

# Stormy Times!



**- When a Drilling Rig cannot communicate -  
Serious problems and even disasters can occur!**

**Who are you going to Call, when your network has problems!**

**By: Tim O'Neill**

When a million dollar a day drilling rig cannot communicate efficiently many serious problems can occur. You usually do not have time to fly in an expert, so who are you going to call?

The world of Industrial Ethernet surrounds the "Must Be Up" network world like production environments and especially the Petrochemical

industry where everything from explosions to oil spills can occur resulting in not only physical and financial losses but loss of lives. When a problem occurs in these areas you must have a proven and focused strategy to get the systems back up to 100% and in a hurry. This is a story of one such problem that was being manifested in a slow response environment.

The Rig is a major offshore platform that costs about \$500K and up a day to run and if the drilling operations or production are stopped the losses can easily push one million dollars a day. They need a strategy and a team that can find and solve the problem before it can affect the safety or the production of the site. They need them on site today and now would be the best.

### **How do they get their problem solved quickly?**

The problem can exist anywhere from the end to end transmission, the satellite WAN configuration, the client PC, the offshore LAN, the WAN, the onshore LAN, the servers, the applications, even down to a single transducer...etc

There are 3 distinct needs for networks on these big rigs –

1. The need for human communications – Phone, e-mail, video...etc
2. The need for business communications – Reports – access to data bases..etc
3. The need to have access and control of the control technology on the rig. This is the monitoring and management access for looking at flows (total and instantaneous), Temperature, Pressure, RPM or speed...etc and a lot more.

If the network, like the one at this site, starts showing response issues someone needs to isolate it now and get the problem fixed before something very bad happens.

### **Who are you going to call? You need answers and a fix immediately!**

In this case the rig is equipped with the YR20 PCAP-Probe™ and once the problem was experienced they called YR20's Team and within a short period of time YR20's Team had isolated the problem as well as assured the Rig Team that it was not an issue that would affect the production but it needed fixing for other Business requirements.

YR20 rents their PCAP-Probe™ technology to Rigs and other production sites, like refineries and they stand ready to respond to any call for help, 24X7 First Responders!

The really great thing about this model is that you have seasoned technologist ready to help you 24X7 and you do not have to fly in experts.

What does YR20 mean – YR20, stands for the fact that every technical employee has over 20 years experience in the network industry. Not just Ethernet and TCP/IP but Satellite, RF, Industrial Control and real experience in the Oil and Chemical arena – from rigs to offshore and much more.

Here is the way that YR20 found the root cause of this issue. –

Remember the probes run all the time and this is very good if you need immediate problem recognition and quick solutions.

The probe was connected at the edge router offshore and the data collection process started. First analysis of the collected data showed that there were 3 active VLAN's on the trunk.

**VLAN #1** was carrying the robotic traffic and showed light traffic and the WAN QoS was very good. It was OK.

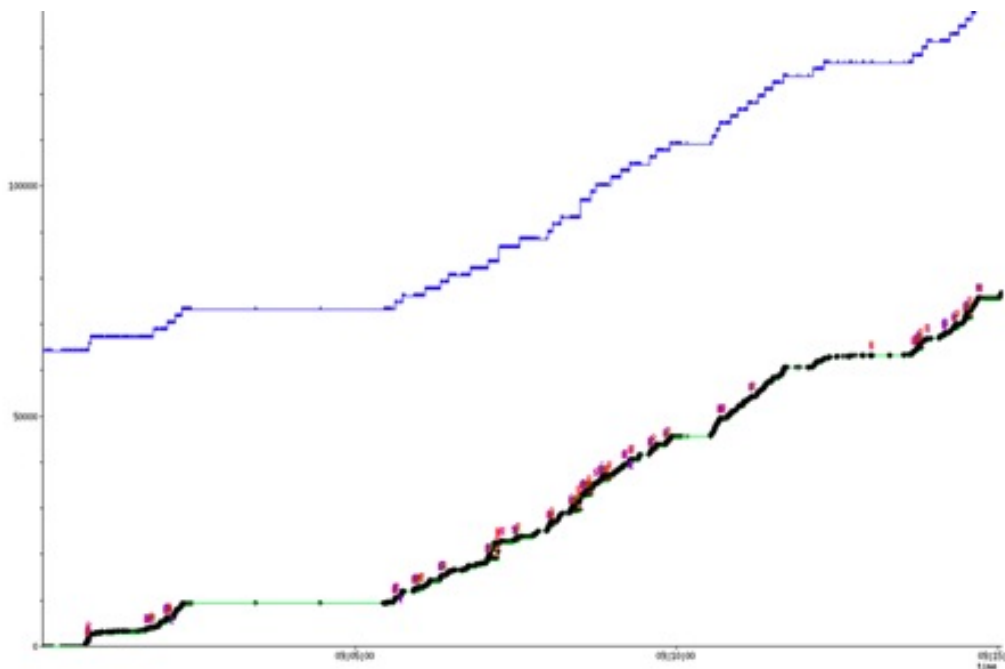
**VLAN#2** was carrying “process instrumentation” information traffic and was responsible for about 7% of the packet traffic. The WAN and LAN QoS was very good. It was OK.

**VLAN #3** was carrying the “General Services” traffic and was responsible for about 91% of the packet traffic. The WAN QoS was very unstable resulting in significant packet loss in the Offshore to Onshore traffic resulting in many retransmissions from both ends. The average Round Trip Time was OK with times in the 560ms to 800ms range.

The important traffic on this VLAN was – Business traffic – Citrix on port 1494, Email on port 25, Microsoft Distributed services for file, print and other MS Remote Procedure Calls with a variety of common ports including 139 and 445.

### **The first view that showed the issue –**

**TCP Time/Event Graph of Offshore to Onshore Database Traffic for #3 VLAN**



The X axis is time and the Y axis is sequence offset (packet count).

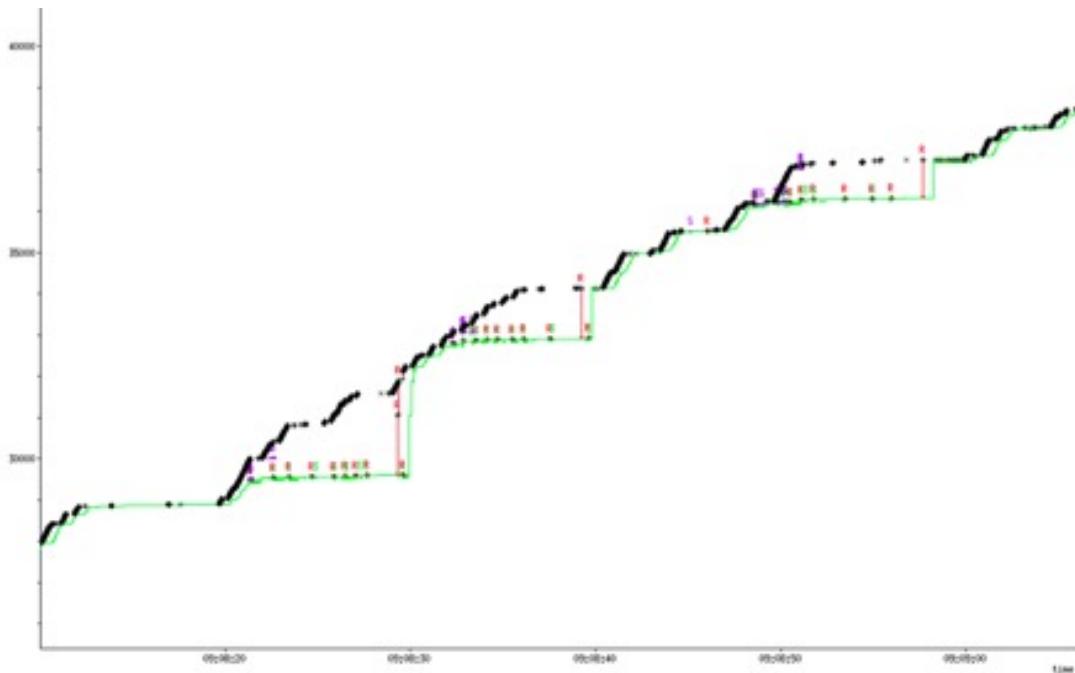
- This is a very busy picture – and that’s not good.

\*\* Note - A normal TCP/IP conversation would result in a near perfect 45 degree straight line, with few if any deviations. When you see a flat line this shows that there were no responses during that time, not a good sign!

- On the X-axis is time; the 15min period.
- On the Y-axis is the byte count of the traffic being transferred across the WAN.
- A variety of events are shown associated with the network packets:
- Red “R” letters indicating TCP re-transmits from Offshore to Onshore.
- Purple “S” letters and lines indicating TCP selective acknowledgements (SACKs) which have been sent from Onshore to Offshore to indicate that data has been lost.

\*\* Note - there is a small associated packet loss on the Onshore-to-Offshore network traffic but it is at a much lower rate-of-loss than the Offshore-to-Onshore loss-rate.

### Zoom in view of the TCP Time/Event Graph of Offshore to Onshore Database Traffic on #3 VLAN



The X axis is time and the Y axis is sequence offset (packet count), the same as graph #1.

This graph is a zoom-in to a typical 60 second period of the previous graph.

The X-axis is time; 60 seconds period, the Y-axis is the packet count of the WAN traffic.

- During this 60 second period the user experienced 3 major “blackouts” each lasting approx. 10 seconds.
- Onshore packet loss In each case there is a packet loss event on the Offshore stream. The Onshore system sends a TCP SACK and the Offshore client system attempts to recover by re-sending packets. This does not work correctly and eventually after ~10 seconds the client system re-sends all the outstanding data – shown in the vertical red lines and associated “R” letters.
- Although the Onshore system has received most of the intermediate packets they cannot be passed to the end-user application as there is data missing. This is shown by the fact that the green line “flat lines”.

- The user would perceive each of these 3 events as a 10-second near-total hang-up of the application followed by a burst of activity at the end of each hang-up then another hang-up.
- This renders most interactive applications almost unusable.

Within a period of about one day the YR20 remote Team had pinpointed the problem area that was causing the data blackouts and the poor and unreliable communications of the critical data. The problem was resolved when they changed the WAN queuing and they corrected a duplex miss-match in the setup of an Onshore switch.

The good news is that the other data showed that the other VLAN's were working well within specifications. All the data accumulated on all the VLAN's and WAN is useful as it provides benchmarks for future comparative analysis. If one does not know what is good then how can you know what is bad, so benchmark analysis data is the best basis to define network issues.

Remember today's Industrial Production networks support many critical operations.

So not having an onsite device with sophisticated 24X7 support Teams like YR20 to help you diagnose and resolve problems that could cause many costly consequences is not an option. The graphs I showed as examples represent only a couple of the many sophisticated visualization methods that YR20 uses to diagnose issues quickly.

The YR20 first responders are your network rescue team, ready to use their experience and sophisticated equipment and resources to find the problems and get you fixed without a trip to the hospital.

The actual customer was not named for, as we all know, company networks never have any problem!

[Tim Everitt](#), one of the three co-founders of [YR20](#) points out –

"Another dimension to offshore situations is that if there are problems there are no IT people on board. That enhances the need for remote diagnostics across the satellite links and access to a probe that has historical information about the network, not just on the WAN traffic but using the satellite WAN so that the support Team can have access to the LAN traffic for analysis, also.

Even with all the new satellite link offerings with multiple classes of traffic (CoS) with complex QoS/SLA arrangements and

signaling/marking (e.g. DiffServ) problems still occur and having instant response to issues is very important.

The Worst-case situation for Rigs or production facilities is the export pipeline control. If this fails then production may need to be reduced or stopped and that is very expensive!

On dive-supported vessels or rigs, network failure that takes down the voice communications usually requires that divers are pulled up out of the water and the diver's and vessel quit getting paid and their work is suspended as well as the resulting production loss.

Other serious information need is the access to weather web sites, marine, ice berg and aeronautical movement information.

A little recognized serious situation is Email. Usually offshore email has no special support but has crept into becoming critical to business processes and production co-ordination. If it fails then screaming usually starts immediately.

If real time systems won't work reliably then it usually means that more people have to be put offshore – This is a huge expense and not only does it mean that they have to pay more people but that production goes down and that is an even bigger cost.

So the need for quick remote analysis is essential for any production facility with response from experience technologist is essential to prevent major losses."

## **Who are you going to CALL?**

Call us at YR20, we can solve your problems quickly and confidentially! Each of our vendor neutral Communication Engineers and Analyst have a minimum of 20 years of experience in designing, building, commissioning, troubleshooting and building networks. Our experience covers all phases of communications from Satellite to Industrial / Production Ethernet including databases, mission critical and Voice/ Video over IP. We have amassed a lot of corporate, off shore, vessel, plant and factory experience that we can apply to any situation you have.

If we can handle critical networks like the one in the story we can handle any of your network needs from design to your most difficult testing and troubleshooting needs!

So, give us a call so we can get your network up and running to meet your business and mission critical needs, ASAP!

