims, of
      different technical approaches may be discussed in standards
      development meetings.
      - Technical considerations remain primary focus
    - Do not discuss or engage in the fixing of product prices, allocation of
      customers, or division of sales markets.
    - Do not discuss the status or substance of ongoing or threatened litigation.
    - Do not be silent if inappropriate topics are discussed … do formally object.
- See IEEE-SA Standards Board Operations Manual, clause 5.3.10 and “Promoting
  Competition and Innovation: What You Need to Know about the IEEE Standards
  Association’s Antitrust and Competition Policy” for more details.
Introductions
IEEE P1159.3 Task Force

IEEE Power & Energy Society
• Transmission & Distribution Committee
  – Power Quality Subcommittee
    http://grouper.ieee.org/groups/td/pq/

• P1159.3 PQDIF Task Force
  http://grouper.ieee.org/groups/1159/3
  – Chair: Daniel Sabin
d.sabin@ieee.org
  – Secretary: Joe Grappé
  joseph.grappe@duke-energy.com
What is IEEE Std 1159.3 PQDIF?

- RMS Samples
- Phasors
- Mag-Dur Events
- Value Logs
- Scatter Charts
- Histograms

- Binary Format
- Extensible
- Lossless Compression
- Widely-Used Worldwide
Examples of Data Stored in IEEE 1159.3 PQDIF
Meeting Overview

• Overview of IEEE P1159.3 Revision Project
• Approval of New PQDIF IDs
• Review of IEEE P1159.3 D13
• Update on Software Resources
• Next Meeting
## New Vendor ID Values Submitted Since Last Meeting

<table>
<thead>
<tr>
<th>Name</th>
<th>Description</th>
<th>Approved / Disapproved / Needs Clarification</th>
</tr>
</thead>
<tbody>
<tr>
<td>ID_VENDOR_ALGODUE</td>
<td>Algodue Elettronica</td>
<td>Approved</td>
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## New Equipment ID Values Submitted Since Last Meeting

<table>
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<th>Name</th>
<th>Description</th>
<th>Approved / Disapproved / Needs Clarification</th>
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</thead>
<tbody>
<tr>
<td>ID_EQUIP_EDMI_MK11</td>
<td>EDMI MK11</td>
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<tr>
<td>ID_EQUIP_EDMI_MK6E</td>
<td>EDMI MK6E</td>
<td>Approved</td>
</tr>
<tr>
<td>ID_EQUIP_SO52</td>
<td>Mikronika SO52</td>
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<tr>
<td>ID_EQUIP_DRANETZ_61000</td>
<td>Dranetz DataNode 6100</td>
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<tr>
<td>ID_EQUIP_DRANETZ_ES210</td>
<td>Dranetz ES 210</td>
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<tr>
<td>ID_EQUIP_DRANETZ_ES230</td>
<td>Dranetz ES 310</td>
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<tr>
<td>ID_EQUIP_DRANETZ_HDPQ</td>
<td>Dranetz HDPQ</td>
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<tr>
<td>ID_EQUIP_AMETEK_JEMSTAR_II</td>
<td>AMETEK JEMSTAR II Meter</td>
<td>Approved</td>
</tr>
<tr>
<td>ID_EQUIP_ARBITER_1133</td>
<td>Arbiter 1133A Power Sentinel</td>
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</table>
New Equipment ID Values Submitted Since Last Meeting

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<thead>
<tr>
<th>Name</th>
<th>Description</th>
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<tbody>
<tr>
<td>ID_EQUIP_ALGODUE_PQM_3000</td>
<td>Algodue PQM 3000</td>
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<tr>
<td>ID_EQUIP_ALGODUE_PQM_3000_RGW</td>
<td>Algodue PQM 3000 RGW</td>
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<td>ID_EQUIP_ALGODUE_PQM_4000</td>
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<tr>
<td>ID_EQUIP_ALGODUE_PQM_4000_RGW</td>
<td>Algodue PQM 4000 RGW</td>
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## New Quantity Characteristic ID Values Submitted Since Last Meeting

<table>
<thead>
<tr>
<th>Name</th>
<th>Description</th>
<th>Approved / Disapproved / Needs Clarification</th>
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</thead>
<tbody>
<tr>
<td>ID_QC_RESISTANCE</td>
<td>Electrical Resistance (R)</td>
<td>Approved</td>
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<tr>
<td>ID_QC.REACTANCE</td>
<td>Electrical Reactance (X)</td>
<td>Approved</td>
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<tr>
<td>ID_QC_IMPEDANCE</td>
<td>Electrical Impedance (Z)</td>
<td>Approved</td>
</tr>
<tr>
<td>ID_QC_CONDUCTANCE</td>
<td>Electrical Conductance (G)</td>
<td>Approved</td>
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<tr>
<td>IC_QC_SUSCEPTANCE</td>
<td>Electrical Susceptance (B)</td>
<td>Approved</td>
</tr>
<tr>
<td>IC_QC_ADMITTANCE</td>
<td>Electrical Admittance (Y)</td>
<td>Approved</td>
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New Quantity Characteristic ID Values Submitted Since Last Meeting

<table>
<thead>
<tr>
<th>Name</th>
<th>Description</th>
<th>Approved / Disapproved / Needs Clarification</th>
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<tbody>
<tr>
<td>ID_QC_RESISTANCE_SPOS</td>
<td>Positive-Sequence Electrical Resistance</td>
<td>Approved</td>
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<tr>
<td>ID_QC_REACTANCE_SPOS</td>
<td>Positive-Sequence Electrical Reactance</td>
<td>Approved</td>
</tr>
<tr>
<td>ID_QC_IMPEDANCE_SPOS</td>
<td>Positive-Sequence Electrical Impedance</td>
<td>Approved</td>
</tr>
<tr>
<td>ID_QC_CONDUCTANCE_SPOS</td>
<td>Positive-Sequence Electrical Conductance</td>
<td>Approved</td>
</tr>
<tr>
<td>IC_QC_SUSCEPTANCE_SPOS</td>
<td>Positive-Sequence Electrical Susceptance</td>
<td>Approved</td>
</tr>
<tr>
<td>IC_QC_ADMITTANCE_SPOS</td>
<td>Positive-Sequence Electrical Admittance</td>
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<tr>
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</tr>
</thead>
<tbody>
<tr>
<td>ID_QC_RESISTANCE_SNEG</td>
<td>Negative-Sequence Electrical Resistance</td>
<td>Approved</td>
</tr>
<tr>
<td>ID_QC.REACTANCE_SNEG</td>
<td>Negative-Sequence Electrical Reactance</td>
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<td>ID_QC_IMPEDANCE_SNEG</td>
<td>Negative-Sequence Electrical Impedance</td>
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<td>ID_QC_CONDUCTANCE_SNEG</td>
<td>Negative-Sequence Electrical Conductance</td>
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<td>IC_QC_SUSCEPTANCE_SNEG</td>
<td>Negative-Sequence Electrical Susceptance</td>
<td>Approved</td>
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<tr>
<td>IC_QC_ADMITTANCE_SNEG</td>
<td>Negative-Sequence Electrical Admittance</td>
<td>Approved</td>
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## New Quantity Characteristic ID Values Submitted Since Last Meeting

<table>
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<tr>
<th>Name</th>
<th>Description</th>
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<tbody>
<tr>
<td>ID_QC_RESISTANCE_SZERO</td>
<td>Zero-Sequence Electrical Resistance</td>
<td>Approved</td>
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<tr>
<td>ID_QC_REACTANCE_SZERO</td>
<td>Zero-Sequence Electrical Reactance</td>
<td>Approved</td>
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<tr>
<td>ID_QC_IMPEDANCE_SZERO</td>
<td>Zero-Sequence Electrical Impedance</td>
<td>Approved</td>
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<tr>
<td>ID_QC_CONDUCTANCE_SZERO</td>
<td>Zero-Sequence Electrical Conductance</td>
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<tr>
<td>IC_QC_SUSCEPTANCE_SZERO</td>
<td>Zero-Sequence Electrical Susceptance</td>
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<td>IC_QC_ADMITTANCE_SZERO</td>
<td>Zero-Sequence Electrical Admittance</td>
<td>Approved</td>
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New Quantity Characteristic ID Values Submitted Since Last Meeting

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<tr>
<th>Name</th>
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</tr>
</thead>
<tbody>
<tr>
<td>ID_QC_ELECTRIC_CHARGE</td>
<td>Electric Charge</td>
<td>Needs Clarification</td>
</tr>
<tr>
<td>ID_QC_MAGNETIC_FIELD</td>
<td>Magnetic Field</td>
<td>Approved</td>
</tr>
<tr>
<td>ID_QC_MAGNETIC_FLUX</td>
<td>Magnetic Flux</td>
<td>Approved</td>
</tr>
</tbody>
</table>
## New Quantity Units Values Submitted Since Last Meeting

<table>
<thead>
<tr>
<th>Name</th>
<th>Description</th>
<th>Approved / Disapproved / Needs Clarification</th>
</tr>
</thead>
<tbody>
<tr>
<td>ID_QU_COULOMBS</td>
<td>Unit of electric charge, equal to the quantity of electricity conveyed in one second by a current of one ampere</td>
<td>Needs Clarification</td>
</tr>
</tbody>
</table>
Website for Submitting New IDs (www.pqdif.info)
Meeting Overview

• Overview of IEEE P1159.3 Revision Project
• Approval of New PQDIF IDs
• Review of IEEE P1159.3 D15
• Update on Software Resources
• Next Meeting
P1159.3 Revision Title and Objectives Project

Title
Recommended Practice for Power Quality Data Interchange Format (PQDIF)

Objectives
1. To complete editorial changes and corrections to the 2003 edition of IEEE Std. 1159.3
2. To add new ID values for existing PQDIF tags
3. To add new tags and ID values
4. To add new quantity types
5. To add an annex on the representation of PQDIF in XML
6. To add an annex on PQDIF and its relationship to IEC 61850
7. To add an annex on PQDIF and its relationship to IEEE C37.111 COMTRADE

Deadline
December 2018
### Example MAGDURTIME table in Clause 7.5

<table>
<thead>
<tr>
<th>Channel Instance</th>
<th>Series Instance</th>
<th>Value Type</th>
<th>Quantity Measured ID</th>
<th>Phase ID</th>
<th>Quantity Units ID</th>
<th>Quantity Characteristic ID</th>
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</thead>
<tbody>
<tr>
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<td>0</td>
<td>TIME</td>
<td>VOLTAGE</td>
<td>AN</td>
<td>SECONDS</td>
<td>TIME_OFFSET</td>
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<tr>
<td>0</td>
<td>1</td>
<td>VAL</td>
<td>VOLTAGE</td>
<td>AN</td>
<td>VOLTS</td>
<td>RVC_DELTA_U MAX</td>
</tr>
<tr>
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<td>2</td>
<td>VAL</td>
<td>VOLTAGE</td>
<td>AN</td>
<td>VOLTS</td>
<td>RVC_DELTA_US</td>
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<tr>
<td>0</td>
<td>3</td>
<td>DURATION</td>
<td>VOLTAGE</td>
<td>AN</td>
<td>SECONDS</td>
<td>DURATION</td>
</tr>
<tr>
<td>1</td>
<td>0</td>
<td>TIME</td>
<td>VOLTAGE</td>
<td>BN</td>
<td>SECONDS</td>
<td>TIME_OFFSET</td>
</tr>
<tr>
<td>1</td>
<td>1</td>
<td>VAL</td>
<td>VOLTAGE</td>
<td>BN</td>
<td>VOLTS</td>
<td>RVC_DELTA_U_MAX</td>
</tr>
<tr>
<td>1</td>
<td>2</td>
<td>VAL</td>
<td>VOLTAGE</td>
<td>BN</td>
<td>VOLTS</td>
<td>RVC_DELTA_US</td>
</tr>
<tr>
<td>1</td>
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<td>DURATION</td>
<td>VOLTAGE</td>
<td>BN</td>
<td>SECONDS</td>
<td>DURATION</td>
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<tr>
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<td>CN</td>
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<td>TIME_OFFSET</td>
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<tr>
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<td>VOLTAGE</td>
<td>CN</td>
<td>VOLTS</td>
<td>RVC_DELTA_U_MAX</td>
</tr>
<tr>
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<td>2</td>
<td>VAL</td>
<td>VOLTAGE</td>
<td>CN</td>
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<td>RVC_DELTA_US</td>
</tr>
<tr>
<td>2</td>
<td>3</td>
<td>DURATION</td>
<td>VOLTAGE</td>
<td>CN</td>
<td>SECONDS</td>
<td>DURATION</td>
</tr>
</tbody>
</table>
Non-Numbers Values and Missing Values

• Some PQDIF users have requested that we store null values or missing values, or that we support the IEEE special floating point numbers (NANs, infinity, etc.)

• The next draft of IEEE P1159.3 will specify that non numbers should not be stored in a PQDIF observation record.

• Additionally, P1159.3 will recommend that missing data be handled by ending a series instance and beginning a new series instance.
Flagging

• IEC 61000-4-3
  – The next draft will define new IDs if necessary to create a series of flagged intervals using Clause 4.7 of IEC 61000-4-30, Ed. 3.

• Quality Flags
  – Look at IEC 61850 for some examples
  – ANSI C12 might have some useful terms that we could borrow
Next Step: Add Annex of PQDIF’s Relationship to IEEE/IEC COMTRADE

- COMTRADE now has a dual IEEE/IEC logo
- We plan to include an annex that compares PQDIF and COMTRADE
- Source material for the annex could draw on the IEEE Power Systems Relaying Committee Working Group H5C report on “Common Data Format for IED Sampled Data”
  - Summarized PQDIF, COMTRADE, and 61850
  - Explained issues related to converting data between the formats
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Free or Freeware Software Resources Maintained by Task Force

• Software Developers Kit (SDK) from http://grouper.ieee.org/groups/1159/3/
  – Updated in October 2015
  – Includes IEEE PQDIF C++ Libraries

• PQDIF COM and .NET Libraries
  – Updated in October 2015

• PQDiffractor® for Viewing/Diagnosing
  – Useful for viewing COMTRADE files
  – Updated in August 2015
New Open Source Projects Related to PQDIF

xml_2_pqdif
• Converts XML files to binary PQDIF files
• [https://github.com/chenyu2202863/xml_2_pqdif](https://github.com/chenyu2202863/xml_2_pqdif)
• Last Update: April 2015

PQDIF Explorer
• Parses PQDIF files, displays records in tree control, views element contents
• [https://github.com/GridProtectionAlliance/PQDIFExplorer](https://github.com/GridProtectionAlliance/PQDIFExplorer)
• Last Update: January 2016
Next P1159.3 Task Force Meeting

• 2017 IEEE PES General Meeting
  • July 17, 2017
  • Chicago, Illinois, USA

• Web Meeting Possible