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Pacific Gas & Electric Synchrophasor Archive Project

Making Data Available

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AVEVA

Pacific Gas and Electric



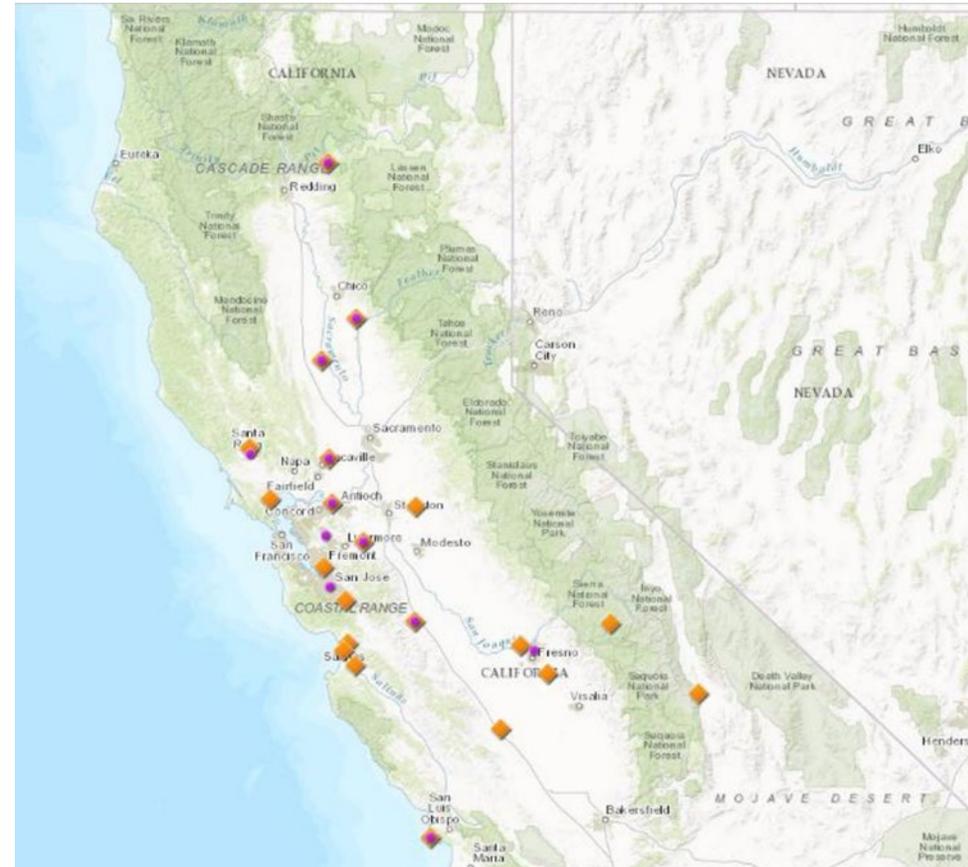
Enterprise License

- Pacific Gas and Electric Company, incorporated in California in 1905, is one of the largest combined natural gas and electric energy companies in the United States. Based in San Francisco, the company is a subsidiary of PG&E Corporation. PG&E is presently relocating its headquarters across the San Francisco Bay to Oakland, California.
- There are approximately 23,000 employees who carry out Pacific Gas and Electric Company's primary business—the transmission and delivery of energy. The company provides natural gas and electric service to approximately 16 million people throughout a 70,000-square-mile service area in northern and central California.
- Service area stretches from Eureka in the north to Bakersfield in the south, and from the Pacific Ocean in the west to the Sierra Nevada in the east.
- 106,681 circuit miles of electric distribution lines and 18,466 circuit miles of interconnected transmission lines.
- 42,141 miles of natural gas distribution pipelines and 6,438 miles of transmission pipelines.
- 5.5 million electric customer accounts.
- 4.5 million natural gas customer accounts
- PG&E is the Nations largest utility

ARRA SGIG Western Electricity Coordinating Council Western Interconnection Synchrophasor Program (WISP)

In 2008 as a cost share participant in WISP PG&E installed 204 Phasor Measurement Units (PMUs)

- Deployed Redundant PMUs in approximately 25 Substations
- Architected and Commissioned Communication system for data delivery
- Architected and deployed Quad Redundant Field Gateways for receiving synchrophasor data
- Approximately 6000 measurement values streaming 60 values per second 5.2M values per day for each measurement. Total 360K values per second
- Proprietary Archive available on the operations network only



Business Challenge

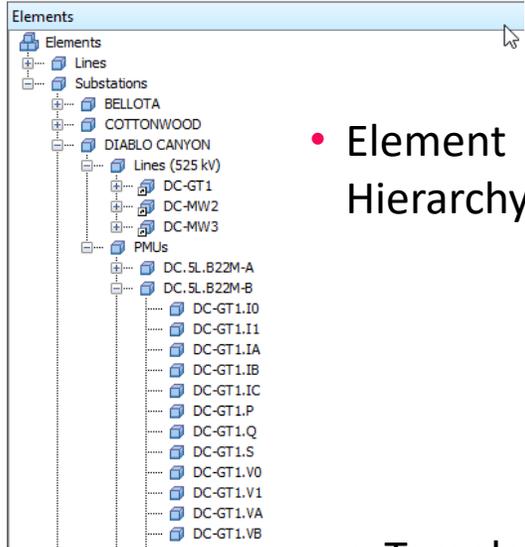
Access to data

- Data only available to a subset of employees with access to the operations network
- Proprietary data archive meant only a few employees had the ability to extract data
- Responding to data requests was time consuming
- Transferring data to requestors was complicated
- Data organization was flat
- PG&E Policy allowed PI Archive on the corporate network only
- PG&E was archiving SCADA data only, approximately 2.5M points
- Initial deployment as part of WISP did not include delivering synchrophasor data to the corporate network

Aveva PI Archive and Asset Framework

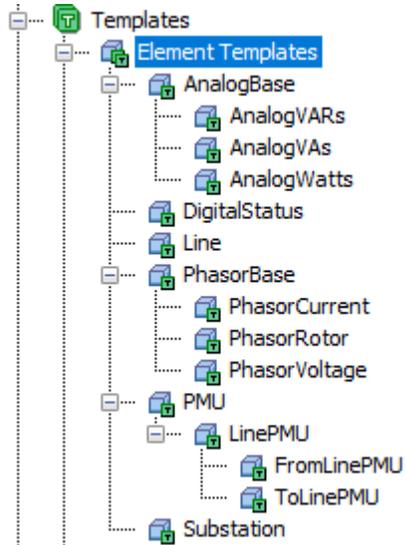
Making data readily available

- Setup PI Collective specifically for synchrophasor data on the corporate network
 - Best practice not mixing SCADA data with Synchrophasor data
 - 150 TB
- Forward synchrophasor data stream from the quad redundant operations network through a redundant DMZ to the corporate network
- Use Open-Source Grid Protection Alliance openHistorian application to write synchrophasor data directly to PI collective
- Develop synchrophasor naming convention (short) with PI Tag and Asset Framework in mind
- Develop Asset Framework builder utility
- Include meta data in element attributes
- Develop compression settings specifically for synchrophasor data



- Element Hierarchy

- Templates

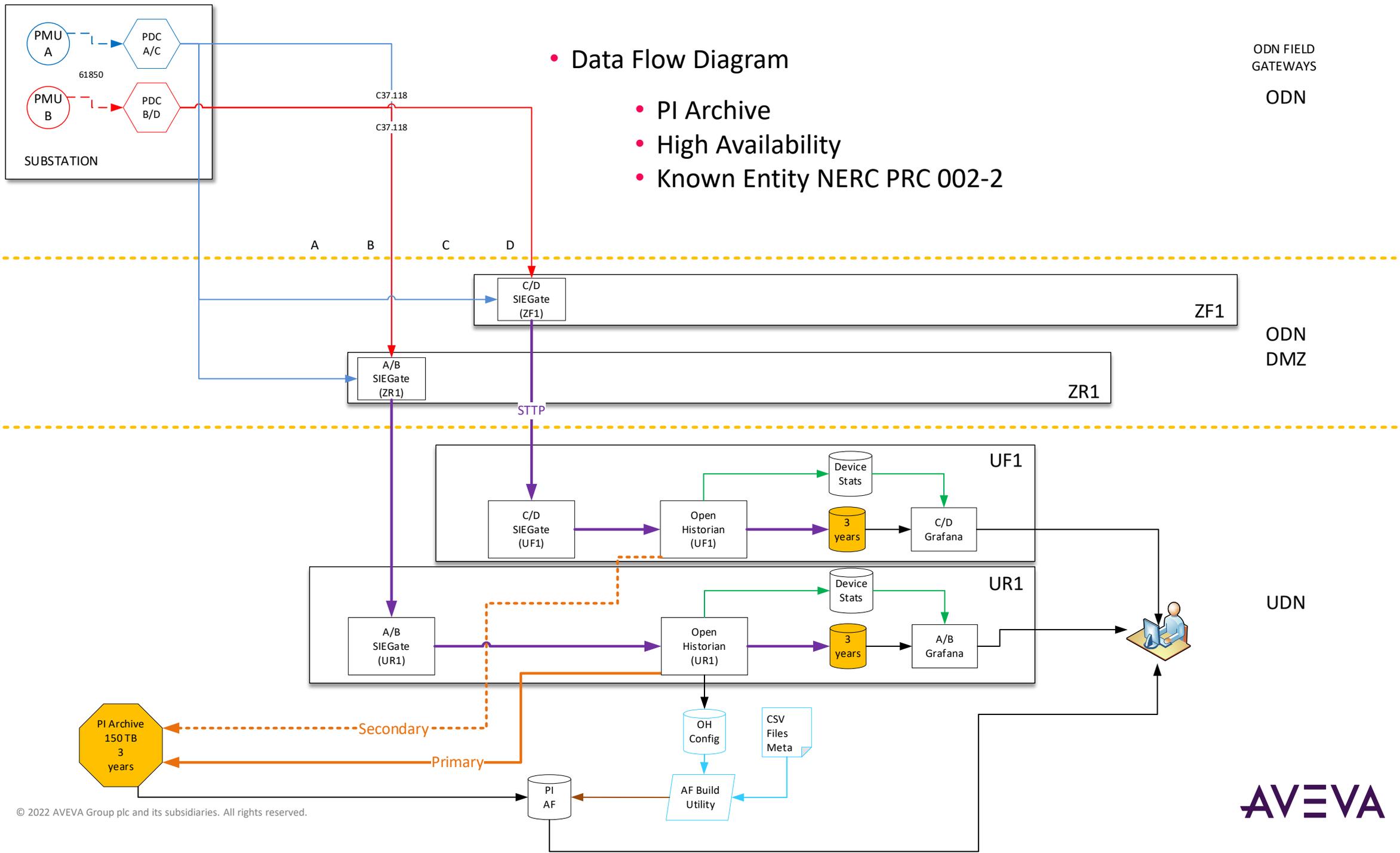


Name	Description	Default Value
AccessID	OpenHistorian PMU Access Identifier	0
C37STAT	The OH Status, plus the C37.118 status form a 32 bit value	0
C37STAT GPA	GPA Signal Reference	
DeviceID	OpenHistorian device identifier	0
DFDT	Rate Of Change Of Frequency Hz/sec	0.000
DFDT GPA	GPA Signal Reference	
Frequency	Every PMU delivers a single frequency measurement	60.000 Hz
Frequency GPA	GPA Signal Reference	
IsPrimary	Is this the primary if redundant PMUs exist	True
Model		
Name	C37.118 name maximum 16 characters	
Name GPA	GPA PMU Name/Acronym	

- Element Attributes

- Compression settings

C	D	E	F	G	H	I	J	K	L	M	N	O	P
ObjectType	compressing	archiving	compdev	compmax	compmin	typicalvalue	compdevpercent	excdev	excmax	excmin	excdevpercent	span	zero
PIPoint	1	1	0.001	28800	0	50	0.001	0.1	600	0	0.1	100	0
PIPoint	1	1	0.1	28800	0	50	0.1	0.1	600	0	0.1	100	0
PIPoint	1	1	0.001	28800	0	50	0.001	0.1	600	0	0.1	100	0
PIPoint	1	1	0.1	28800	0	50	0.1	0.1	600	0	0.1	100	0
PIPoint	1	1	0.001	28800	0	50	0.001	0.1	600	0	0.1	100	0
PIPoint	1	1	0.1	28800	0	50	0.1	0.1	600	0	0.1	100	0
PIPoint	1	1	0.001	28800	0	50	0.001	0.1	600	0	0.1	100	0
PIPoint	1	1	0.1	28800	0	50	0.1	0.1	600	0	0.1	100	0
PIPoint	1	1	20000	28800	0	500000000	0.001	2000000	600	0	0.1	2000000000	-1000000000
PIPoint	1	1	10000	28800	0	500000000	0.0005	2000000	600	0	0.1	2000000000	-1000000000
PIPoint	1	1	10000	28800	0	500000000	0.0005	2000000	600	0	0.1	2000000000	-1000000000
PIPoint	1	1	0.001	28800	0	50	0.001	0.1	600	0	0.1	100	0
PIPoint	1	1	10	28800	0	50	10	0.1	600	0	0.1	100	0
PIPoint	1	1	0.001	28800	0	50	0.001	0.1	600	0	0.1	100	0
PIPoint	1	1	10	28800	0	50	10	0.1	600	0	0.1	100	0



Data Flow Diagram

- PI Archive
- High Availability
- Known Entity NERC PRC 002-2

ODN FIELD GATEWAYS

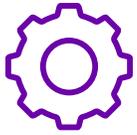
ODN

ODN DMZ

UDN

AVEVA

PG&E Success Story



Challenge

- Very High Report Rate Data Set
- Availability Limited to Operations Network
- Data Requests Time Consuming
- Limited Toolset for Data Access



Solution

- Integration to PI System
- PI Archive Collective on the Corporate Network
- Comprehensive Asset Framework



Benefits

- Data now available to multiple PG&E Business Units supporting
- Data accessible to meet NERC Requirements
- Industry Standard Archive technology
- PI suite of data access tools
- Substantial improvement in time spent accessing Data
- Next Steps: PI Vision and Analytics



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“It does not require many words to speak the truth.”

Chief Joseph

Questions?

Please wait for the microphone.
State your name and company.



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Navigate to this session in the mobile app to complete the survey.



Thank you!