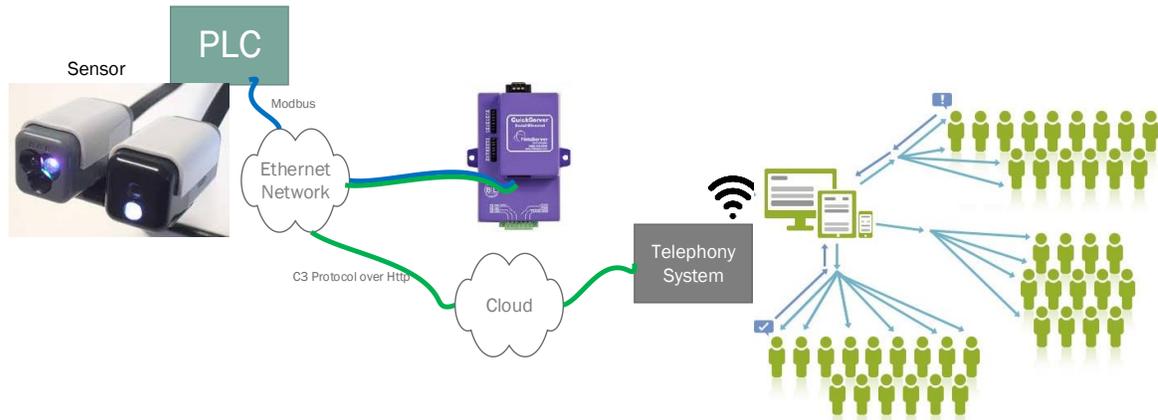


Case Study

Custom Driver Development Interface to an Automated Call Out System for an Oil Refinery Application in Kuwait

In this project the customer wanted the DCS system to automatically call and message phones based on operational, plant and safety information.





Introduction

The industrial automation system at an Oil Refinery in Kuwait is the source of almost all operational data. It knows the state of the plant, the process and equipment. It knows if a tank is empty, a motor has been left in manual or if there has been a pressure drop that is unusual. In legacy systems all this information is fed to the control room and there humans assess it and make callout decisions. Does an operator need to be sent to inspect the location? Does a maintenance team need to be called? Does an event need to be reported to a manager?

Modern systems like the one at this refinery realize that a great deal of the assess and assign type tasks can be done by the control system itself. It is programmed that so that under various operational conditions it can trigger a specific callout routine. In this project we provide an interface between the control system and the automated digital telephony system. Thus, the DCS is able to call out a person or a crew, or even call the fire and emergency services and report specific alarm / event information. All this without human intervention and thus leaving the humans free to focus on other issues.

(It should be noted that the total system also includes an interface to the CCTV system, which drives cameras to presets based on operational conditions.)

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C3

C3 is a Cambridge, UK-based company specializing in computer telephony platforms and associated multichannel applications.

Some Details

DCS Control System uses ModbusTCP to communicate with the gateway. Although, as the gateway supports over 100 protocols, the protocol could just as easily have been BACnet, EGD, Lonworks, XML, Rockwell, FINS etc.

The gateway provides a number of communication channels. A channel is a pipe into which a request for a particular callout activation can be requested. The trigger, validation and completion of a callout are asynchronous to the trigger. When triggered the Telephony system acknowledges and accepts the trigger or rejects it with a reason. The Control System monitors the feedback to see if callout completed and to generate additional alarms or callouts on failure.

The Gateway is a Modbus Slave and a Client on the telephony side. A keep alive heartbeat message is also exchange with the C3 server so that it can generate an alarm if communication fails.



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Normal Operation

Gateway allows DCS to read status data and responds. It receives changed data for a channel – Sends Activation Request based on group/message in that channel’s Modbus Registers. At any time, the DCS can overwrite the value in the Channel Status Register. That in turn will get overwritten again by the gateway when it next sends a Status Request to the C3 and gets the status in a response. This allows the DCS to clear the ‘feedback’ if want to.

The DCS can write 1, 2 or 3 registers in a single transaction allowing it to operate a single channel. One register to reset status. 2 Registers to set Group/Message. 3 Registers to reset status and set Group/Message,

The DCS can also block write to multiple channels in a single message. The gateway will watch the Group/Message Modbus registers for each channel. If the data changes it will send an Activate Command to the C3. If the data has not changed, then no new activation will be sent for the pair.

The Gateway will send a Status Request message for each channel to the C3 based on a configurable timed interval. The response will contain the current status of the Group/Message that was activated in the channel. The Gateway will make available to the DCS one/more additional registers which report other status information such as the C3 being offline to the gateway. It will determine this based on timeouts in the messages to the C3.

