- records
  - tagContainer
  - tagRecDataSource
    - tagDataSourceTypeID
    - tagVendorID
    - tagEquipmentID
    - tagSerialNumberDS
    - tagVersionDS
    - tagNameDS
    - tagOwnerDS
    - tagLocationDS
    - tagTimeZoneDS
    - tagCustomSourceInfo
    - tagEffective
    - tagChannelDefns
  - tagRecMonitorSettings
  - tagRecObservation
  - tagRecObservation
  - tagRecObservation
    - tagObservationName
    - tagTimeCreate
    - tagTimeStart
    - tagTimeTriggered
    - tagTriggerMethodID
    - tagChannelInstances

IEEE P1159.3 PQDIF Task Force Meeting

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July 23, 2012
San Diego, California, USA

IEEE PES Power & Energy Society™

Meeting Agenda

- Introductions
- Patent Notice
- Task Force Overview
- PQDIF News
- Planned Task Force Activities
- Updates to PQDIF Values
  - New Web Site
- Next Steps
- 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

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
  - http://standards.ieee.org/develop/policies/bylaws/sect6-7.html#6
  - IEEE-SA Standards Board Operations Manual
    - http://standards.ieee.org/develop/policies/opman/sect6.html#6.3
  - Material about the patent policy is available at
    - 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 http://standards.ieee.org/about/sasb/patcom/index.html

This slide set is available at https://development.standards.ieee.org/myproject/Public/mytools/mob/slideset.ppt

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:
  - 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

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.
  - Don’t discuss the interpretation, validity, or essentiality of patents/patent claims.
  - Don’t 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
  - Don’t discuss or engage in the fixing of product prices, allocation of customers, or division of sales markets.
  - Don’t discuss the status or substance of ongoing or threatened litigation.
  - Don’t 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.

IEEE Std 1159.3 Task Force

IEEE Power & Energy Society

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

Task Force Web Site: http://grouper.ieee.org/groups/1159/3/

What is IEEE PQDIF?

- PQDIF is an IEEE recommend practice for power quality data interchange format that allows exchange of measurements and simulation results between computer hardware and software systems.
- PQDIF is a binary file format with a file usually ending in the file extension PQD
- PQDIF contains the following types of records
  - A single container record
  - One or more data source records
    - Channel and series definitions
  - One or more optional monitor settings records
  - One or more observation records
    - Waveforms, rms samples, data logs, histograms, magnitude-duration tables.

PQDIF News

- China Southern Power Grid
  - Operates and oversees transmission and distribution grids in Guangdong, Guangxi, Yunnan, Guizhou, and Hainan Provinces
  - In 2012, CSG began to integrate power quality monitoring data from the individual PQMS databases maintained by each province into a central database in Guangzhou. Each province provides data in IEEE PQDIF format.
- Norwegian Water Resources and Energy Directorate (NVE)
  - Regulates Electricity in Norway

Planned Task Force Activities during 2012-2013

- Apply for PAR for new version of IEEE Std 1159.3
- Complete editorial changes and corrections to 2003 edition of IEEE Std. 1159.3
- Add annex on PQDIF and its relationship to IEC 61850
- Add annex on PQDIF and its relationship to IEEE/IEC COMTRADE
- Add new ID values for existing tags
- Add new tags and ID values
- Promote new IDs to software developers using PQDIF and solicit input and more active participation

Recent P1159.3 Task Force Activities

Updates to P1159.3 Database in January 2012

- Revised a Microsoft Access database that was first built during the development of IEEE Std. 1159.3-2003 that was used to maintain the ID values that define PQDIF itself and be used to produce source code files for C++, C#, Java, and VB6.
  - Added records to support a new “PQDIF Version 1.6”
  - Added new values for vendor IDs, equipment IDs, and phase IDs that were submitted to the task force in 2010 and 2011.
  - Built new source code using the PQDIF Version 1.6 values

New tagVendorID Values in Draft Version of PQDIF Version 1.6

- ID_VENDOR_A_EBERLE
- ID_VENDOR_ALPESTEC HNOLOGIES
- ID_VENDOR_AMETEK
- ID_VENDOR_ARBITER
- ID_VENDOR_CESINEL
- ID_VENDOR_ELECTRO_I NDUSTRIES
- ID_VENDOR_ELSPEC ID_VENDOR_EMAX
- ID_VENDOR_ENERNEX
- ID_VENDOR_HIOKI
- ID_VENDOR_LANDIS_GY R
- ID_VENDOR_METRUM
- ID_VENDOR_NEXANT
- ID_VENDOR_ORL
- ID_VENDOR_PSL
- ID_VENDOR_SST
- ID_VENDOR_UNIPOWER

New tagEquipmentID Values in Draft Version of PQDIF Version 1.6

- ID_EQUIP_ARBITER_1133A
- ID_EQUIP_ELSPEC_PQSCADA
- ID_EQUIP_EMAX_DIRECTOR ID_EQUIP_ETK_PQDIFFRACTOR
- ID_EQUIP_LANDIS_GYR_MAXCOM
- ID_EQUIP_ORL_AP300
- ID_EQUIP_ORL_OTHER
- ID_EQUIP_ORL_PM1000
- ID_EQUIP_ORL_PM1200
- ID_EQUIP_ORL_PM2000
- ID_EQUIP_ORL_PM2200
- ID_EQUIP_ORL_PM3000
- ID_EQUIP_ORL_PM3006
- ID_EQUIP_ORL_PM4000
- ID_EQUIP_ORL_PM6000
- ID_EQUIP_ORL_PM7000
- ID_EQUIP_ORL_RANGER_II
- ID_EQUIP_ORL_RANGER_III
- ID_EQUIP_ORL_RANGER_IV
- ID_EQUIP_ORL_RANGERHA5000
- ID_EQUIP_ORL_RANGERMETER SOCKET
- ID_EQUIP_ORL_RANGERRR1250
- ID_EQUIP_ORL_RANGERSCOUT
- ID_EQUIP_PQUBE
- ID_EQUIP_SST_IGRID
- ID_EQUIP_GPT_61000
- ID_EQUIP_GPT_ES210
- ID_EQUIP_GPT_ES230

New tagQuantityCharacteristicID Value in Draft Version of PQDIF Version 1.6

- We added ID_QC_RAPID_VOLTAGE_CHANGE because at least one vendor was storing RVC data in PQDIF files.
- This is most likely needs to be revised or augmented because of subsequent revisions
  - **ΔUmax**: difference between maximum and minimum rms values of a voltage change.
  - **ΔUss**: difference between two adjacent steady state voltages separated by at least one voltage change characteristic.
  - **Umax**: maximum voltage measured during the RVC event
  - **Umin**: minimum voltage measured during the RVC event

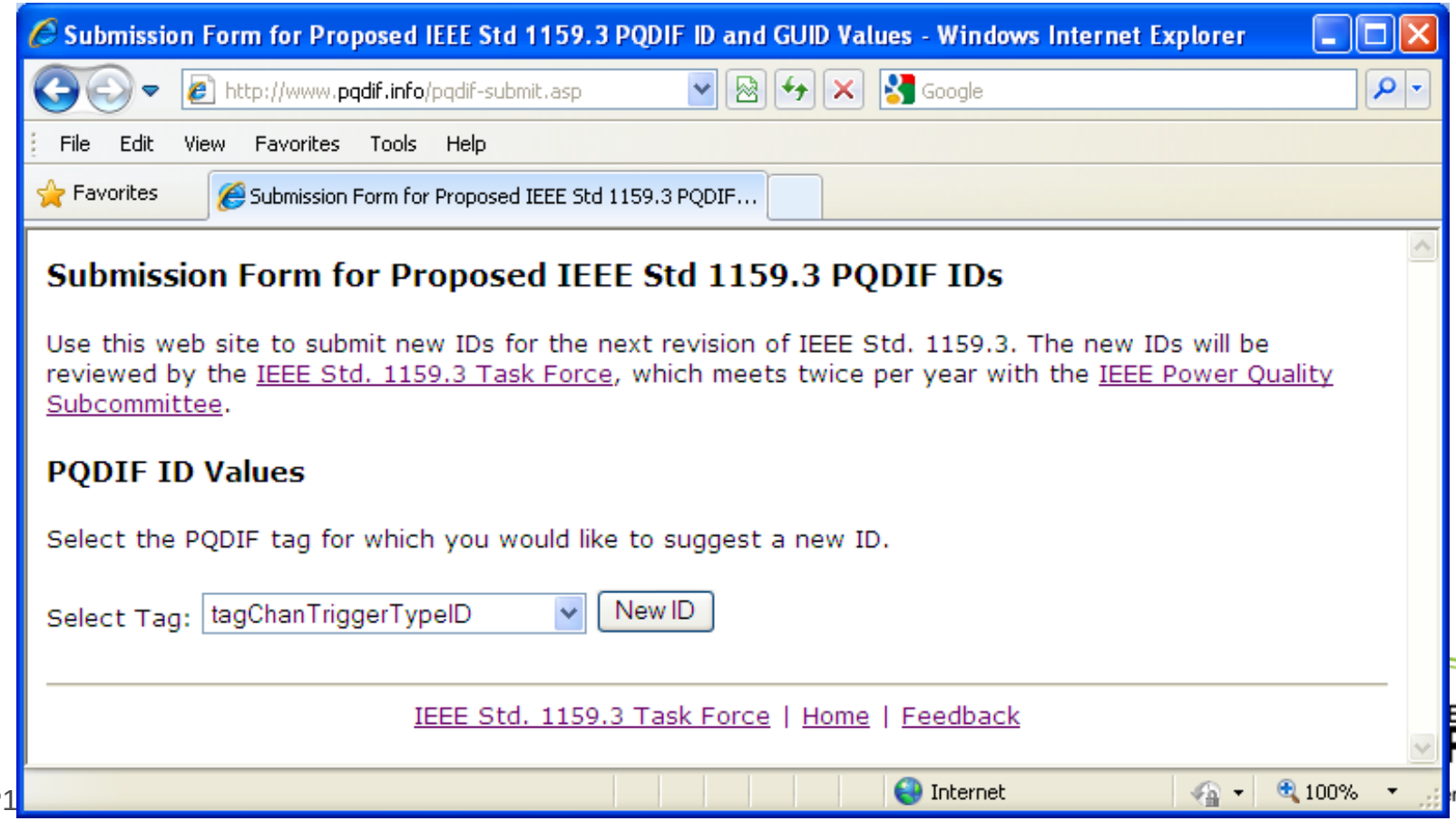
New tagPhaseID Values in Draft Version of PQDIF Version 1.6

- ID_PHASE_LN_MAX
- ID_PHASE_LN_MIN
- ID_PHASE_LL_MAX
- ID_PHASE_LL_MIN

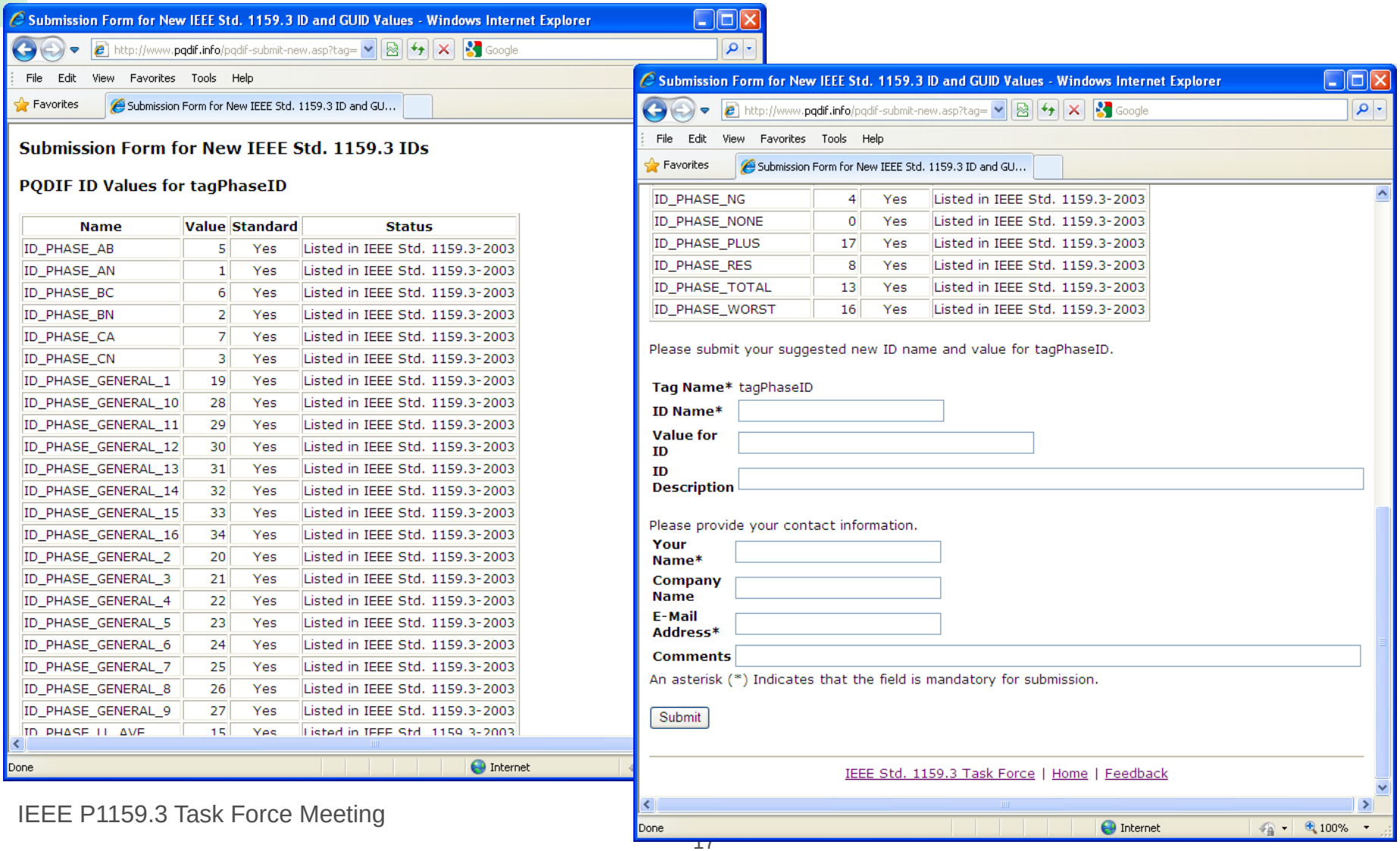
The existing version already includes ID_PHASE_LN_AVG and ID_PHASE_LL_AVG

New Web Site to Assist in Collecting Information for New PQDIF IDs

- The task force has created a new web site that will allow users an easy way to submit new IDs for existing tags



Example of Submitting a New ID for tagPhaseID



Proposed New Quantity Characteristic Needed?

- Asked by Alex McEachern
  - How should we go about adding to PQDIF the new IEC 61000-4-30 measurements of 2kHz-150kHz conducted emissions?
- Current values for tagQuantityCharacteristicID related to harmonics:
  - ID_QC_SPECTRA
  - ID_QC_SPECTRA_HGROUP
  - ID_QC_SPECTRA_IGROUP

Proposed New Tag: tagMonitorInfoText

- Proposed by Robert Fransson

```
// tagMonitorInfoText - String
// This optional tag may be be placed in
tagRecMonitoringSettings, with additional textual setup
information.
//  Required/opt:  Optional
const GUID tagMonitorInfoText = { 0x1d869abd, 0xb197, 0x4b4e,
{ 0xb3, 0x3e, 0xd0, 0x91, 0x31, 0xec, 0x9e, 0xb9 } };
```

Proposed New Tag: Location of Trend Time Stamps

- Proposed by Robert Fransson
  - Are trend timestamps referring to the beginning of each interval, or to the end of the interval?
  - This tag is useful to select a proper plotting method for “step-wise” plotting.

Proposed New Tag: Timestamp Time Zone

- Proposed by Robert Fransson
  - There should be a tag to indicate if the time stamp is in local time, local standard time, or UTC
  - Smaller companies developing a PQDIF writer tend to store in local time whereas other (larger systems/companies) stores in UTC.
  - It should be convenient to have a required tag for this vital information.

```
// If 1 The trend data is time stamped when data interval ends
// UINT4  0 = Timestamp indicates value is valid from timestamp and forward
// UINT4  1 = Timestamp indicates value is valid from timestamp and backward
until previous timestamp
const GUID tagTimeStampTypeID = { 0x9e7d9f, 0x270d, 0x44b9, { 0x89, 0x97,
0x61, 0x1d, 0x43, 0xf5, 0x6a, 0x35 } };
```

Proposed New Value Type ID: ID_SERIES_VALUE_TYPE_RMS

Issue Raised by Stéphane Do and by Dan Sabin

- When storing a data log, many PQ monitors will store a minimum, average, and maximum value in regular intervals (e.g., once every ten minutes).
- When storing the data log for these values, you would set tagValueTypeID to ID_SERIES_VALUE_TYPE_MIN, ID_SERIES_VALUE_TYPE_AVG, or ID_SERIES_VALUE_TYPE_MAX
- However, IEC 61000-4-30 requires that the average be computed as the quadratic mean (not the arithmetic mean). The quadratic mean is also known as the root mean square or RMS value.
- Do we need to have an ID known as ID_SERIES_VALUE_TYPE_RMS to differentiate between the two averages?

Proposed New Value Type ID: ID_SERIES_VALUE_TYPE_QUAL

Proposed by Fernando Quintino Pimenta

- We propose a series representing a measurement data qualifier, to be used as possible value for tagValueTypeID ID_SERIES_VALUE_TYPE_QUAL
- Proposed ID's to be used in the Observation's tagSeriesValues (level 5) vector to qualify measurement values. The legal values are masks, since they are OR-able.

Example of Proposed New Value Type: ID_SERIES_VALUE_TYPE_QUAL

- vector(tagSeriesValues)=ID_QUAL_MESYNC, ID_QUAL_DIP | ID_QUAL_MESYNC, ID_QUAL_MESYNC
  - The first value indicates that the measurement or its aggregation value was recorded while the measuring equipment was time synchronized
  - The second value indicates that the measurement or its aggregation value was affected by a voltage sag and the measuring equipment was time synchronized
  - The third value indicates that the measurement or its aggregation value was recorded while the measuring equipment was time synchronized.

Proposed New Value Type: ID_SERIES_VALUE_TYPE_QUAL

- However ID_QUAL_NONE can not be OR-ed, so this would be invalid:
- vector(tagSeriesValues)=ID_QUAL_NONE, ID_QUAL_NONE | ID_QUAL_SWELL, ID_QUAL_NONE

Proposed New Value Type: ID_SERIES_VALUE_TYPE_QUAL

- ID_QUAL_NONE = 0x01 The data value in tagSeriesValues does not have a quality qualifier
- ID_QUAL_SAG = 0x02 The measurement or its aggregation value in tagSeriesValues was affected by a voltage sag
- ID_QUAL_SWELL = 0x04 The measurement or its aggregation value in tagSeriesValues was affected by a swell
- ID_QUAL_INTERRUPTION = 0x08 The measurement or its aggregation value in tagSeriesValues was affected by an interruption
- ID_QUAL_MPSERVICE = 0x10 The data value in tagSeriesValues was obtained while the measuring point was out of service
- ID_QUAL_METEST = 0x20 The data value in tagSeriesValues was obtained while the measuring equipment was in test
- ID_QUAL_MECALIB = 0x40 The data value in tagSeriesValues was obtained while the measuring equipment was being calibrated
- ID_QUAL_MEDIST = 0x80 The data in tagSeriesValues was obtained while the measuring equipment was disturbed
- ID_QUAL_MESYNC = 0x100 The data in tagSeriesValues was obtained while the measuring equipment was time synchronized

Next Task Force Activities
Volunteers Needed Tag Review

- tagPhaseID
  - ID_PHASE_AN, ID_PHASE_BN, and ID_PHASE_CN, etc.
- tagQuantityMeasuredID
  - ID_QM_VOLTAGE, ID_QM_CURRENT, etc.
- tagQuantityUnitsID
  - ID_QU_AMPS, ID_QU_PERUNIT, ID_QU_TESLAS
- tagQuantityCharacteristicID
  - ID_QC_RMS, ID_QC_THD, ID_QC_FLKR_PST, etc.
- tagQuantityTypeID
  - ID_QT_WAVEFORM, ID_QT_PHASOR, ID_QT_MAGDUR, etc.

Proposed Annex on PQDIF's Relationship to IEC 61850

- IEC 61850-8-1 defines file classes that can be mapped to the Manufacturing Message Specification (MMS) file object.
  - PQD file
    - IEEE 1159.3 Format (Power Quality Data Interchange Format – PQDIF)
  - COMTRADE folder
    - A folder of COMTRADE files.
    - If the directory contains a file with a suffix of "zip", that file shall convey the compressed contents of the COMTRADE hdr, cfg, and dat files of the files of the same name.
  - Other supported file types: bin, dtd, gif, htm, txt, xml, xsd, zip
- However, these file classes are not widely used in commercial software.

Proposed Annex of PQDIF's Relationship to IEEE/IEC COMTRADE

- Should we 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

Next Task Force Activities

Coordination with Correspondence Liaisons

- Known third parties should be notified that there is a new draft of the standard and source code available for review.
- Apply for a PAR to revise IEEE 1159.3

Next Task Force Meeting

- 2013 IEEE PES Joint Technical Committee Meeting
  - Monday, January 14, 2013
  - Memphis, Tennessee, USA