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Remote Diagnostics - New ways of Improving Service Response and Ensuring System Availability

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Abstract: Communication systems now available to offshore owners can be applied to further improve the Field Service *support for DP systems and other maritime products. This paper presents some of the tools that are available, the experience of Kongsberg Simrad and gives a brief survey of the trends in offshore communication services.*

The challenge

Maritime products such as DP, ship automation and safety systems can be used anywhere in the world. It is a challenge to provide the best possible service for the offshore owners. Service offices are spread around the globe, but still valuable time is needed to travel to a vessel in a remote location. Since an increasing set of functions on the vessel is controlled by data systems, a team of experienced engineers may be needed for the analysis and resolution of multifaceted situations.

The typical steps to process a service request are:

- Sort out the nature and details of the problem.
- Consider if the operator can solve this problem with some telephone assistance, or if a service visit is required.
- Additional analysis at manufacturer site may be needed before further suggestions can be made.
- A service visit will require planning and preparations.
- When the service personnel has arrived on the vessel, additional consultation with the support office may be required for final analysis of the situation.

This paper discusses some of the utilities that can be used to improve the steps of this process. With the readily available and widely used high-speed data communication within the maritime sector, the operator on the vessel can get an on-line connection to the manufacturer's support office. This possibility to further improve the Field support has been the goal for the investigation of the new Remote service.

At the request of offshore owners a remote on-line service, similar to those offered by many mainland services, has been established to ensure that support for their operations are available at any time. Oceaneering International Inc. is one of the owners that have offered to install equipment for Remote Diagnostics testing.

Remote diagnostics utilities

Once the remote connection is ready, several utilities are available in the support process:

- **Assess the system status**: The remote support engineer can call-up the identical view and information being displayed on the operator's console. Based on this, they can discuss the nature of the problem (a parallel telephone connection is assumed). This will give an easier understanding of the system status, and may lead to a quicker assessment of the situation.
- **Record information for later use:** The information viewed during the discussion can be recorded and viewed later on, for example if the situation requires discussion with other support personnel.
- **Transfer log files:** The support engineer can easily transfer configuration and log files to the support office**.** This will ensure that the vessel's on-board system configuration is replicated when running simulations on the support centre's systems.
- **On-board system update:** When approved in co-operation with the Master of the vessel, corrections can be transmitted to the vessel and the system updated.
- **Remote access to supplier's onboard test utilities:** These are normally not available for the operators, but can be used by the service engineer to assess the system status in further detail.

- **Operation planning:** When a new operation is planned, the contractor, owner and senior support engineers can perform an on-line walkthrough of the important system functions to be used, and ensure that the configuration is correct for the new operation.

By implementing these utilities several steps in the support process can be improved. The requirement for installation for this added service is that the vessel must have an existing communication system with a bandwidth of 64 kbits/sec or higher. The connection must be configured such that a separate "conduit" is established to separate the communications to the remotely supported system from normal vessel traffic.

Offshore communication technology

The traditional Telefax and radiotelephone used for Field support has now been augmented by E-mail. By these means the user can easily send written descriptions of the actual situation, and receive detailed instructions. Most DP/Vessel Management System vessels are equipped with satellite communication systems that allow both regular telephone and E-mail contact. Inmarsat is one typical system used.

Drilling vessels within coastal reach also may have established telecommunication using microwave data links to serve more advanced use.

There is a steady development in the offshore communication market, and there are now as many communication choices available for the marine user as there are on-shore. Services that provide instant Internet access, E-mail, high-speed data and multiple telephone lines can be leased or owned outright.

Satellite service providers offer scaleable solutions where data, telephone, radio, etc. are multiplexed into high-speed connections.

In the office, ISDN connections give a better price/performance versus analogue connections. Thus instant access with sufficient response time is available to serve offshore systems from an office located far away from the vessel's shore base.

Many of today's vessel owners already use these communication systems to support their own on-board data network. The Helpdesk for vessel office computers and administrative systems may well be located at the contractor's home office. The contractor can then also offer communication facilities to the client that supervises the operation.

The trend is toward increased bandwidth for such connections. The high-speed link of today is 64 kbits/sec and upwards. For regular transfer of large data files and other demanding applications a bandwidth up to 512 kbits/sec may be required. To be partially compatible with the normal local area network response, a "broadband" communication in the T-1 range (1.54 megabits/sec) is required.

Remote connections for Kongsberg Simrad systems

The current trend in offshore communications availability opens up for new service possibilities on the DP vessels.

The Kongsberg Simrad operator stations use standardized hardware and operating systems. With the addition of commercial communication software to the system the set of service utilities listed above becomes available, provided a reliable connection can be made through the existing on-board communication system. The Remote diagnostics service has been tested from Norway with several satellite systems:

- Telenor Satellite Service NORSAT Sealink with Ku-band in the North Sea
- Inmarsat-B with its worldwide antenna system.
- Oceaneering's "Ocean Intervention" vessels in the Gulf of Mexico, utilizing Caprock's Ku-Band services.

The drawing illustrates how the Remote diagnostics will cover on-shore installations to be reached by landline or offshore installation reached through satellite systems. For each case, the routing through the operators communication system must be sorted out. Once perfected, a fixed procedure can be used to re-establish the connection to Kongsberg Simrad's system when remote support is required.
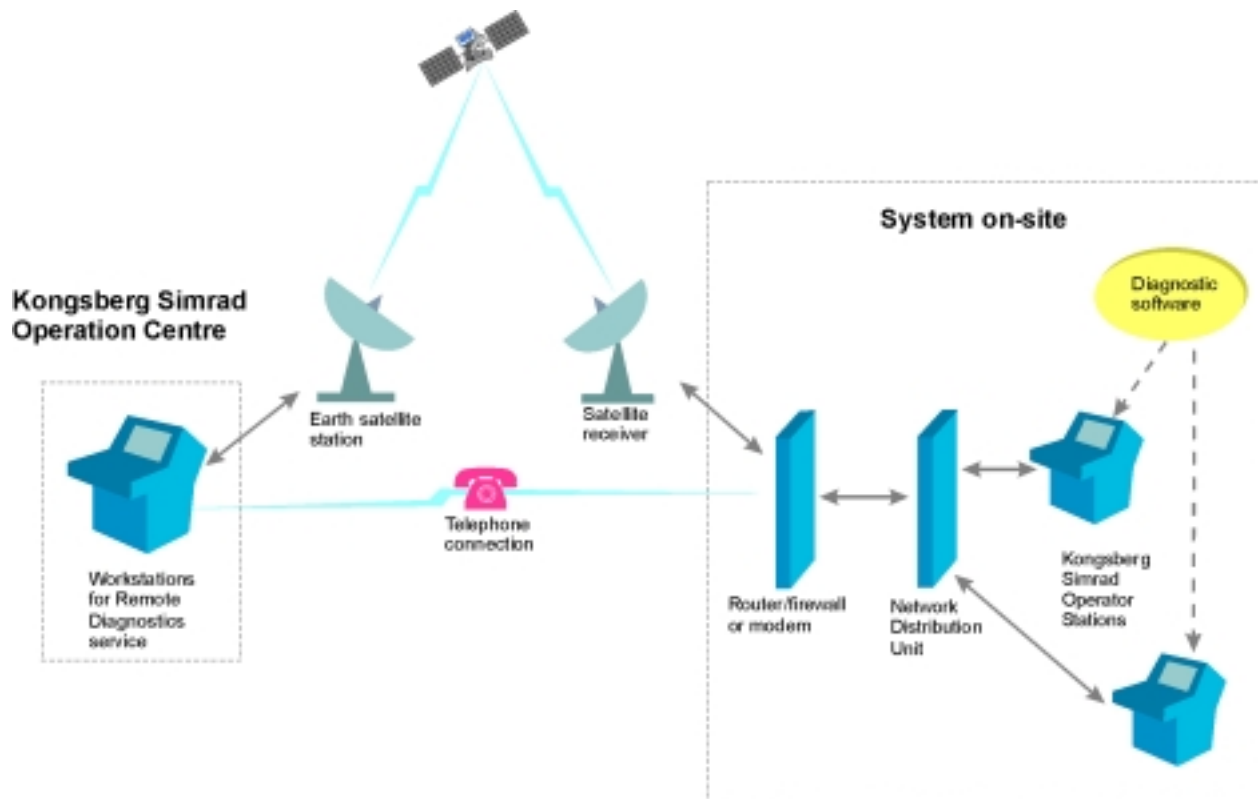
Schematic drawing showing alternative solutions for remote diagnostics

Organization for remote diagnostics support

It is recommended that the supplier build an organization to handle the new Remote diagnostics support:

• Operation Centre establishment: The Remote diagnostics support should be organized in an Operation Centre, where sufficient communication and data equipment are located. The centre must be a restricted area. Only essential service personnel should have access to the actual business of the vessel owner.

• Hotline - round the clock: Due to the nature of the operations for the vessels to be served, Remote diagnostics must be available 24 hours a day.

On-board the vessel, there should be clear procedures for use of the Remote diagnostics:

• The Master should control remote access.

• Telephone contact with Remote diagnostics centre is required during remote service.

• The criticality of current vessel operations will dictate the limits of any remote session.

Security issues

Several measures should be applied to ensure that the remote access takes place in a secure manner. Some of these measures are:

• Access is protected through physical connection controlled onboard, login/password, etc.

• Routing tables within routers/firewall ensure limited access.

• The DP/Vessel Management process networks should not be intermixed with the owner's local area network. The Kongsberg Simrad operator stations are equipped with an extra network, thus the Remote diagnostics communication can also be separated from the internal DP and Vessel Management Systems process communication.

• Access to the Operation Centre for Remote diagnostics is restricted, as previously mentioned.

Experience

- Valuable experience has been achieved, through use of similar Remote diagnostics, from previous deliveries to on-shore process system customers. For the offshore market, a detailed walkthrough with each customer and the satellite service provider is required to plan the installation. A test period is also required. Once established, the setup can be easily applied on other vessels equipped with the same systems.

- Stable communication links are of course important when on-line remote work takes place. For some vessels the satellite receiver moves into shadow areas with certain vessel headings. Part of the procedure must then be to move out of this shadow area before the remote service is entered.

- Although the on-shore service operator may be allowed to remotely operate the on-board system, it is important to limit the access. This can be accomplished by either using the command control options of the on-board system or by limiting the use of cursor/keyboard operations to just view the console displays. The on-board operator should always be consulted during the access.

Conclusions

- The Remote diagnostics solutions provided today require a bandwidth of ca. 64 kbits/sec for efficient use. With rapid improvement in telecommunications, higher bandwidths will soon be available at a reasonable cost. The remote service utilities will then become even more powerful and efficient to use.

- Operating systems will also be improved regarding security and remote access. In the future it may be possible to use Remote control in addition to Remote diagnostics. The contractor may then consider supporting his operations with senior experienced personal from the on-shore office.

- The experience that Kongsberg Simrad has collected with Remote diagnostics shows that the offshore market is ready for this solution. We believe that the Remote diagnostics will be a valuable improvement to current Field support, and thus give added value to the DP and Vessel Management System customer.