SHEARWATER

Date: 9 Dec 2019

Certification of Experience

Designation	From Date	To Date	Place of Posting	Employer Details
Sr. Marine Positioning Specialist & Vessel Network Administrator	Jun 2019	Present	Worldwide	Shearwater Geo Services (Reflection Marine UK Ltd)
Sr. Marine Positioning Specialist & Vessel Network Administrator	Jun 2015	May 2019	Worldwide	Freelance Contracting on WesternGeco Vessels
Sr. Marine Positioning Specialist & Vessel Network Administrator	Nov 2006	Apr 2015	Worldwide	WesternGeco/ Schlumberger Intl Ltd.

This is to confirm that **Sandeep Narayanan Das** (Bhagyasree House, Thycattussery P.O, Cherthala, Kerala, India-688528) has nearly 14 years of Experience in Marine Seismic Positioning. Currently Mr. Sandeep Narayanan Das is a full time Employee of Shearwater Geo-Services since 10 June 2019. Sandeep Joined WesternGeco Intl. Ltd (a Schlumberger subsidiary) in November 2006. Between June 2015 and May 2019, He worked as a freelance contractor in the same field. His duties include,

- Vessel Network Administration: Managing all components of the company standard vessel IT and communication network (UNIX and NT servers, switches, routers, pbx and peripheral equipment).
- Ability to fault find on equipment: installation, maintenance and repair of all equipment and systems.
- Sound understanding of survey and geodetic principles. Good understanding of Seismic Positioning system. Plan and execute surveys such that the positioning products meet the necessary quality acceptance criteria.
- Ability to work in an organised manner and to produce clear and consistent written reports: Providing pertinent information and feedback to Chief Positioning and produce documents and reports as required.
- Ability to supervise coworker and instil motivation: Supervise the Positioning Department and assist in on job training and development of co-worker(s).
- Ensure and promote teamwork through actively assisting other departments and actively participating in innovative solutions to increase vessel efficiency and utilisation.
- Strong awareness and commitment to QHSE Management System: Awareness of, and compliance to, company policies, standards, procedures and safety critical tasks relating to your assigned job and location. To ensure safe working procedures for critical activity under your control are adequate, understood by all and adhered to.

Yours Sincerely,

Russell Turner,
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I'm a B. Tech Graduate in Computer science and a Diploma holder in Electronics. In my career, first I worked as a Computer Engineer in HCL Infosystems Ltd. In 2006, I joined WesternGeco (Schlumberger) Intl. Ltd., world's largest seismic company as Marine Positioning Specialist. Along with Positioning job, I was Vessel Network Administrator. From 2016 to 2018, I worked as a freelance contractor in same field. In 2019 I joined with Shearewater GeoServices, when WesternGeco was brought by this company.

I have 6-week rotation, 6-week work and 6-week vacation. This give me a chance to develop my other IT skills. I have knowledge and experience in Software programing language such as Java, C, C++, C#, python, web scripting languages, Robotic Operating system, Unity3D, etc.

Experience Summary

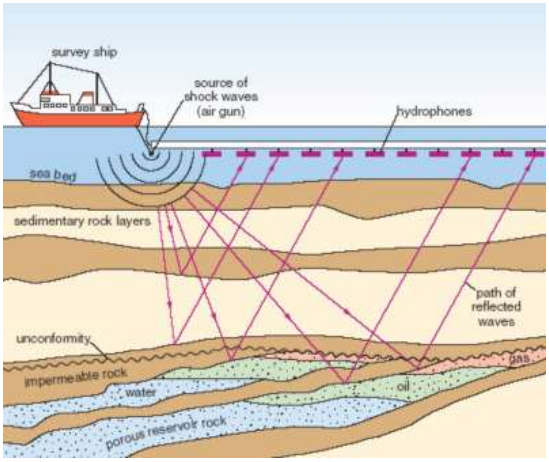
Marine Positioning (Navigation) Specialist		
14 Years	From: Nov 2006	To: Present
Clients and Locations	ONGC(India), Reliance(India), Petronas(Malaysia), Repsol(Malaysia), Shell(Brunei), Petronas(Malaysia), TGS(USA), Multiclient(USA), Kris Energy(Cambodia), Total(Taiwan), Point Resources(Norway), Aker BP(Norway), (Petrobras)Portugal, Total(Angola), (INPEX)Japan, (Multiclient)Mexico, Rosneft(Russia), ENI(Mozambique), Aramco(Saudi Arabia), Chernomorneftegaz(Turkey), Murphy(Australia)	
Vessel Network Administrator		
14 Years	From: Nov 2006	To: Present
Onboard WesternGeco (Schlumberger) Oil Field and Shearwater GeoServices Vessels		
Computer Hardware Engineer		
2 Years	From August 2004	June 2006
Worked in HCL Infosystems (Patna) and major customers were, Banks (SBI, PNB, BOI, UBI, etc.), NIC, Other Central India and State government units.		
Software Programmer (Freelance)		
16 Years	2004	Present
Programming Languages: Operating Systems: Technologies Database Tools	Java, C, C++, C#. Unix, Linux, Windows, Android, ROS (Robotic OS). HTML, JavaScript, CSS, Angular, Unity 3D, Spring, Hibernate, Unity3D MySQL, MS Access, Objectivity.	
Projects	Websites, Java Shopping Cart, Academic Projects, etc.	

As my work is a bit unique and different from normal land job, I have briefly explained the nature of works and projects I do with some basic explanation.

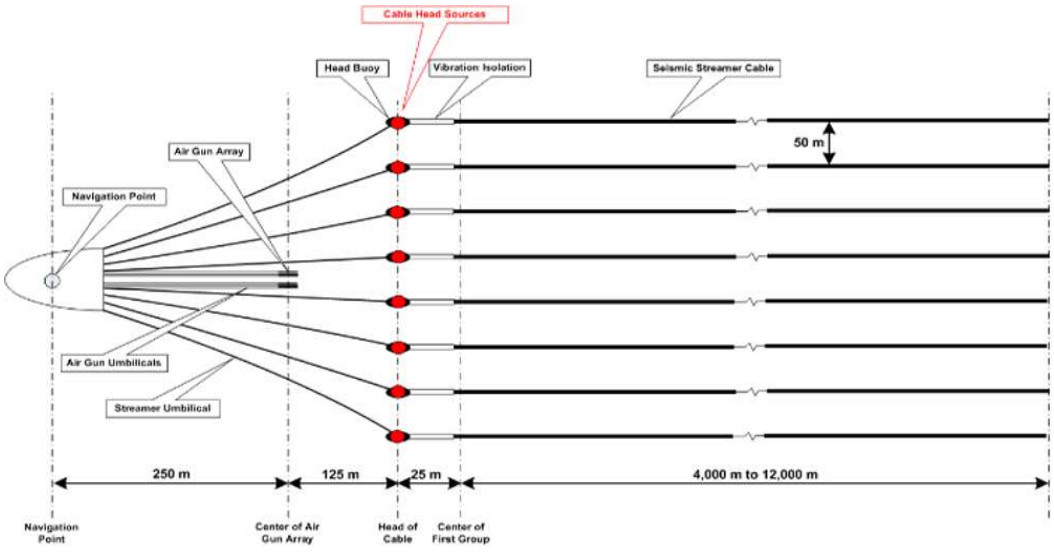
About my Company and type of work

Currently I'm working in Shearwater GeoServices(www.shearwatergeo.com), Marine Seismic Company with 6 weeks rotation. Shearwater is a provider of 3D and 4D marine seismic data, imaging products and data processing software. - https://www.shearwatergeo.com/14/about-us/our-company. They have multiple division; I work in Marine acquisition.

3D marine seismic survey



In order to perform a 3D marine seismic survey, a couple of seismic streamers, each typically couple of kilo meters long and containing arrays of hydrophones and associated electronic equipment, and towed at about 5 knots speed behind a seismic survey vessel, which also tows one or more seismic sources, typically airguns. Acoustic signals produced by the seismic sources are directed down through the Water column into the earth beneath, where they are reflected from the various layers. The reflected signals are received by the hydrophones in the streamers and then transmitted to the seismic survey vessel, where they are recorded with the ultimate aim of building up a representation of the earth strata in the area being surveyed.



Types of 3D Marine surveys.

https://www.shearwatergeo.com/129/marine-acquisition/technologies

Towed marine survey involves many technologies, two main ones are

Q-Marine: https://www.shearwatergeo.com/135/marine-acquisition/technologies/qmarine-point-receiver-marine-seismic-technologies and

Isometix - https://www.shearwatergeo.com/130/marine-acquisition/technologies/isometrix-multi-measurement-streamer-system

A 3D Marine Vessel

There are three sub departments in seismic vessel – Navigation (Positioning), Recording (Acquisition) and Handling(Source and Towing). Navigation is responsible for source and receiver positioning with help of GNSS technology and hardware. Acquisition responsible for recording seismic data. The Handling department takes care of Source.

Basic Navigation

Before a seismic survey is started all the lines to be shot are defined by the client company. The coordinates for the lines start and end points are sent on board the ship. These are called preplots. It is the positioning specialists role to navigate the vessel down these lines. Each preplot line is divided up into shots by a fixed regular interval, usually 12.5, 18.75 or 25 meters. This is called the “shot point interval”, and is specified by the client.

The Navigation aids available to the navigator to steer down the line include GPS satellite navigation, gyro compass, ships log and current meter. This is all integrated into a computer controlled navigation system. The navigation software, I’m using is called TRINAV. Using inputs from the different navigation aids, TRINAV will continuously calculate the ships position. These positions are used to line up the ship prior to start of line, and while on the line issue a trigger pulse or navigation closure for each new shot point reached. For each shot both the calculated position, and the raw data from the different navigation aids are recorded to disk for processing on board the vessel.

It is always impossible to keep the ship exactly on the line, due to wind, swell and currents the ship will behave dynamically and continuously move a few meters from side to side of the line.

Sequence of events for each shot while on the line

For each shot point the source will be fired.

1. The navigation system estimates that the ship is in place for the next shot and issues a closure. At the same time the data from all of the navigation sensors is recorded to disk.

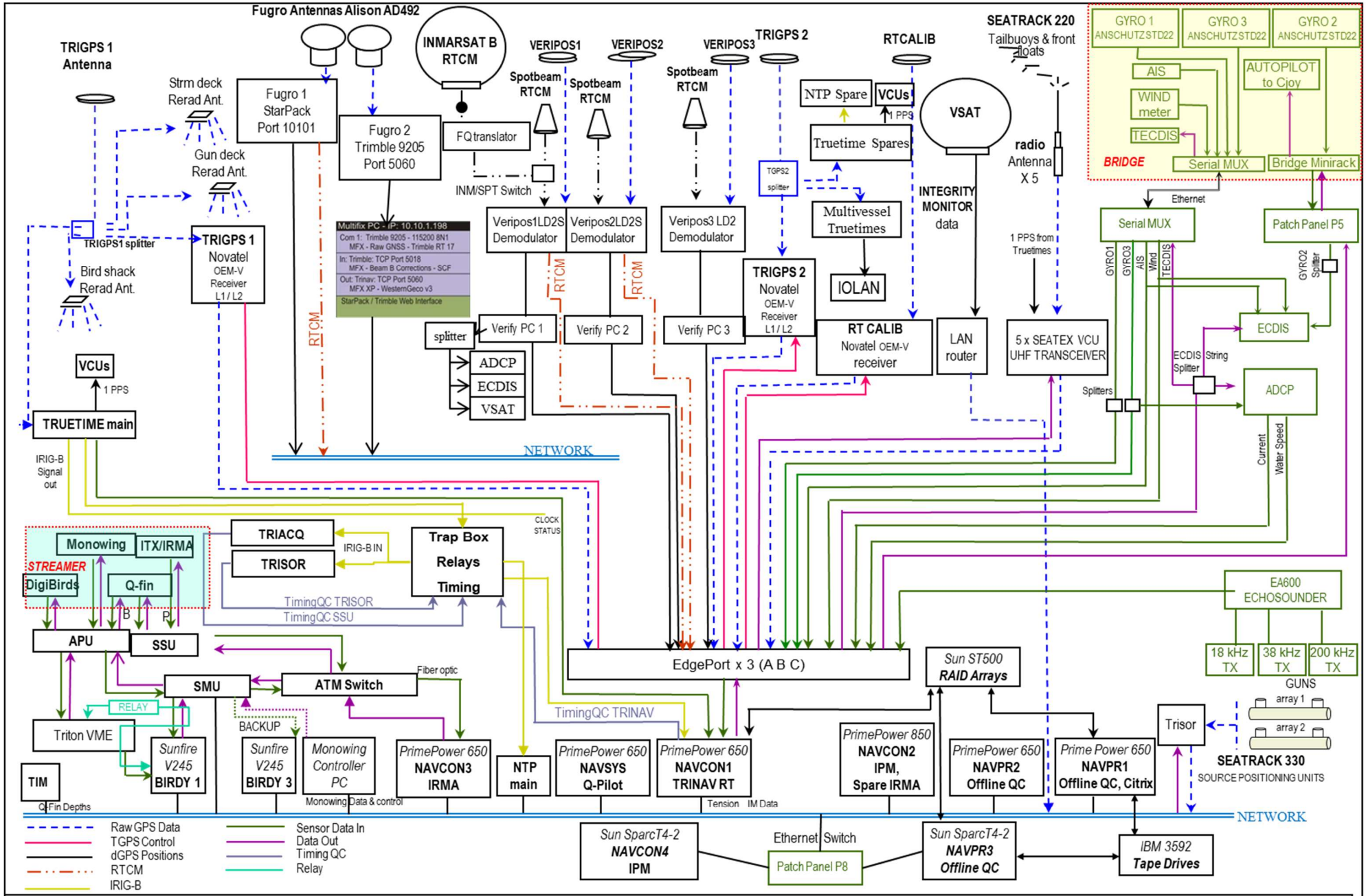
2. The recording instruments receive the “closure” from navigation and trigger the gun controller.

3. The gun controller fires the guns. The sound wave from the guns will be reflected by the geological horizons under the seabed.

4. The reflected seismic data (sound waves) are then picked up by the streamer, digitized and recorded on magnetic tape together with any relevant auxiliary data. This recording normally lasts between 4 to 8 seconds. This is called the “record length” and is specified by the client.

Marine Positioning Specialist

I have more than 14 years of experience in marine seismic surveys. My job title is Sr. Marine Positioning (Navigation) Specialist. My job is to record and deliver the source and receiver positions. The job involves advanced computers, electronic devices, and modern networking and communication technologies. My electronics educational background and experience in computer job in the past is a plus. Along with my Positioning duties, I take care of onboard Servers, PCs and networking (Vessel Network Administration). A typical positioning hardware and connections are shown in the diagram below.



Positioning Systems and Network Diagram

Major devices and Inputs.

Oil and Gas exploration requires precise knowledge of position. This is critical both in the exploration and production phases. In the exploration phases the seismic 3-D images require positioning of seismic sources and receivers to an accuracy of one meter. GPS signals do not penetrate water and can only be used for surface object positioning. Acoustic ranging technology is the primary compliment to GPS for underwater positioning.

Historically the navigation requirements for seismic acquisition were limited to positioning the vessel, and using compasses and acoustic data to derive the position of source and receiver groups. Basic position computations were done while acquiring the data, and on shore post-processing was needed to produce the final results.

Today's positioning requirements demand a higher accuracy, improved robustness against measurement faults, and rigorous quality control.

Gyro: Survey gyros are used to determine vessel heading. The gyro is aligned with the vessel centerline and will show True North.

Digicourse 5011 Compass Bird: Compass heading is used to assist with streamer and gun positioning.

Echosounder: A device for measuring water depth.

ADCP: Acoustic Doppler Current Profiler - shows the speed and the direction of the current at numerous depths below the water surface.

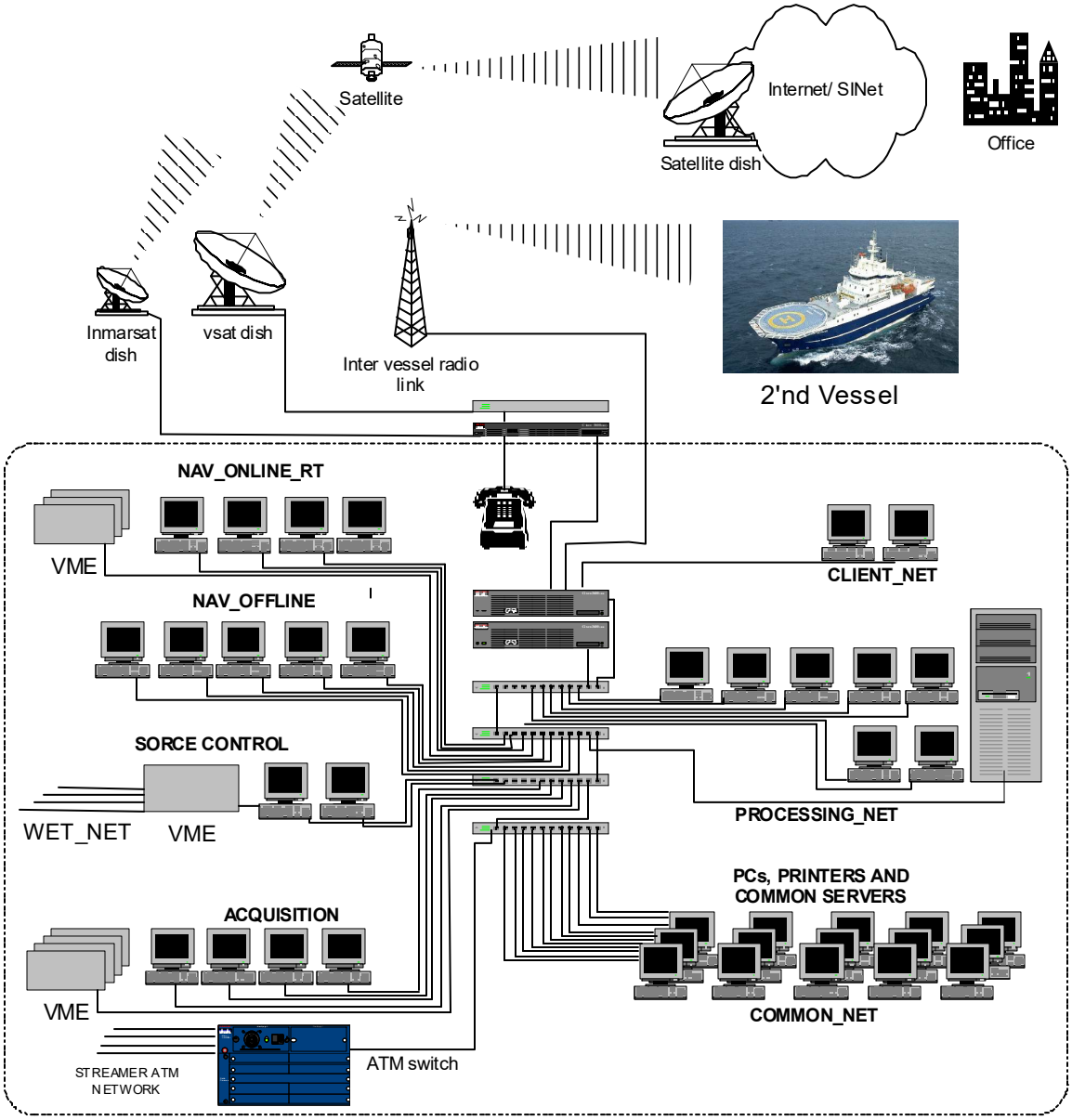
Connection between the devices are achieved via fibre, ethernt or serial connections. I'm responsible for installation, maintenance and managing of devices. A good understanding of geodesy is important. Geodesy is the study of: a) The size and shape of the earth; b) The measurement of the position and motion of points on the earth's surface; and c) The configuration and area of large portions of the earth's surface.

GNSS (Global Navigation Satellite System) is the standard generic term for satellite navigation systems that provide autonomous geo-spatial positioning with global coverage. We use the GPS, GLONASS for accurate positioning. DGPS (Differential GPS) are available for positional corrections to GPS signals.

A key component of positioning the seismic spread is float tracking. GPS units are also mounted on each source sub array, streamer front and tail ends. These units provide absolute positioning of the Source and the ends and fronts of the streamer. From the positions provided by these units we can use the relative positioning from the acoustics to position the receivers.

Acoustic transmitters area receivers are deployed on the spread to accurately position the streamers. These rages are tied up with gyro and GPS signal for final positioning.

VESSEL NETWORK CONFIGURATION



A typical vessel network and configuration is shown in the diagram below. Vessel communicates with outside world mainly via VSAT and backed up by INMARSAT. As a vessel network Administrator I take care of the onboard servers and liaise with office for smooth working of vessel. On shore dedicated IT department and support engineers are available and 24/7 support is provided. As Vessel Network, I install and configure computer networks and systems, identifying and solving any problems that arise with computer networks and systems, consulting with any onboard department and users to specify system requirements and solutions, maintaining existing software and hardware and upgrading any that have become obsolete, monitoring computer networks and systems to identify the reason for performance degradation, working with IT support personnel ashore.

The WAN router enables voice and data network connections to company intranet and the Internet.

Lan router connects to WAN router and voice and data connection to local vessel network and other vessels in multi-boat operations. This is further connected to different department by Switches.

Access is restricted by access-list. Vessel belongs to Vessel VPN. Route Exports between different VPNs occur to ensure complete communication between all Networks connected through DexaNet.

Various communications equipment is used on board, some general ships communication and some specific for the seismic operations. The communications can be divided into two parts: Wire based and wireless.

VSAT

Very Small Aperture Terminal is a satellite service with almost world wide coverage using at C-band (worldwide coverage) or Ku-band (local coverage) frequencies. These include integrated solutions that offer to the maritime industry simultaneous voice and data communication. This gives us 24hours a day connection to onshore networks. This is the vessel primary communication system with the outside world.

INMARSAT

Inmarsat is a backup service for maritime VSAT services. It provides a reliable L-band connection for data and Internet use.

Seismic Communication

Each department will also connect to each other via an Ethernet. However, then we have a router connected to do load sharing between the different sub systems. The speed of the network is up to 1Gbps and we are using TCP/IP protocols to communicate.

PC network

This is a Microsoft TCP/IP network running on Ethernet. The network is used for common file services, email and web based services (internet browsing). All departments on board make use of this facility.

Wirebased systems: Telephone central (Private Automatic Branch Exchange - PABX).

Vessels have a phone central installed. The lines out from this central are connected to the ships satellite phone and couple of portable phones.

VHF (Very High Frequency - 30-300MHz) & UHF (Ultra High Frequency - 300-3000MHz) Radios

VHF radios are general purpose vessel-to- vessel and vessel-to-shore voice radio communication. UHF radios used for communication within the ship. Installation of fixed radios and antennas, amplification, troubleshooting, maintenance, etc. are carried on part of duty.

Software Projects

I had a chance to be a part and created couple software projects and websites throughout my career. My 6 weeks regular break helped to progress on these skills.

I have enrolled as a graduate special student at University of Nevada, Reno. I enrolled for some computer science credits and was working with Dr. Fred Harris Jr. for some projects. The aim was to use these credits to carry forward when I fully enroll as a master student.

I also involved and supported for many academic projects. Listing major projects below.

Virtual Watershed System: A Web-Service-Based Software Package For Environmental Modeling using Uninty3D Game Engine and C#. With this tool, users can examine single points of data, or look at values over time. They are also able to create and explore 3-D models, or look at the topography of a two-dimensional slice.

Climate Hangman - A Word Challenge Educational Game Unity3D Game Engine, C#. The aim of this project is to impart knowledge to the K-16 and lay audiences about the risks of Nevada Climate change and also to disseminate the science behind climate change through educational based computer games.

Development of a Multirotor Aerial Vehicle capable of Autonomous Navigation, aimed to expand on multirotor unmanned aerial vehicle autonomous capabilities through the use of on-board image processing, in outdoor, unmapped environments. Components: ROS, IMU, USB-Cam, C++, etc.

An Efficient Way to Generate Large-scale Bayesian Networks using Genetic Algorithm

Development of the Flying Arena: UNR provides large space for testing of unmanned aircrafts. The available infrastructure includes a motion capture system which facilitates ground truth but also enables us to deploy safety mechanisms that can take over the control of our robots in case of emergency. Components: ROS

Online Music Store: An ecommerce project created with Java, Spring, Hibernate, SQL Server.

Websites: Created and deployed couple of websites (eg: www.essensolutions.com, www.dosagrillva.com) using HTML, CSS, JavaScript, Angular and NodeJS.

NCLab: Worked as an associate for expanding business and training students. NCLab (Network Computing Lab) is an open public cloud computing platform that empowers future coders, engineers, and scientists by providing engaging self-paced and self-graded courses in essential STEM subjects, as well as powerful open source computing and simulation tools. www.nclab.com.

Software Testing: SDLC, STLC. Java, JUnit and TestNG, Selenium WebDriver, and Cucumber.