Advancement of SCADA Host software over the years. –IMPO White Paper -
If we go back 30 years, an RTU was a 'dumb' telemetry box for connecting field instruments. The RTU would 'relay' the data from the instruments to the SCADA host without any processing or control but had well-developed communication interfaces or telemetry. **In the 1990s control programming was added to the RTU so it operated more like a PLC.** PLCs on the other hand could always do the control program but lacked communication interfaces and data logging capability, which has been added to some extent over the past decade.
A further development of devices in the field is to offer a specific application that could incorporate a number of instruments and devices with an RTU/ PLC, incorporating technology sets to provide an 'off the shelf' approach to common process requirements, e.g. gas well production that includes elements of monitoring, flow measurement and control that would extend as an asset into the SCADA Host.

In terms of environmental and regulatory compliance, PLCs and RTUs have the same type of requirements as instrumentation in that they operate in the same environment. However, PLCs have traditionally not been as environmentally compliant as RTUs. This is mainly due to the fact that PLCs were designed to operate in areas, such as factory floors, where the environment was ***already conditioned*** to some degree.

The remote communication network is necessary to relay data from remote RTU/PLCs, which are out in the field or along the pipeline, to the SCADA host located at the field office or central control center. With assets distributed over a large geographical area, communication is the glue or the linking part of a SCADA system and essential to its operation. How well a SCADA system can manage communication to remote assets is fundamental to how successful the SCADA system is.

Twenty years ago the communication network would have been leased lines or dial-up modems which were very expensive to install and maintain, but in the last 10-15 years many users have switched to radio or satellite communications to reduce costs and eliminate the problematic cabling issues. More recently, other communication types have been made available that include **cellular communications and improved radio devices that can support greater communication rates and better diagnostics**. However, the fact that these types of communication media are still prone to failure is a major issue for modern, distributed SCADA systems.

At the same time as the communication medium changed so too did the protocols. Protocols are electronic languages that PLCs and RTUs use to exchange data, either with other PLCs and RTUs or SCADA Host platforms. Traditionally, protocols have been proprietary and the product of a single manufacturer. As a further development, many manufacturers gravitated to a single protocol, MODBUS, but added on proprietary elements to meet specific functionality requirements. For the Oil & Gas industry there are a number of variants of MODBUS, including but not limited to, MODBUS ASCII, MODBUS RTU, Enron MODBUS and MODBUS/TCP. This provided a communication standard for the retrieval of flow or process data from a particular RTU or PLC. This incremental development in using MODBUS protocol variants was seen as an

improvement, but it still tied a customer to a particular manufacturer, which is very much the case today. A good example is how historical flow data is retrieved from a RTU/PLC by a SCADA Host. However, the advancement of SCADA Host software, and in some cases the sharing of protocol languages, has meant that many of the issues with proprietary elements have been further resolved.