

SCE WASAS Phasor Data Concentrator (PDC) Functional Requirements

**ADVANCED
TECHNOLOGY**
Transmission & Distribution Business Unit

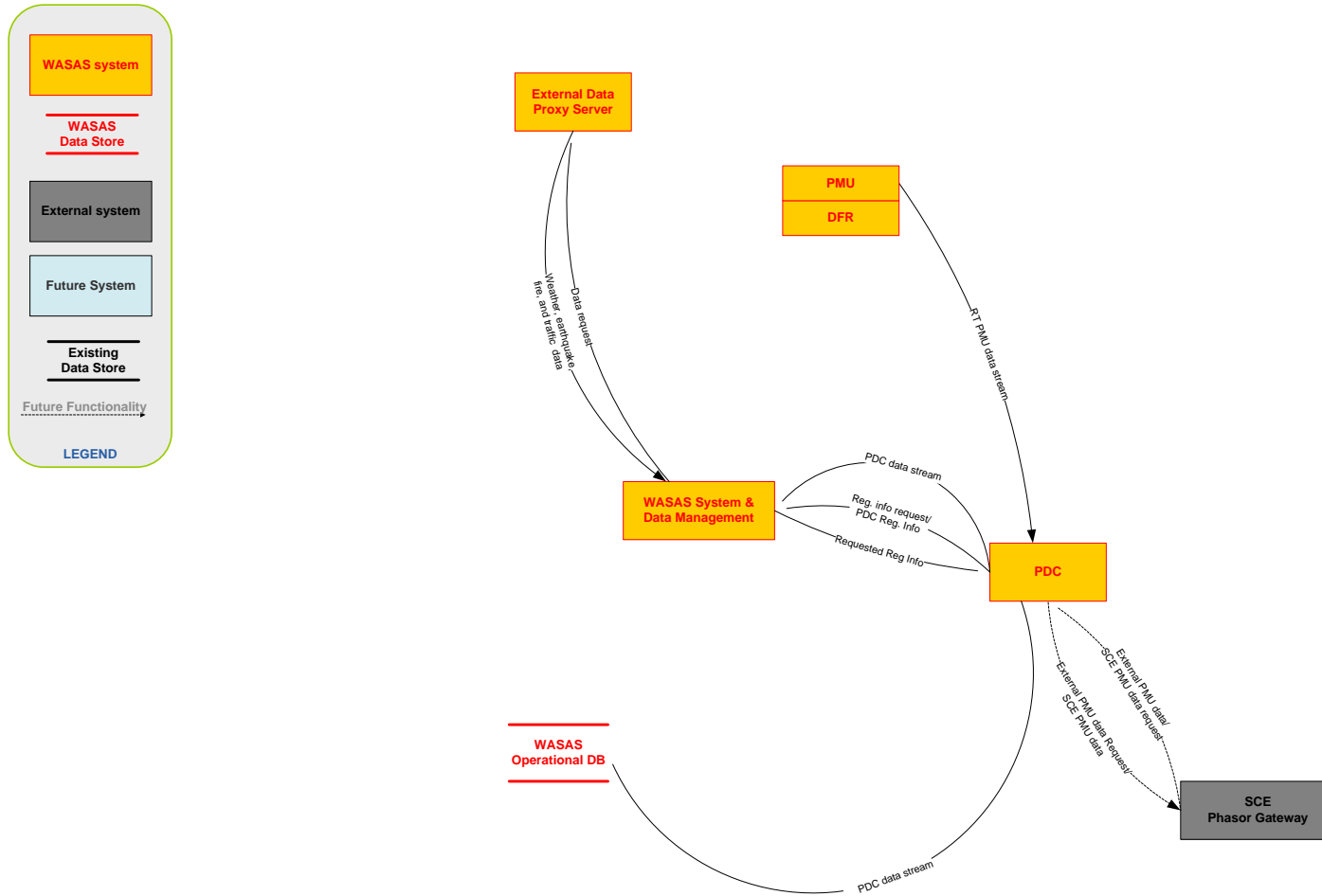


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Summary

- Functional requirements for a Phasor Data Concentrator (PDC) system for SCE Grid Control Centers
 - Aggregates, time-aligns, and streams multiple synchrophasor data streams, at various rates, individually configurable
 - An integral part of System and Data Management (SDM) service
 - Expandable to grow with the number of PMUs deployed (internal and external to SCE)

Grid Control Center PDC Data Flow



PDC Specification

- Overall functional requirements
- Input / Output requirements
- Communication requirements
- Performance requirements
- Feedback

Overall functional requirements

- Synchrophasor data concentration and real-time streaming at various rates
 - Aggregate and time align real-time synchrophasor data
 - Generate real-time data streams for use by SCE WASAS applications with user specified configurations
 - Generate data streams, with specific SCE PMU data, for sending to external PDCs
- Data management and error handling
 - Quality attributes according to C37.118
 - Abnormal conditions detection and logging
 - Warnings / alarms
 - Simple data validation and quality indication
 - PMU Quality of Service (QoS) monitoring ?? {put here to ask the vendors what they can do}

Overall functional requirements (cont'd)

- Interfaces with other WASAS components/services and external PDCs and other systems.
 - Interface with other SDM services of WASAS
 - Get PMU registration information
 - Provide GCC-PDC information registration,
 - Information update, and deletion; secure information exchange; and QoS assurance
 - Interface with external PDCs to support synchrophasor data exchange between SCE PDC and external PDCs through WECCnet for synchrophasors, such as responding to external PDCs' request to start/stop the transmission of the requested SCE PMU data streams
 - Interface with SCE Phasor Gateway for exchanging synchrophasor data with other entities through NASPInet (future)

Input / Output Requirements

- 12, 15, 20, 30, 60, and 120 frames/second.
- IEEE C37.118 - 2005
- Data streams from PMUs and external PDCs
- Data streams to real-time data base, (and optionally to real-time applications, and external PDCs)
- All data streams independently configurable
 - Which data, data rate, wait time, ...
- Controls and messaging with PMUs, external PDCs, and System and Data Management service.

Communication Requirements

- Interface to PMU through a private IP network (IPv4/IPv6).
- Interface to external PDCs through a secure (firewall) IP network (IPv4/IPv6).
- Receive and send real-time data through TCP and UDP ports, user configurable.
- Communication with DFR/PMU Units using both TCP/IP and UDP/IP protocols.
 - The streaming PMU data shall use UDP/IP protocol,
 - UDP/IP, configurable destination IP address,
 - Receiving multicast data
 - Other messaging and non-streaming communications, such as control signals, shall use TCP/IP.

Performance Requirements

- Filtering and data processing with IEEE C37.118-2005 standard's level 1 performance.
- User configurable Waiting Time (waiting for PMU data), adjustable at least in the range of 1 ms to 60 s with 0.1 ms resolution.
- Synchrophasor data processing time configurable (selectable) with 0.1 ms resolution. Default is half of sampling period (4.2 ms for 120 records per second)
- PMU data quality measures (e.g., Alarms, error logger, data quality checks, ...).
- {How fast the alarm should be generated}

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