# **Application Guide**

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# Flow Computing and Connectivity Considerations for Oil and Gas Applications

Oil and gas applications increasingly have a variety of vendors' equipment on their sites, which has heightened the need for tightly integrated data and reliable real-time connectivity. Dissimilar protocols used by the different components adds a communication

wrinkle – oil and gas producers need to figure out a way to reliably connect this equipment, while keeping an eye on the scalability that future plans will require.

Traditionally, oil and gas (O&G) operations used multiple standalone flow computers and RTUs, which would communicate back to their PLC responsible for performing the automation on the site. The integration of the measurement system and the PLC required additional communications configuration that could lead to a complex setup and commissioning process, to make sure that information was being transferred correctly. Data collection could sometimes necessitate site visits, which could add up in travel costs and reduce productivity, depending on the distance involved.



More effective ways to fulfill these tasks have emerged, though. With solutions like in-rack flow computers and protocol gateways, oil and gas producers can bring data directly to control systems and reduce their overall capital spending. Wireless radios and cellular solutions can be added to enable real-time communications and data transfers.

A common theme for many producers is the need for a long-lasting, scalable solution. In this application guide, we'll discuss how you can:

- + Add flow computers and protocol converters that can seamlessly integrate with newer PACs
- Build wireless communication networks that can easily expand as equipment is added
- · Securely access remote Oil and Gas equipment

# **Integrated Flow Computing**

In-chassis flow computers can be an ideal alternative to traditional measurement setups. These integrated flow computers can bring your O&G measurement application (LACT, Pipeline Monitoring, Multi-Well Pad, Central Facilities) data directly into your Rockwell Automation® control system, eliminating the need for standalone flow computers or dedicated measurement RTUs. They can also reduce your setup time and help your application better prepare for future growth with numerous expansion possibilities.



# Saving space and time

Opting for in-chassis flow computers can help you conserve space – key for any application, but especially in an O&G application. With a computer that fits directly into your PAC, you're able to have a smaller cabinet space or in some instances eliminate an entire control panel.

From an integration standpoint, having the flow computer directly in the control system saves time in getting data directly into the PAC. If you have a Rockwell Automation PAC, opt for an in-rack module that features premier integration tools to streamline setup. As your measurement requirements grow, you'll essentially be able to copy and paste ladder logic to add additional ProSoft measurement modules to the system, compared to starting from scratch with each new RTU. (We're exhausted just thinking about the latter.)

Adding a standalone flow computer or RTU, on the other hand, will typically require extra setup and the headache of integrating a new vendor's solution into a separate control system.

# **Future options**

Chances are, you can't see into the future and get a sense of how your measurement systems and fortunes will change. Opting for a scalable flow computer solution is the most prudent action – all industries can be topsy-turvy at times, but oil and gas is one where your site's needs especially could be very different a decade from now.

In-rack flow computers can support more gas or liquid meter runs, helping you avoid extra components as you add measurement points. These solutions can be more cost-effective (in the range of \$3,000-\$5,000) than the typical \$6,000-\$10,000 you'd likely be looking at for each RTU. Wondering how many in-rack flow computers you can add? That can depend on the memory of the PAC you're using, and how many measurement points you are comfortable with having in a single system.

Another factor to consider is what you'll be measuring. Some solutions require separate licensing fees for gas and liquid measurements, or different flow computers for each type of measurement. (Multiply that by however many flow computers you need, and it really starts to add up!) A more cost-effective approach is to opt for an **in-rack flow computer** that doesn't require separate fees for the different measurements, especially if your measurement needs may change in the future.

#### Your Flow Computer Checklist

Remember to keep these considerations in mind when evaluating flow computing solutions:

- How will the solution integrate into your control system, and do you have the expert support you need for that integration? The integration factor can be an issue when using standalone flow computers or RTUs, and it's one reason why we suggest in-rack flow computers.
- How can you add more flow computers in the future if your site expands? There are a few factors to consider here, including the space additional flow computers would take and the cost to buy and implement them. If you may need several additional standalone flow computers (or more), they may not make the most sense for your application in the long-term.
- Which licenses will you need?
  If you're opting for both gas and liquid measurement, fees for each could add up. As an alternative, opt for a flow computer that can handle both
   without doubling the license fees.

# Connectivity

So you've got flow computing covered with an eye toward your site's future needs. Now it's time to discuss connecting other site components, via industrial gateways, wireless radios, and cellular solutions. Adding reliable connectivity solutions can help you increase efficiency and meet production goals.

# **Protocol Conversion**

As mentioned earlier, the proliferation of components by a variety of vendors has made connecting this equipment a challenge. Using industrial gateways to link these components back to your central control system and other necessary equipment is a key automation need on your site to ensure real-time, reliable data transfers. The addition of newer protocols that reliably connect can also help you take advantage of Industrial Internet of Things (IIoT) benefits: Having access to this data from across your site can help you increase efficiency.

A typical control system protocol that ProSoft's field engineers see used is EtherNet/IP<sup>TM</sup>. **Built-for-purpose gateways** are available to connect this Logix protocol with each of the following protocols used by Oil and Gas component manufacturers.

Modbus is the most widespread protocol that you'll find throughout your site. It's typically used by equipment such as gas chromatographs, control valves, and instrumentation, and is used in monitoring tank levels as well. **Multi-port Modbus gateways** are available to allow you to prioritize data from certain equipment. These types of gateways work by breaking up your Modbus network across the four Modbus Serial ports, providing the flexibility to build networks of equipment based on the priority of getting that data into the control system. This division can let you get data more quickly or on a different cadence from some equipment, such as multivariable data transmitters that need data in under a second, than other data collection needs that have a lower priority, such as monitoring tank levels or gas chromatographs. Another common protocol you'll likely see on O&G sites is HART. The protocol has a couple characteristics that make it ideal for these applications:

- It's vendor-neutral, which is helpful when it comes to connecting its devices to others from different manufacturers.
- It's something of an overachiever when it comes to getting diagnostic data from field instruments. HART provides information that'll help you pinpoint the source of an issue, and could allow you to diagnose issues remotely.

HART is typically used by instrumentation equipment, including:

- · Magnetic flow meters for water measurement
- Pressure and temperature transmitters

Two other vendor-neutral protocols – DNP3 and IEC 61850 – are used in power-related functions of O&G applications. Both protocols offer benefits:

- DNP3 allows users to prioritize data and time-stamp that data directly at the source.
- IEC 61850 devices have standardized naming conventions and meanings as part of its Data Model approach, simplifying configuration and commissioning.

An example application with these protocols is when a site has its own transmission & distribution substation, through which it distributes power for equipment such as pumps, motors, heaters, and compressors. The protocols can be used to connect the substation equipment and automation control system.

## Wireless Communications

It used to be that to connect anything on your oil and gas site, you'd have to dig the trench and run wire between the communication points, or lay hundreds to thousands of feet in cable trays. To put it mildly, this took a lot of time – and there were a lot of wires running, with connectivity criss-crossing across the site. Needed to add more equipment? Get ready for some more of that work.

And really you just had to hope that any work above the wires – including newly required trenching – wouldn't slip through and damage them.

It doesn't sound like much fun, but it was all that was available. But now, you can save time – and sometimes downtime – with wireless connectivity instead.

Wireless radios help make connecting your site's distributed I/O more reliable and less maintenanceheavy. **Weatherproof radios** are also available if heat or dust is a concern, or you need to install radios without an additional enclosure.



With an **802.11 primary radio** at your control house and access points across the site, you can ensure data is sent among each piece of equipment you need to connect. It's another forward-thinking option as well. When new equipment is added, you'll just add a new access point radio: no trenching, no wires in cable trays. These radios are also helpful if you have equipment that needs to be mobile but you still need data from it – you can outfit the equipment with a radio without pondering the headache that would be wired communications with mobile equipment.

## **Remote Access**

The availability of reliable remote connectivity brings several benefits to Oil and Gas producers, including:

- Increased safety
- Improved efficiency
- Increased ability to control access to equipment

#### Remote Connectivity for Industrial Applications

Before we delve into these, let's explore what's involved in remote connectivity that's designed for industrial use. This type of functionality isn't the commercial remote services that some companies may use for smaller-scale remote access of desktop computers or similar devices. Remote access services designed for industrial use will feature a **cellular gateway** located at the equipment you need to access, and an application through which you can do so from your computer or mobile device.

Their high level of security also helps differentiate these services. While each have varying levels of security, we advise looking for one that takes a Defense-in-Depth approach with measures that include:

- · No software to install or maintain software installation can be an entry point for hackers
- · Support for multiple authentication methods including token-based two-factor authentication and single sign-on



- · Ability to allow certain IP addresses
- · Ability to allow you to set your own password policy

#### Increased Safety

For some industries, remote connectivity's benefit of less travel – both in terms of costs and time – is a major one.

For Oil and Gas producers, this benefit serves a far more important goal: Keeping employees safe. Oftentimes, the sites that crews need to monitor are in remote locations on leased lands. Traveling to them – and the windshield time that typically includes – can lead to accidents. Since a lot of oil and gas incidents are tied to these drives, reducing the travel to sites can help a company decrease their incident rate.

As companies aim to maximize production while simultaneously minimizing their effects on the environment – either for corporate objectives or as a response to regulatory requirements – connecting remotely can help protect their employees and minimize traffic disruptions within the communities that they operate, while giving personnel more important things to do than driving to site after site.

#### Improved Efficiency

In addition to avoiding the need to travel to sites, remote connectivity can help O&G companies identify issues early on, and perform predictive maintenance based on past data and patterns.

Being able to analyze past data and use that information to make changes that'll increase efficiency can help improve production and decrease downtime. By opting for a remote access service that will send you alerts, you can effectively monitor your equipment via cellular gateways without having to be watching the screen constantly (who has time for that?). The data you receive – or collect at the source via a **data logger** – may also help you identify inefficiencies based on usage or diagnostic data that you can then address. Your site's data can also be sent to your existing SCADA, host, or headquarters location, where it can be analyzed and acted upon.

The use of cellular gateways can also make adding new equipment to your remote connectivity service as streamlined as possible. This is especially true in the case of acquired Oil and Gas sites that need to be added to the owner's existing SCADA system – but with only minimal CAPEX and time investments allowed for such an update. With a **managed remote access setup using cellular gateways**, the new owner won't need to worry about installing new towers when consolidating the site – instead, they can quickly deploy the new connectivity using the existing cellular network.

#### The Security Factor

Security is essential for any Oil and Gas company - the Colonial Pipeline shutdown in 2021 is a powerful example of that.

It was reported that the ransomware attack in the case was the result of just one compromised password. This highlights the need for companies to ensure security measures are in place so that:

- Functions like email are separate from operational technology (OT) functions
- Equipment access is given to those who need it within your organization



That second point can be achieved with a remote access service that grants access to equipment at the right time to the correct people, as compared to access as long as an employee is at the company or for the duration of a third-party agency's work on the equipment (such as in situations where a system integrator or machine builder needs access). This type of virtual lockouttagout system can ensure anyone who needs access to remote equipment can request it for a certain period of time. This can also help guard against someone accidentally accessing the equipment during an inopportune time.

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Tech Support

ProSoft Technology's technical support is unparalleled in the industrial automation industry. To continue our world-class technical support, we have opened offices in most time zones in an effort to support our customers at a local level. See Regional Tech Support contact information above.



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