Industrial Routers

Applicaton examples of using CDP Studio to extend the power and flexibility of supported industrial routers.

- Less hardware and reduced wiring
- Distributed control systems
- Integrated device management
- Customer specific functionality
- Open to future requirements

CDP Studio supports the INSYS icom MRO, MRX, and SCR routers

IIoT Gateways

Secure communication is more important than ever, as sensors and devices are increasingly connected to outside services. We now have industrial routers that provides a Linux environment for third party applications. The humble router transforms into an IIoT gateway applicable as a compact control and monitoring system; now competing with small industrial controllers. With communication and security handled isolated, even if the hardware is shared, the controller part is almost a separate (virtual) device. When the controller software is "pre-integrated", then installation and access to data points already on the router works out of the box. Modern sensors are more intelligent, but also communicate over Ethernet or serial interfaces rather than the "good old" 4-20mA interface. The result is that in certain use cases, the PLC with remote I/O is obsolete; the industrial router with controller software is all you need.

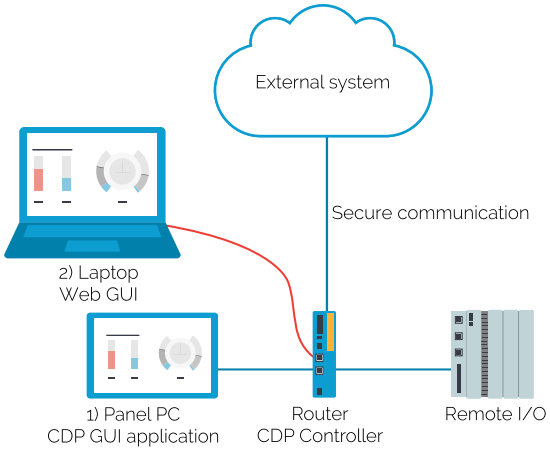
CDP Studio is integrated on a range of hardware from several vendors, so adding controller functionality to a Linux enabled box has never been easier. The following examples illustrates some of the solutions possible to implement directly on the router, ranging from simple control functions and user interface to virtual metering. Functionality has moved from vendor specific hardware to software applications that can be configured directly to customer requirements.

Substation with local display or Web GUI

Remote stations for control and/or monitoring runs "headless", without any local user interface, as this the very concept of "remote" systems. However, when a technician is working on the site, getting local access to status and running data makes sense.

As the router is used for data processing in addition to the normal router functions, you may regard it as a controller, but still rather "headless". There are two ways of adding a local user interface:

1) A panel PC is built into the cabinet running a GUI application built with CDP Studio.
   A CDP application on the router is used to collect and process data, this runs continuously, while the panel PC may be switched on when needed as a local display. When the panel PC is running, this will be a part of the local CDP control system with access to the control data as well as system parameters.
2) The CDP Studio control application provide a HTML5 based webpage as a local user interface. This implies bringing a laptop or similar with a web browser to connect to a dedicated Ethernet port to access the local user interface. The web interface may be made available remotely as well.



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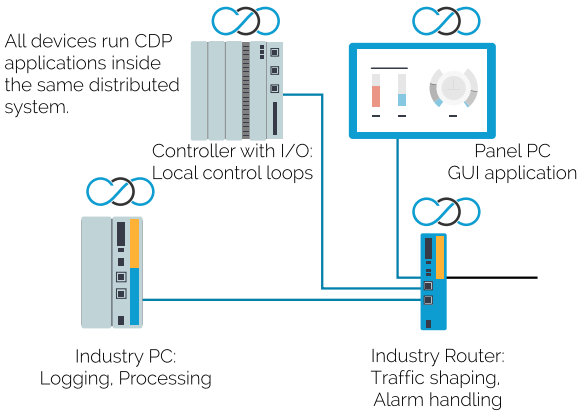
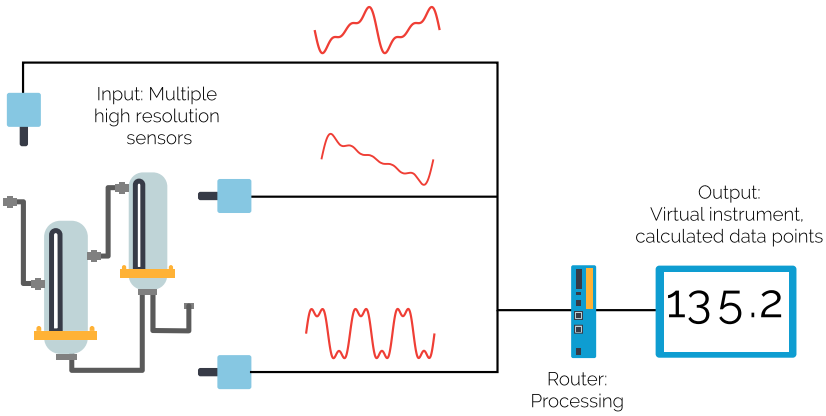
Integrated in a control system

In some cases the router is an integral part of a local control system. CDP Studio is used as a single development/configuration tool for the complete system even if functionality is distributed over multiple devices. This way, data points and parameters are shared between the devices directly inside the CDP system consisting of multiple applications for easy communication, logging, and local user interface. System configuration is simplified and most likely achieved with less hardware.



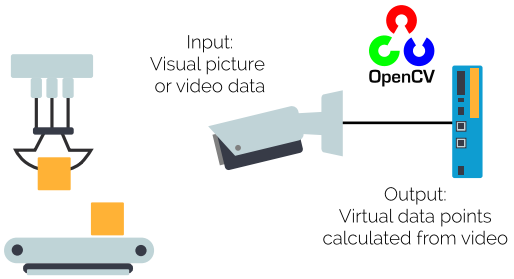
Virtual instrumentation

To reduce required bandwidth from a substation, there is the possibility to apply extensive processing on some of the data with high data rates. Virtual instrumentation is one example, where a slow output is calculated from multiple sensors with relatively high bandwidth. Such calculation may even have elements of machine learning, so the freedom and power of building custom components in CDP Studio will be an enabler to achieve this directly on the router, again saving hardware.



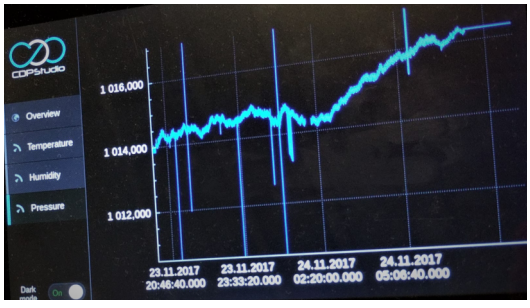
Video processing

To use a router to process video may not be a typical case, but illustrates how capable Linux based controllers can be. Using video for monitoring of a remote site does not imply live feed, but using the video information to trigger alarms or give other data points is feasible using the OpenCV library linked to CDP Studio. Typical functions would be motion detection, shape detection, light detection, etc., potentially combined with snapshots stored locally or sent to a control centre. The key is to use the processed data from the live video, not the video itself. One example is to interpret the picture to give valve positions and other visual status as data points. In addition, the camera could be powered up by external events, either data points or actual input from door sensors or similar.



Substation with local raw data logging

For substations with limited communication bandwidth will a way to store triggered incident logs for later retrieval help tracking down root causes on system incidents. As a router even has some storage space, a running "sliding window" log of raw data, may store the signal history before the incident as well as a defined time after. This snapshot is then saved when triggered by a set of criteria. The log entry is specified per signal, either on value change or time sampled, and may have a much higher resolution than the normal monitoring data sent to the control centre. This is also useful in the case of temporary communication loss.



Logging may have much higher bandwidth than the available external communication link