

IEEE Guide for Phasor Data Concentrator Requirements for Power System Protection, Control, and Monitoring

IEEE PSRC Working Group C4

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Introduction

- Smart Grid developments revealed the need to fulfill standardization gaps, in particular for synchrophasor technology
- To assist users standardization work on PMUs and PDCs was undertaken by NASPI PSTT and IEEE PSRC Working Groups

IEEE PDC Guide: IEEE C37.244-2013

- Developed by IEEE PSRC Working Group C4
- Used NASPI PSTT document, as initial input
- Fast track development
 - First Working Group meeting May 2011
 - Approved and published May 2013
- Coordination with other IEEE Working Groups
 - IEEE PSRC Working Group H11 (IEEE C37.118.1-2011)
 - IEEE PSRC Working Group C5 (IEEE C37.242-2013)

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IEEE PSRC WG C4 Assignment

Develop a guide for performance, functional, and information communication needs of Phasor Data Concentrators for power system protection, control, monitoring, and information management.

The Guide will include system needs for PDC applications, configuration, and testing procedures.

IEEE C37.244 Scope

This guide describes performance, functional and communication needs of Phasor Data Concentrators (PDC) for power system protection, control and monitoring applications. The guide covers synchrophasor system needs and testing procedures for PDC.

It includes functional requirements for associated interfaces with Phasor Measurement Units (PMU) to PDC and PDC systems. In particular, it includes requirements for synchronization, synchrophasor data processing, real-time access and historical data access.

IEEE C37.244 Purpose

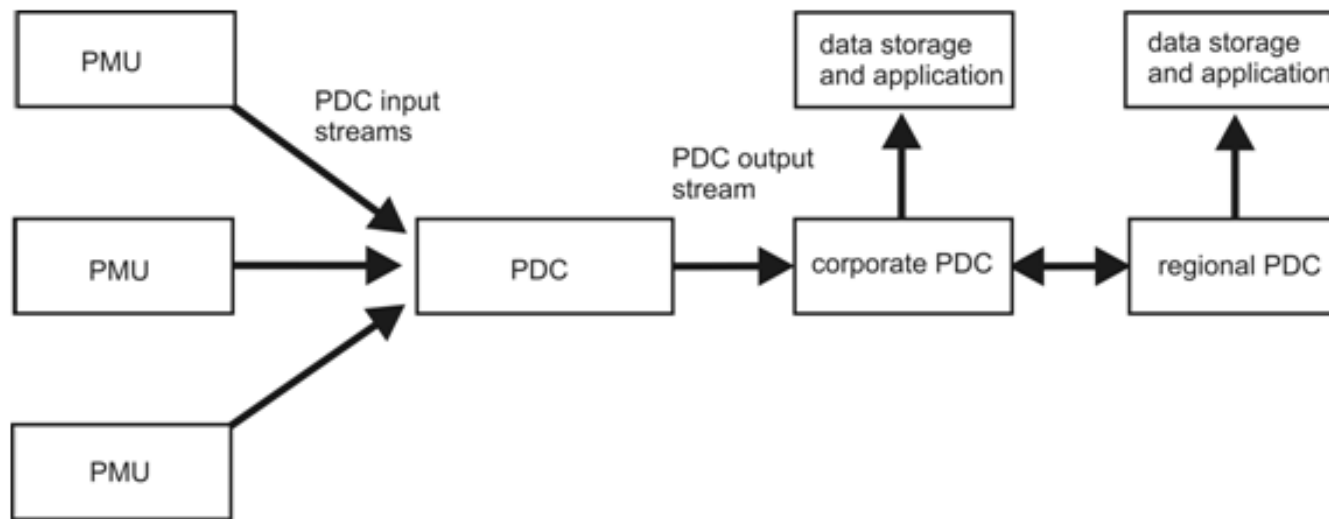
The purpose of this guide is to assist users to specify the performance and functional requirements of typical Phasor Data Concentrators and define performance testing for PDC systems.

It includes consideration of PDC latency, input and output streams supported, interface and data transport protocols, the ability to configure output stream payload, the communication media supported, time alignment functions, error handling, etc. Some user applications may also be described.

IEEE C37.244-2013 Content

- Synchrophasor system architecture
- System components: PMU, PDC, applications
- PDC definition: PDC is defined as a function
- Functional requirements
 - requirements for 17 functions that a PDC may have
- Performance requirements
- PDC testing
- Annexes
 - filtering for rate conversion and PMU latency

IEEE C37.244: PDC definition



phasor data concentrator (PDC): A function that collects phasor data, and discrete event data from PMUs and possibly from other PDCs, and transmits data to other applications. PDCs may buffer data for a short time period, but do not store the data. This guide defines a PDC as a function that may exist within any given device.

PDC functional requirements

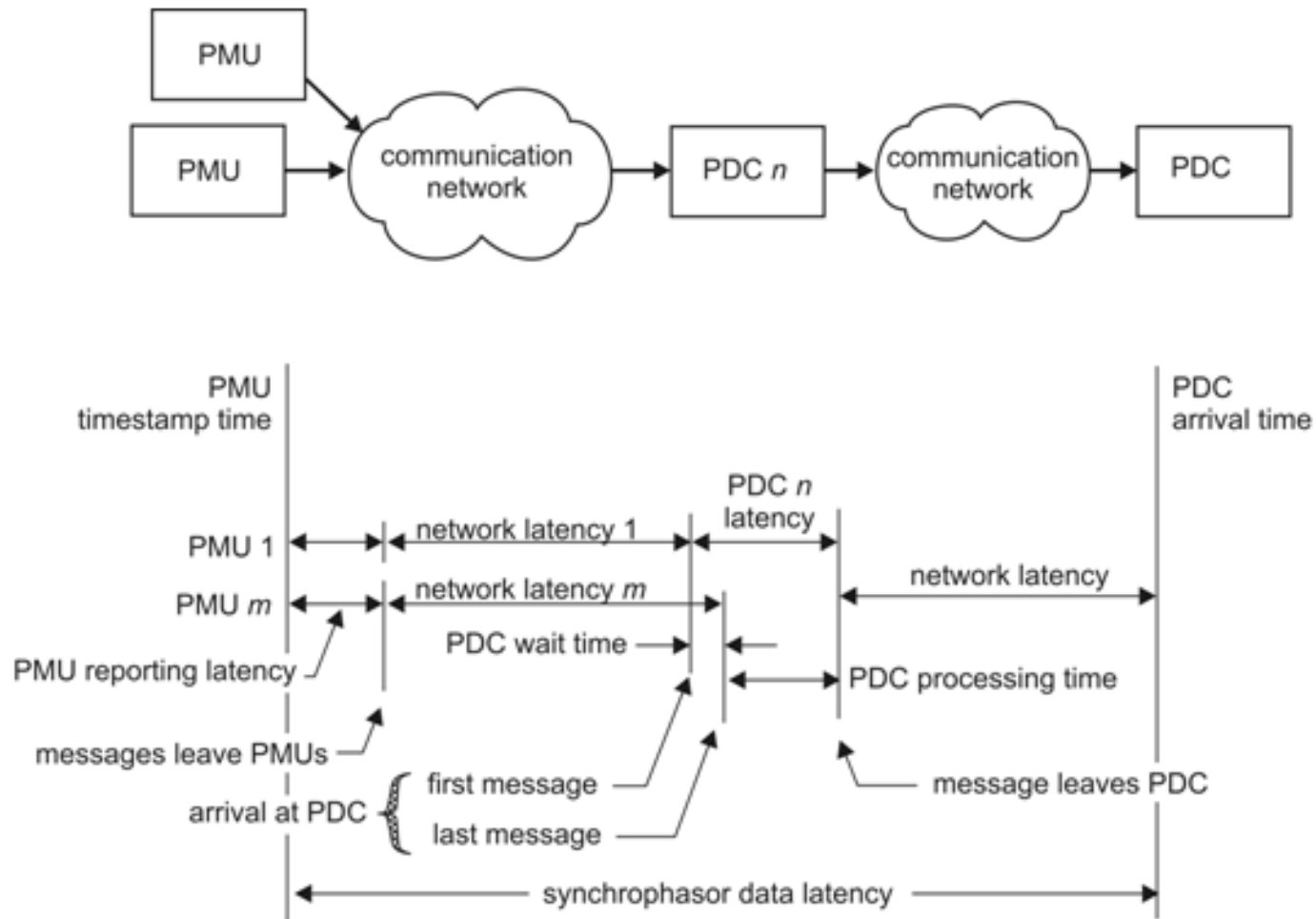
- Data aggregation
 - With and without time alignment
 - Time alignment to absolute or relative time
- Data forwarding
- Data communications
- Data validation
- Data transfer protocol and protocols conversion
- Data format and coordinate conversion
- Reporting rate conversion

PDC functional requirements

- Output data buffering
- Configuration
- Phase and magnitude adjustment
- Performance monitoring
- Redundant data handling
- Duplicate data handling
- Data re-transmission request
- Cyber security

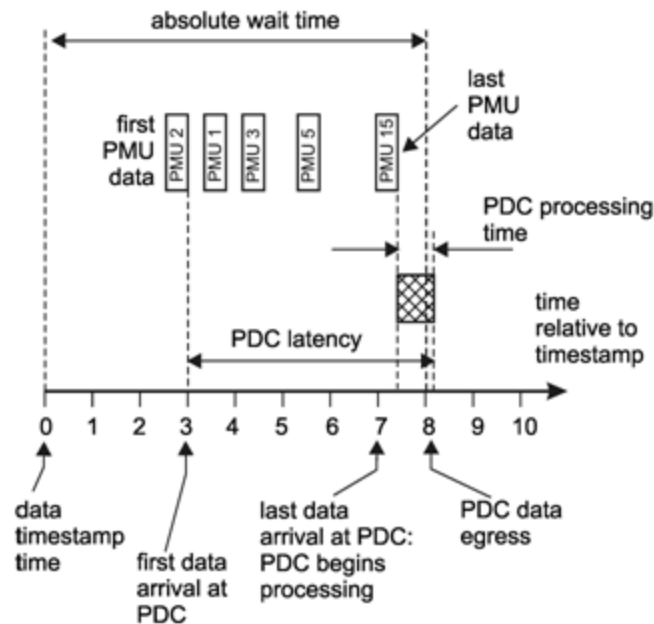
PDC functional requirements

- Data latency calculation

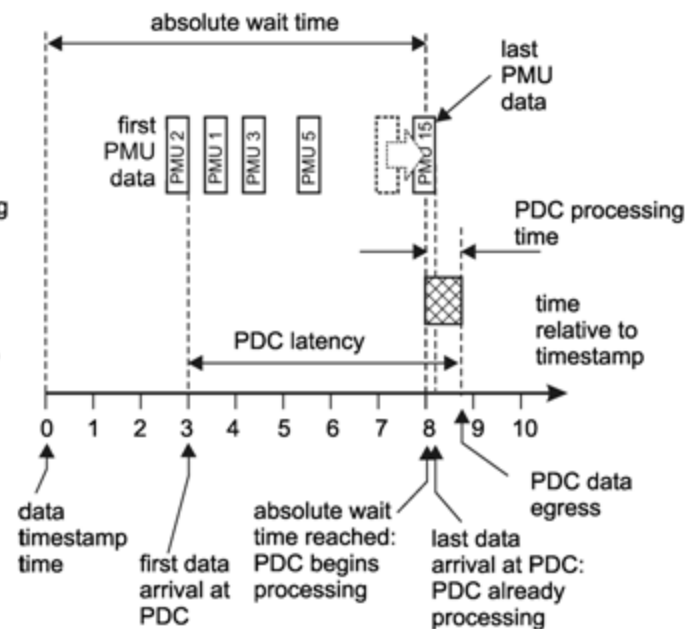


PDC performance requirements

- PDC latency
 - data aggregation with time alignment to absolute time



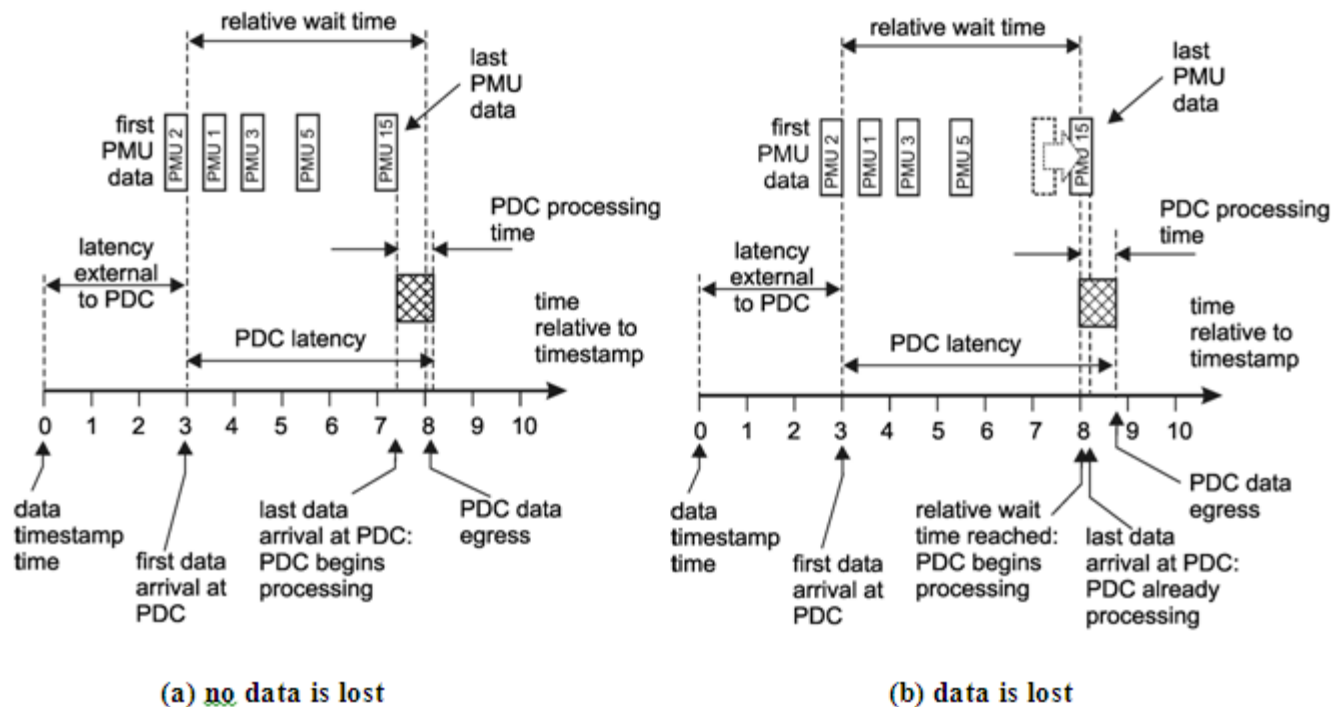
(a) no data is lost



(b) data is lost

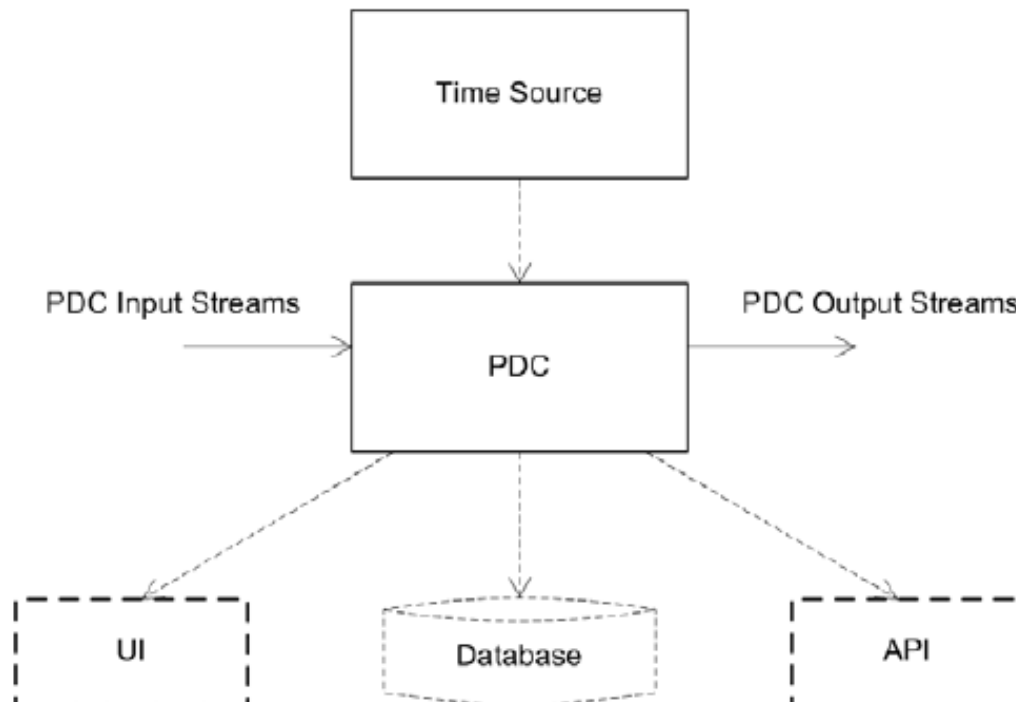
PDC performance requirements

- PDC latency
 - data aggregation with time alignment to relative time

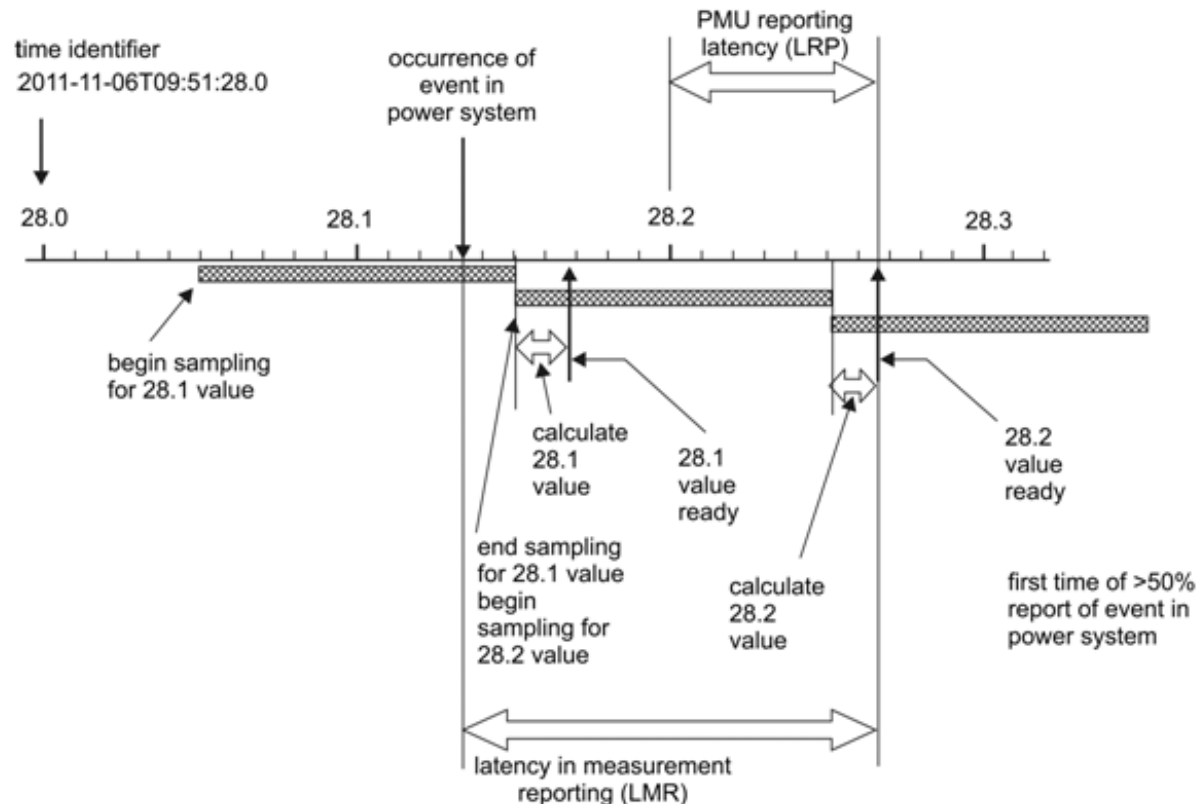


PDC testing

- Test categories, test interfaces and setups
- Test outlines, test reporting and tools



IEEE C37.244 Annex: PMU latency



- Annex C discusses potentially different interpretations of PMU latency definition given in IEEE C37.118.1-2011.
- This is resolved in the Amendment IEEE PC37.118.1a

Conclusions

- IEEE C37.244-2013 PDC Guide was generated to assist users to define of PDC requirements for their synchrophasor systems
- The Guide was published in May 2013, included functions already appear in customer specifications
- Next step is generation of PDC Standard that will list mandatory and optional PDC functions. Work on PDC Standard IEEE PC37.247 has started in IEEE PSRC