

Offshore GPS Requirements & Utilization for the Gulf of Mexico

Maritime Briefing for CGSIC

ION GNSS+

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Stephen Browne

Executive Vice President – Veripos

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Maritime use of GPS in the Gulf of Mexico

- Industries and Operations where GPS is utilized in the Gulf of Mexico
 - Shipping
 - Recreational Boating
 - Search & Rescue
 - Scientific
 - Military
 - Offshore Oil & Gas



Image courtesy of Royal Caribbean Cruise Lines



Image courtesy of the USCG



Image courtesy of DOF Subsea



Image courtesy of Subsea 7 Inc.



Image courtesy of ENSCO Inc.



Image courtesy of the USCG



Image courtesy of NOAA



Image courtesy of NOAA

GPS for Shipping

- Navigation
 - Position
 - Interfaced to ECDIS (electronic plotters)
 - Route planning
 - Vessel guidance
 - Speed (Both GPS speed and aiding Doppler speed logs)
 - Heading
 - Communications & GMDSS
 - Interfaced to ARPA Radar
 - Bridge integrated navigation systems
- AIS
 - Collision Avoidance
 - Vessel Traffic Services
 - Maritime Security
 - Aids to Navigation
 - Search & Rescue
 - Accident Investigation
- Docking Operations
 - Cruise Ships
 - Cargo Ships
- Cargo & Container Management



Photos courtesy of Kongsberg Maritime



GPS as part of an Integrated Bridge Navigation System



Government Operations

- Search & Rescue Operations
- Maritime Law Enforcement & Drug Interdiction Missions
- Environmental Response
- Fisheries Enforcement
- NOAA Operations



Images courtesy of the USCG



NOAA Vessel Ronald H. Brown
Photo courtesy of NOAA



Scientific Operations

A few examples:

- MetOcean research
- Fisheries & Sea Mammal monitoring & research
- Environmental research
- Seabed research
- Ocean Archeology
- Sediment monitoring



DGNSS for the Offshore Energy Industry

Offshore Energy Industry

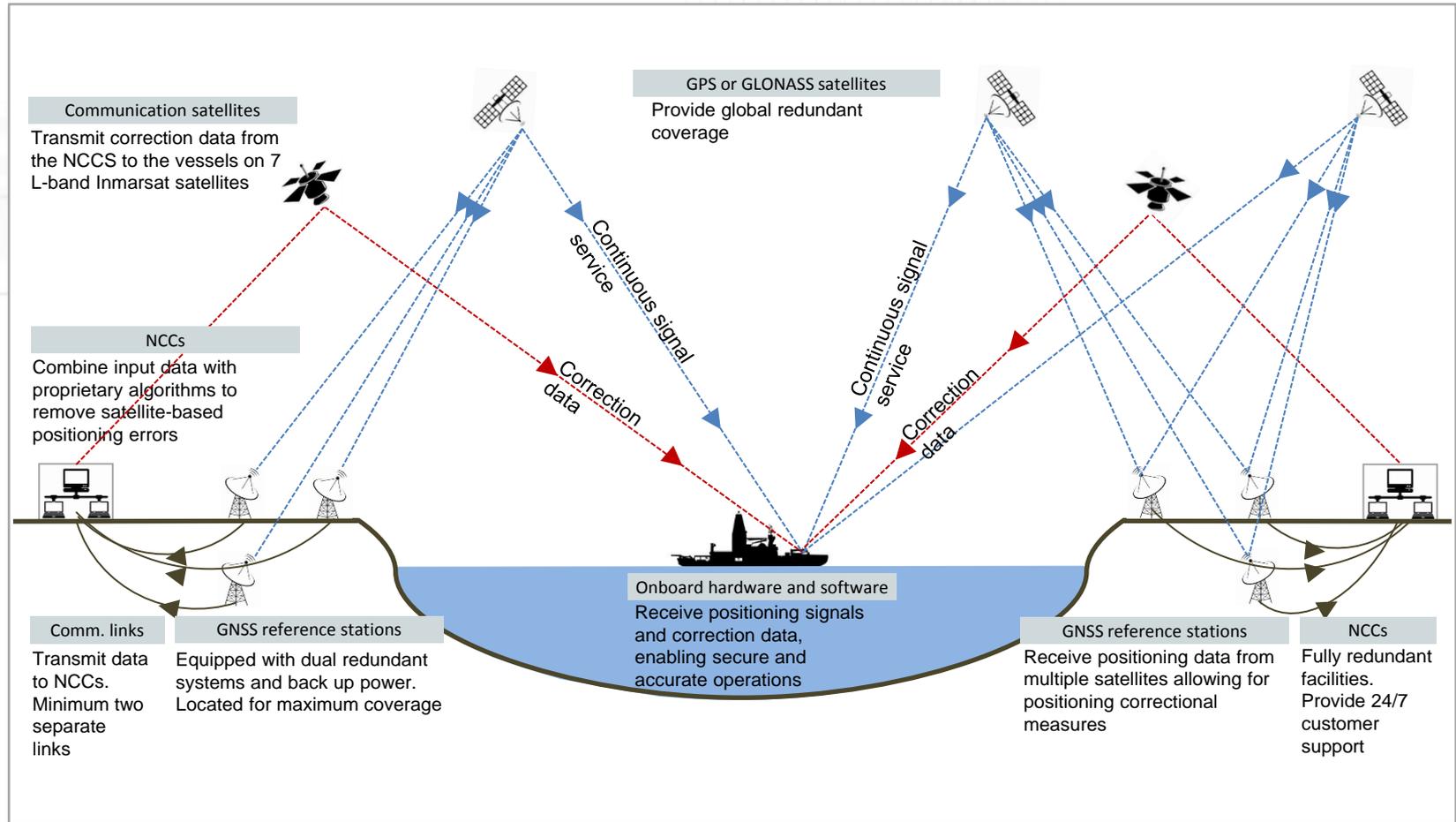
- Dynamically Positioned Vessels
- Drilling
- Hydrographic Survey
- Seismic Survey
- Geotechnical Operations
- Other Operations
- Construction Installation Operations
 - Subsea Installations
 - Surface Installations
- Pipe-lay Operations
- IRM Operations
- Diving Operations
- Abandonment



The DGPS / DGNSS Requirement

- The offshore energy industry requires precise, repeatable and reliable positioning for all types of operations.
- This means the use of commercially available augmentation services such as Veripos and Fugro, and the use of free augmentation services as back-up, such as IALA.
- Veripos currently provides independent high accuracy PPP services based on JPL data and our own network of reference stations with accuracies of +/- 6cm 2 sigma (95%).

Illustration of How a Commercial DGNSS Augmentation Service Works



The Offshore Energy Cycle



Finding hydrocarbons



Planning & Hazard Survey



Drilling



Pre-field development engineering



Subsea Installation



Offshore facility installation



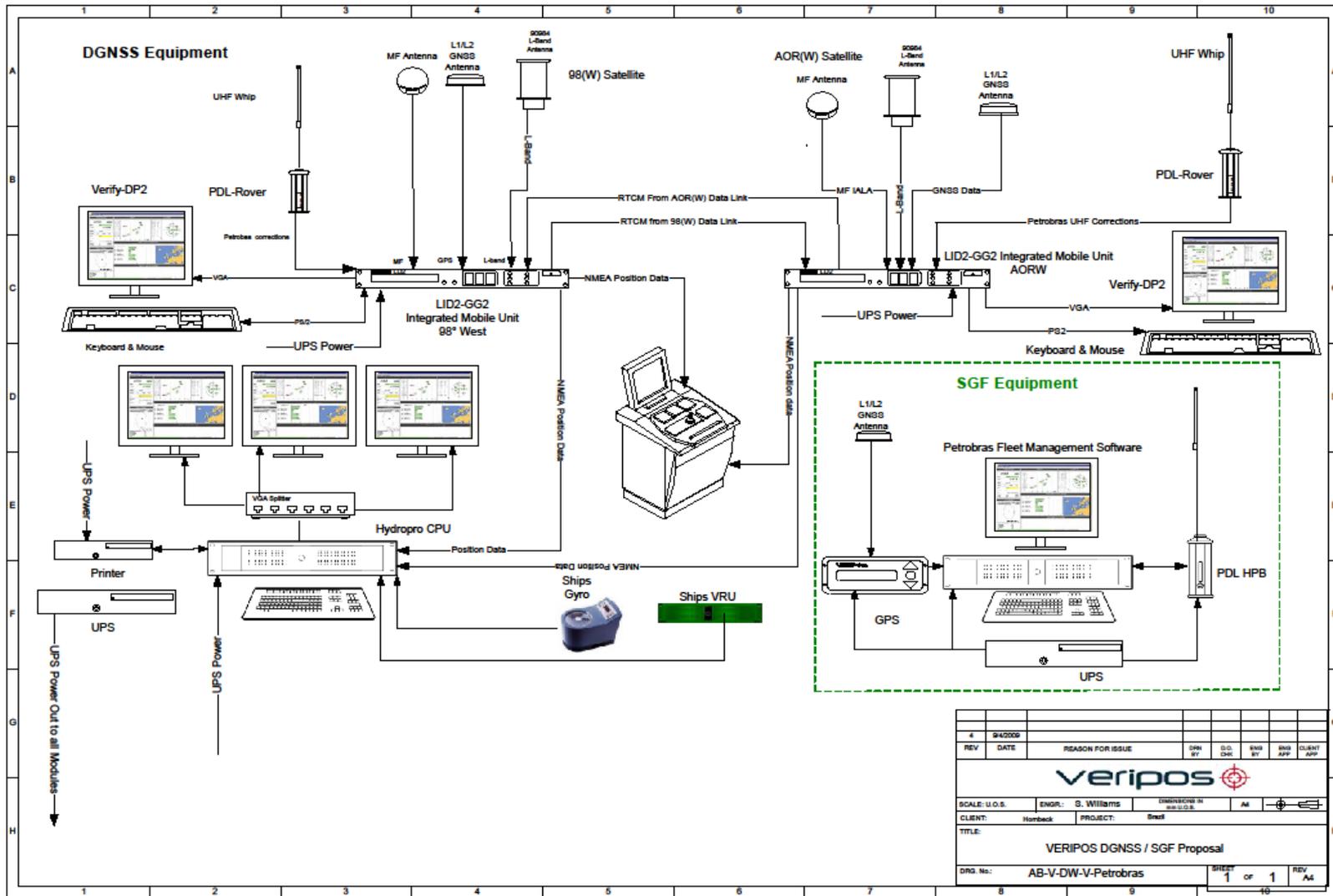
Pipe Lay

DGPS/DGNSS for Dynamic Positioning

- Dynamic Positioning is using an on-board control system, fed by various sensors, of which DGPS/DGNSS is a prime sensor, that allows a vessel to keep station offshore.
- Types of DP Vessels include:
 - DP Semi-submersible Drill Rigs and Drill Ships
 - Offshore Support Vessels (OSVs), including Platform Supply Vessels (PSVs), Anchor Handling Tugs (AHTS), and Multiple Purpose Support Vessels (MPSVs)
 - Construction Vessels which include pipelay vessels, subsea installation vessels, heavy lift vessels for platform installations, IRM (intervention, repair, and maintenance) vessels which utilize ROVs, Divers, and AUVs and Abandonment operations vessels, crane barges and accommodation vessels
 - A growing number of Seismic Survey vessels
 - A growing number of Hydrographic Survey vessels
 - Wind Farm installation vessels (not currently in use in the GOM)



Typical DGNSS Installation for DP Operations



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CLIENT: Hornbeck		PROJECT: Shell							
TITLE: VERIPOS DGNSS / SGF Proposal									
DRG. No.: AB-V-DW-V-Petrobras								SHEET 1 of 1	REV AA

Offshore Drilling Operations

- 1st phase: The Rig Move
- 2nd phase: Station Keeping
- 3rd phase: Drilling
- 4th phase: Hitting Pay
- 5th phase: Completion
- Well intervention



DGPS/DGNSS for Survey Operations

Offshore Survey operations include:

- Hydrographic Surveys
- Hazard Surveys
- Pipeline Route Surveys
- Seismic Survey
- Geophysical and Geotechnical Survey
- Survey for Offshore Construction Projects
- Survey for Pipe Lay Operations
- Survey for IRM projects
- Positioning for Rig Moves



Offshore Construction Operations

- DGPS / DGNSS used in all facets of construction operations, including engineering, site survey, installation and post construction IRM.
- In these operations dual use of DGPS is most prevalent as it is used for positioning, whether anchored or DP and for Survey operations for every project.
- As with other all other areas, accuracy, repeatability, and reliability are essential.



Summary

- GNSS is used in all facets of offshore operations for the maritime industry, for scientific work, for government operations, and for the offshore energy industry.
- While the technology and capabilities of GNSS have continuously improved, so have the technical and operational requirements providing a need for more sophisticated systems.
- GNSS has been integrated into more and more systems and the reliance on it offshore has grown exponentially.

Questions?

- Contact details:
 - Email: stephen.browne@veripos.com
 - Phone: 281-966-7633

Thank You!