WISP

Western Interconnection Synchrophasor Program
Communication and Data Quality

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Acknowledgement and Disclaimer

- Acknowledgment: This material is based upon work supported by the Department of Energy under Award Number DE-OE0000364.

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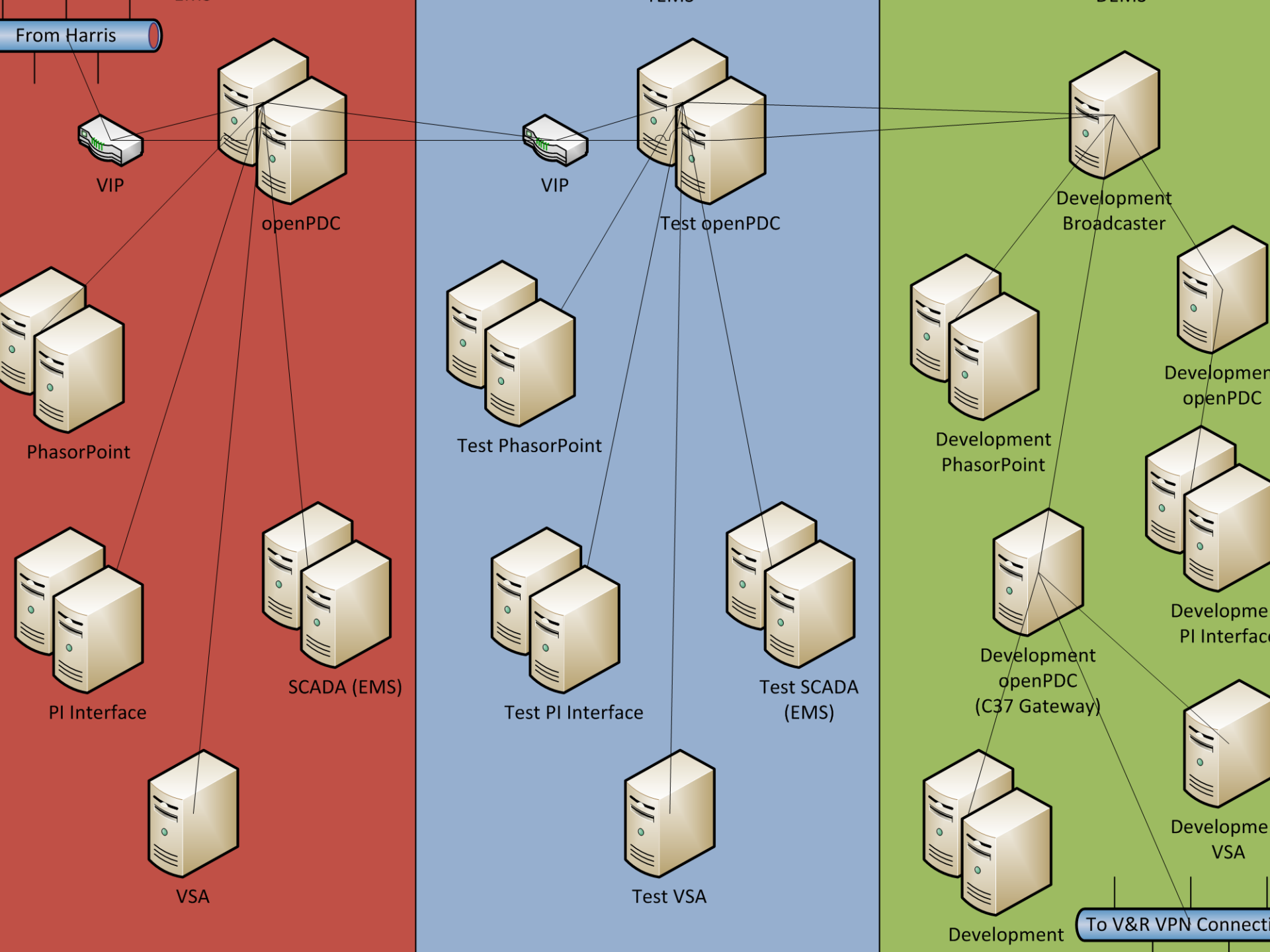
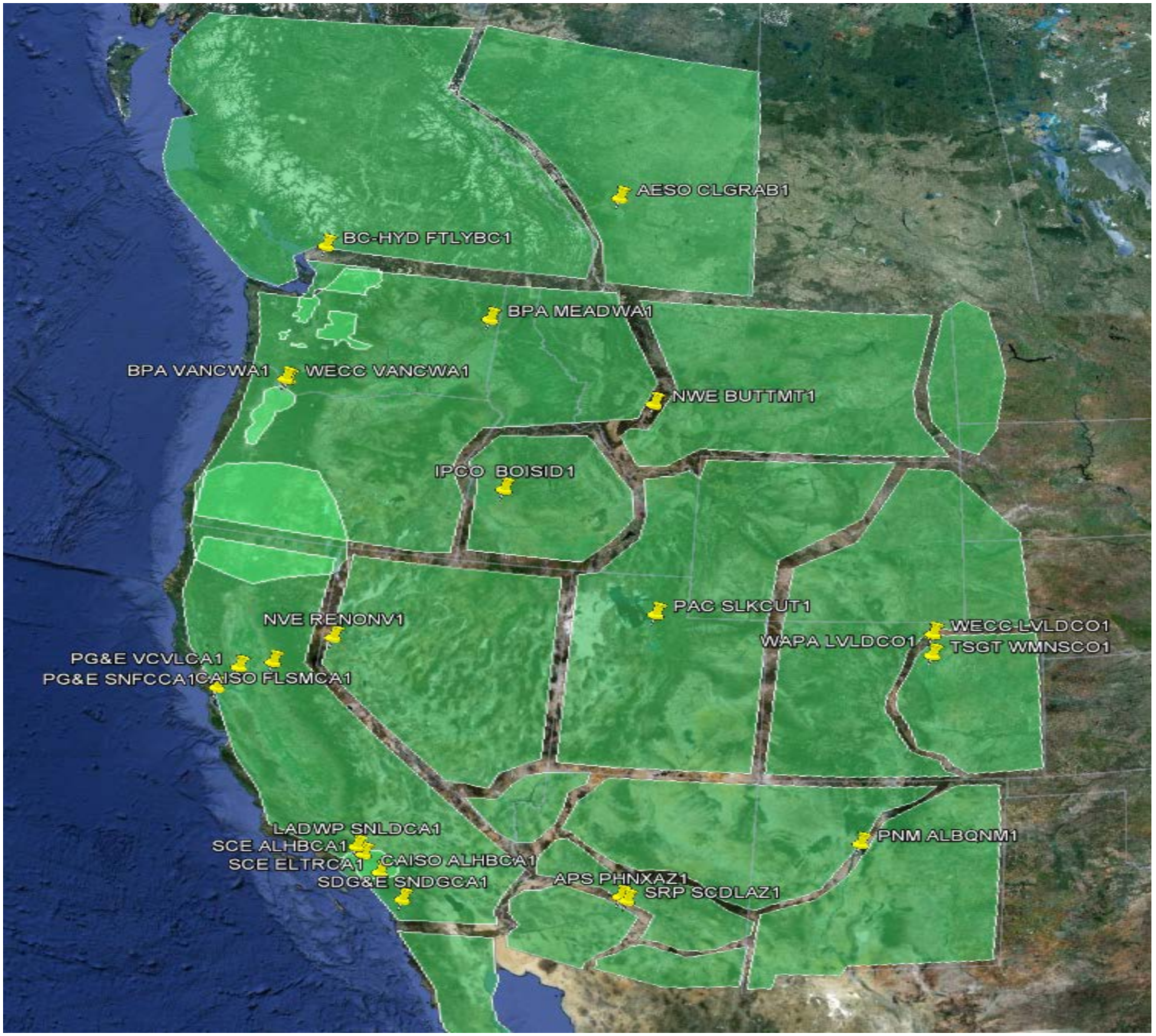

From Harris
VIP
openPDC
PhasorPoint
PI Interface
SCADA (EMS)
VSA
VIP
Test openPDC
Test PhasorPoint
Test PI Interface
Test SCADA
(EMS)
Test VSA
Development
Broadcaster
Development
PhasorPoint
Development
openPDC
(C37 Gateway)
Development
To V&R VPN Connecti

Communication Design Goals

- Edge router to edge router < 30ms latency
- Backbone network 99.9999% available
- Last mile (local loop) 99.99% availability
- Source PDCs: Dual redundant PDCs at two separate physical locations
- Destination PDCs: Dual redundant PDCs at two separate physical locations


AESO CLGRAB1
BC-HYD FTLYBC1
BPA MEADWA1
BPA VANCWA1
WECC VANCWA1
NWE BUTTMT1
IPCO BOISID1
PAC SLKCUT1
NVE RENONV1
WECC-LVLDCO1
WAPA LVLDCO1
TSGT WMNSCO1
PG&E VCVLCA1
PG&E SNFCCA1
CAISO FLSMCA1
LADWP SNLDCA1
SCE ALHBCA1
SCE ELTRCA1
CAISO ALHBCA1
SDG&E SNDGCA1
APS PHNXAZ1
SRP SCDLAZ1
PNM ALBQNM1

PMUs and PDCs

Total existing or planned PMUs	484
Total existing or planned PDCs:	59
PMUs currently deployed:	200
PMUs currently streaming data:	90

Class A data 50/50 mix sample rate 30Hz and 60Hz

High Availability and Disaster Recovery

- Redundant PDCs at each collection site location
  - o Manual switchover between PDCs at each site
  - o Both sites active
  - o Disaster recovery plan in development
- Redundant PDCs at some source locations

Archives

- Storage duration and capacity:
  - o All Data On-Line – 15 months
  - o Disturbances – 7 years
  - o 100+ TB
- Redundant Archives at each archive location

Communications

- Dedicated, private wide-area network (WAN);
- Provided by Harris Corporation:
  - All data on WAN is encrypted using GET-VPN WECC control keys;
  - WAN from RCs up to TOs/ISOs edge routers under contract to WECC;
  - Centralized management;
  - Core network deployment complete: Nov. 2011;
  - Final PDC to PDC communications testing: Nov. 2012; and
- Peer-to-peer communication is occurring; and
- Will facilitate NASPInet phasor gateway demonstration – March 2013.

Performance monitoring

- Edge to edge router performance tracked by Harris
  - Notification of outages is fully automated
- Full end to end monitoring presently being handled by openPDC
  - Working with vendor to develop more accurate monitoring
- Participant PMU and / or PDC outages presently handled through email notification
  - Workflow in place to track outage

PMUs (cont.)

- Data Quality:
  - o 95 percent of PMUs delivering quality data some issues with older PMUs;
  - o A small number of PMUs have timing issues (one is convinced it is 2034); and
  - o In all cases so far, timeliness issues have been PMU related not communication system related, even when communications are over serial connections.

Communications

- Data flows and speeds:
  - PMU to PDC communication controlled by each Participant — latency varies among Participants.
  - PDCs to RCs for centrally processed applications:
    - Edge router to edge router latency requirement is 30 ms average over 10 min, experiencing 19 ms; and
    - Jitter requirement is 2 ms average over 10 min, experiencing 1.4 ms.
    - WAN availability 99.99 percent (measurement beginning May 2012).
  - Expecting 2100 phasor measurements initially — WAN capable of 10X this volume limited only by ‘last mile’ connection.

WECC