Overview of Submarine Cable Route Planning & Cable Route Survey Activities

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Presentation Summary

- Submarine cable systems - concept to reality
- Objectives of route planning and marine route survey
- Planning tools
- Desk Top Studies
- Route survey technologies and applications
- The cable route survey and UNCLOS provisions
- The cable route survey – Why this activity does not constitute Marine Scientific Research
- Permitting and impact on project lead time
Concept to Reality – Key Phases

- Development of Business Model
- Feasibility Study & Initial Engineering
- Pre Survey Desk Study
- Route Survey & Burial Assessment
- System Installation
- Definition of Key Project Milestones
- Define Permitting Requirements
- Secure System Permits in Principle
- Marine Operations Permitting
- Project Concept & Initial Investors
- Formation of Interim Management Team
- Supply Contract Processes
- Route Survey Contract Process
Key Project Milestones

- Completion of Business Case
- Completion of Feasibility Study – this should include
  - Clear definition of permit requirements and responsibilities
  - Clear understanding of permit lead times
- Target RFPA date
- Issue of Supply Contract RFQ
- Award of Supply Contract
- Complete securing of system Permits in Principle
- Completion of Pre Survey Desktop Study
- Completion of Route Survey
- Completion of installation
- Complete commissioning
- RFPA
Permitting & Impact on Project Programs & Planning

- Varying permit lead times can lead to project planning and implementation phase dislocation if not properly sequenced
- Identification of permit interdependency a critical factor in project planning
- Impact of variations in permit lead times on project planning:
  - Minimal when dealing with domestic national systems
  - Most complex for long haul international systems with highly variable national jurisdictional requirements
- Impact of route transits through non landing country jurisdictions:
  - Can lead to protracted negotiations when transits are through territorial waters and/or contiguous zones
  - Complexities when either jurisdictional agencies approached late or not at all; or when unpredicted changes or routing requirements imposed
  - Problems associated with conflicts with UNCLOS protocols for coastal states that have ratified UNCLOS
Planning & Survey Objectives

- To develop optimised routing between defined landing sites that meets economic and technical viability criteria including:
  - Avoidance of or minimising conflicts with other seabed users
  - Minimising exposure to natural and manmade risks and hazards
  - Optimising cable engineering and protection
  - System maintainability
  - Adherence to ICPC Protocols and Recommendations
Available Planning Tools

- GIS Databases
  - GeoCable
  - In-house from historic data
  - Geoscience institutions
- Route planning software tools
  - MakaiPlan
  - Map Info
  - Bespoke satellite imagery tasking
- Web based interactive imagery
  - Google Earth
Planning Tool Applications

- GIS Databases – Inputs to Feasibility & Desktop Studies
  - Cable fault histories
  - Location of existing (and planned) cables and repeaters
  - Location of existing and planned pipelines
  - Maritime boundary delimitations
  - Offshore oil & gas lease block boundaries
  - Offshore mining lease block boundaries
  - Military exercise areas
  - Dumping grounds
  - Marine park boundaries
  - Geoscience inputs (metocean, tectonics, volcanism)
Planning Tool Applications

- Route planning software tools – Inputs to Feasibility & Desktop Studies
  - Pre survey RPL & SLD development
  - Pre survey cable type selection
  - Final post survey (or survey concurrent) RPL & SLD development
  - Final post survey (or survey concurrent) cable engineering

- Web based interactive imagery
  - Qualitative early landing site evaluation
  - Qualitative identification of some hazards
Pre Survey Desktop Study

- Output from planning activities will be input to a pre survey DTS.
- Risk and hazards for each route section will be assessed and summarized in a Risk Matrix.
- In addition to archival research, the desk study will document information gathered from visits to the system landing sites.
- The DTS will recommend appropriate route survey procedures designed to prove viability of the pre survey planning effort.
Table XX: Risk Summary along the ANY-1 Cable Route

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<th>Slope Instability</th>
<th>Seismicity/ Faulting</th>
<th>Volcanic Activity</th>
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<th>Steep Slopes</th>
<th>Bottom Currents</th>
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**LEVELS OF RELATIVE CONCERNS**

- **High (H)**: Available data indicate a significant risk and continuing concern from this source.
- **Medium (M)**: Available data indicate a possible risk that needs to be better assessed.
- **Low (L)**: Available data indicate that while present continuously or intermittently in some areas, this concern is unlikely to affect cable integrity.
The Route Survey

- Provides information required to confirm or amend the preliminary pre survey DTS route
- Defines and documents the final route
- Enables final cable engineering to be defined
- Provides the system installer with the data required to finalize installation procedures
- Identifies potential post installation/residual hazards including unmitigated risks from potential tectonic activity during the system design life
Route Survey Data Sets

- Data is collected along a **narrow** strip of seabed, typically 500m to 3 x water depth wide and includes:
  - Bathymetric data – seabed topography
  - Sonar imagery data – seabed surface features
  - Sub-bottom profiling data – shallow sub surface soil profile
  - Burial assessment data – mechanical properties of the seabed soils within the planned burial profile (typically 1m to 3m)

- Geophysical and soils data usually only collected where cable protection by burial is planned typically up to a maximum water depth of 1,000m; rarely up to 2,000m

- Only bathymetric data collected in deep water
Multibeam Bathymetry

- Bathymetry and co-located back-scatter data
- Digital data output can be rapidly processed and analysed
- Data used to develop seabed terrain model
- Resolution of multibeam systems is altitude dependant
High Resolution in Shallow Water
High Resolution in Shallow Water
Deep water data

Philippine Trench maximum depth
10,400m
Side Scan Sonar Imagery

- Towed systems
- Depth range up to 3000m
- Provide images of seabed surface features
- Surface back-scatter intensity can be used as indicator of seabed hardness
Side Scan Sonar Imagery
Sub-bottom Data
Burial Assessment

- Gravity coring
- Cone Penetrometer Tests
  - Tip resistance
  - Sleeve friction
  - Resistivity
- Typically to 3m below seabed
- Used to predict and categorize cable plough burial performance
Short reporting lead-times have led to:

- On-board data acquisition, processing & charting
- Telemetry of processed data to shore based offices
- Data output direct to route planning software (Makai)

Final reporting typically office based
UNCLOS – Provisions & Application

- Cable route surveys are part of the process of laying submarine cables.
- 10 articles of UNCLOS govern the activities related to cables in the territorial sea, the EEZ, the continental shelf and the high seas.
- The freedom to navigate and lay cables and the operations associated with ships exercising these freedoms are expressly provided for under these articles.
- In reality, an increasing number of coastal states are now insisting on permits; or the lesser, but no less program challenging, Letters of No Objection issued by the coastal state, for survey and cable installation within their EEZ.
- The justification often given by coastal states imposing these permitting restrictions, is that the route survey constitutes Marine Scientific Research, the tools and methodology of which being similar.
Cable Route Surveys

Why this activity is not Marine Scientific Research

- The fundamental objective of the cable route survey is to:
  - Prove and document the initial route developed during initial project planning stages
  - Identify and where practical, develop the initial route to avoid obstructions and hazards found during the survey
  - Determine final cable engineering and cable quantities
  - Confirm or amend preliminary cable protection strategies
  - Provide all data and documentation necessary to support cable installation
  - Provide the database framework for system maintenance
Cable Route Surveys

Why this activity is *not* Marine Scientific Research

- Marine Scientific Research is not defined in the Convention; however, it is clear that the scope of submarine cable route surveys cannot be construed as *Scientific Research*
  - The route survey scope is not designed to perform systematic investigations into and study of the marine environment in order to establish facts and reach new conclusions about the marine environment, *nor*
  - To carry out exploration or exploitation of living or non-living resources
  - Drill on the continental shelf
  - Use explosives or harmful substances
  - Construct, operate or use artificial islands, installations or structures
Permits

Program Impacts & Consequences

- Requirement for survey vessel to mobilize in advance of all survey operational permits being issued has resulted in:
  - Inability to commence operations upon arrival on site
  - Dislocation of planned survey phase sequence
  - Protracted vessel standby
  - Long out of sequence and non productive vessel transits
  - Increased costs through consequential Contract Variations
  - Substantial overall project delays with loaded installation vessels idle waiting on survey data and installation permits

- Increasing requirement for marine operational permits in EEZs particularly for non landing countries in “apparent” contravention of UNCLOS provisions has further negatively impacted permit lead time and project progress
Permits
Program Impacts & Consequences

- In the case of recent projects in the Red Sea, Gulf of Aden and Arabian Sea, permit delays caused survey work to be pushed into the Southwest Monsoon with the attendant weather delays and negative impact on survey data quality.

- The one permit at a time policy of adopted by some countries has required out of sequence survey operations, long transits between permitted and non permitted routes further escalating cost.
Securing permissions to carry out survey operations vary from coastal state to coastal state and from straightforward to highly complex with lead-times measured in days to many months; associated conditions can include:

- Requirement for all survey team members and vessel crew to undergo security checks
- The imposition of restrictions on certain nationalities within the survey team and/or vessel crew; and even the country where the survey contractor’s company is registered
- Requirement for survey operations to be witnessed by security officers
- Mandate for survey work be conducted by national research institutes to pre-agreed hand over locations
- Requirement for copies of survey data to be made available to the coastal state upon completion of the survey and/or copies of reports
Questions & Clarifications

Questions and clarifications on the content of this presentation or related matters can be addressed to:

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