PROFINET and OPC UA = Data to Valuable Insight

PROFIBUS and PROFINET International (PI) is celebrating its 30th birthday with 1,700 member companies worldwide working together to make the best automation technology for Industrial networking. Worldwide, PROFINET and PROFIBUS node count tops 87 million in the year 2018 and out of which **PROFINET** continues its accelerated growth and reaches 26 million devices in total and 5.1 million devices being added last year - 2018.
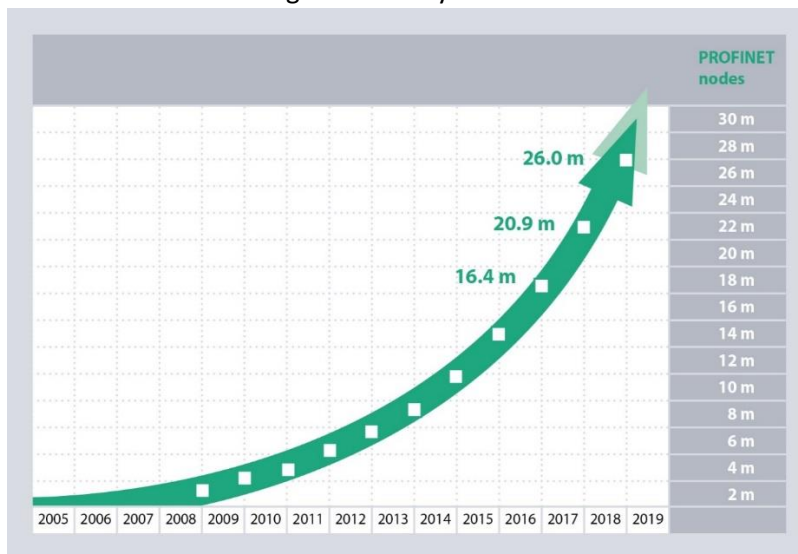

Image source: us.PROFINET.com

On the other hand, OPC UA has become the de facto global standard for exchanging the information reliably and securely between the automation systems. There are 47 million automation devices includes OPC technology as per ARC advisory report published in 2018. It is also anticipated that OPC usage will grow at approximately 45% annually for next 5 years.

Even though PROFINET and OPC UA have some overlap in the automation and process industries, they complement with each other very well in bringing the best vertical and horizontal integration possible as shown below.

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In a typical automation topology as shown below, at the field level and up to controller level, PROFINET shall be used for exchange of cyclic and real-time capable I/O data.
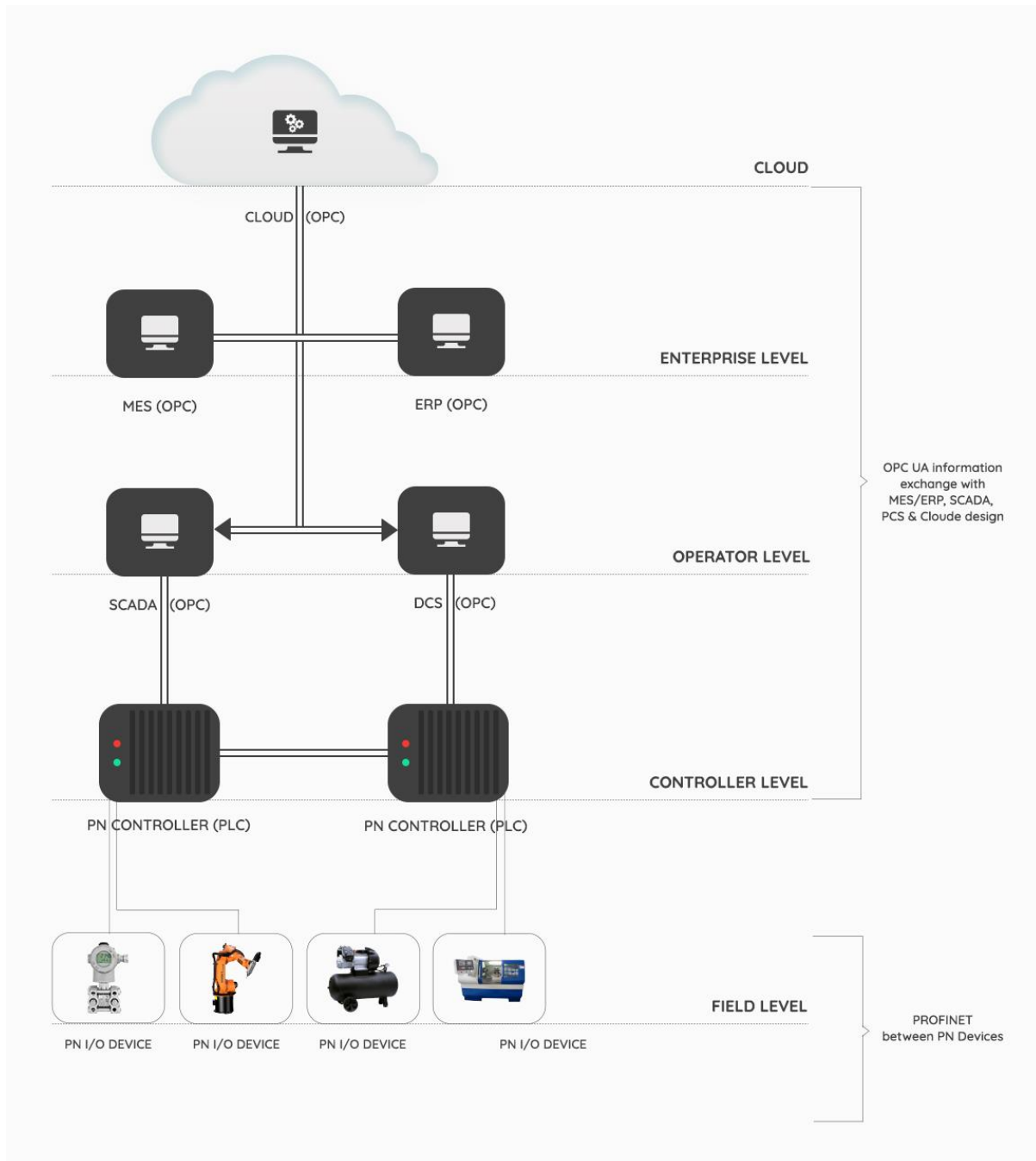
OPC UA in PROFINET Controller/PLC

OPC UA can be integrated into the edge device, in this case PN Controller device or PLC. In this scenario I/O data fetched from multiple PN I/O devices are aggregated and analysed, turning the raw I/O data into the meaning valuable insight (information). This enables the vertical integration of the data from the field device into the high level enterprise level application. If both the controller is

OPC enabled, then it horizontal communication between the controller is achieved via OPC UA services.

If the existing PLC does not have support for OPC UA, then external OPC enabled PROFINET edge gateway can be used as an alternative. In this way, data can be fetched and turned into valuable information without disturbing the existing process. This is one of principle behind NAMUR Open Architecture (NOA).

OPC UA in PROFINET I/O device

OPC UA can be integrated into the PN I/O device to share the asset and diagnostic information with the higher level system. This will be useful in scenarios like, PROFINET I/O device which does not have connection to the PROFINET Controller system or is not configured to share the relevant asset and diagnostic information or the frequency of the data collected by this I/O device is much higher compared to the PN Controller scan cycle rate. In this scenario, PROFINET I/O device may have local PROFINET OPC UA Information model. Since both PROFINET and OPC UA share the common Ethernet cable, they can share the same infrastructure. However, as there is chance of OPC UA consuming most of the network bandwidth, care should be taken to ensure that this does not affect the performance of PROFINET packets. This can be handled by making network TSN enabled.

Conclusion

- PROFINET and OPC UA together makes the horizontal and vertical integration efficient, by turning the raw data from field device to valuable information as expected by higher level decision making systems
- OPC UA can be integrated into PN I/O Device, PN Controller device (PLC) or edge gateway
- PROFINET and OPC UA in edge gateway enables the Namur Open Architecture (NOA) which highlights upon monitoring and optimizing the process information without disturbing the existing system, instead adding an additional secure OPC UA channel.

Stay tuned for our next article:
PROFINET and OPC UA: Real world use case of mapping diagnostic information

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