

No excuses: APL is available now

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Ethernet-APL will be the normal signal transmission technology in the process industry, replacing 4-20 mA and field buses. In combination with other technologies it will facilitate engineering, provide more information about field instrumentation and be the basis for Digitalization in Process Industry. Of course, prerequisite for implementation of APL in projects is the availability of APL components like instruments, field switches and integration in DCS and AMS. This paper summarizes the results of a market survey performed by atp magazin together with NAMUR and ZVEI and serves as introduction to the spreadsheets with the detailed results.

1. Ethernet-APL Technology Stack

Ethernet-APL will replace signal transmission with 4-20 mA and field busses – this statement is common sense within process automation community. It will facilitate engineering, provide more information about field instrumentation and be the basis for Digitalization in Process Industry, called Industrie 4.0. [1,2, 3] However, Ethernet-APL is only one crucial element of the technology breakthrough we are facing today in OT communication: The technology stack in principle consists of five elements:

- » Industrial Ethernet with high bandwidth including intrinsic safety for hazardous atmosphere: Ethernet-APL provides „Ethernet-speed“ as industrial grade;
- » Common, Ethernet-based communication protocol for control: PROFINET or Ethernet/IP are seen as „minimum binding requirements for the process industry“ according to NE 168 “Requirements for a field level Ethernet communication system”.);
- » Standardized device description for device integration: FDI-Package with Electronic Device Description;
- » Standardized Data Format: PA-DIM, an OPC UA companion specification;
- » Option for safety-oriented solutions: PROFIsafe as a possible safety-protocol [4]

2. Background of this Market Survey

At the end of 2022 the „NAMUR APL Task Force“ was initiated to coordinate NAMUR’s activities around the emerging topic of Ethernet-APL. The aim is to catalyze the implementation of APL within the member companies by using a holistic approach and by close synchronization inside NAMUR, but also with leading vendors. The task force has a planned lifetime of two years and a target of ten or more projects associated with APL inside the task force associated companies in this lifetime. The team of the task force consists of representatives from BASF, Bayer, Bilfinger, Covestro, DOW,

Evonik, and LANXESS. An interview with Emanuel Trunzer, co-head of the task force, can be found in this issue, page 38. Of course, for the acceptance of a new technology a broad offer of relevant components is required. Nobody will start an Ethernet APL-based project if only one or two different sensors are available, network components are still missing or automation systems like Distributed Control Systems (DCS) and Asset Management Systems (AMS) do not support the technology. As part of its mission, NAMUR’s APL task force drafted a questionnaire on market availability of

- » Field Instruments like sensors or actuators,
- » Field switches (infrastructure components),
- » DCS and
- » AMS.

NAMUR, the User Association of Automation Technology in Process Industries, collaborated for this questionnaire with ZVEI, the German Electro and Digital Industry Association. ZVEI has in the meantime implemented an APL Taskforce as mirror committee to NAMUR. atp magazin, the leading German automation magazine, offered to conduct the market survey and the publishing of results as a service for its readers, as well as to support NAMUR and ZVEI in this activity.

The invitation to participate in this survey was edited by NAMUR and atp magazin and shared with all companies that are engaged in ZVEI’s Task Force. Several additional companies were added to this list through invitation by individuals and by NAMUR’s working group for Process Analytical Technology.

3. Overview of the Survey’s Results

All in all, 16 filled questionnaires we returned: eight companies offer instruments, five offer field switches and infrastructure components, six vendors report their DCS and AMS are or will be ready for APL. All in all, this feedback is encouraging and a positive surprise since the companies are publishing their availabilities and commitments for future developments in written form. To keep the tables as user friendly as possible, columns where all given feedbacks are identical are mentioned in the following text but skipped in the table. If you are surprised to miss APL offers from your company or if you know about other company’s products that are missing in this table: some vendors might have overlooked our invitation to participate or might not have got it since they are not part of ZVEI’s APL Task Force. Nevertheless, they are invited to submit their offer in our spreadsheet and send it to atp-redaktion@vulkan-verlag.de or atp@tautomation.de at any time.

3.1 Results for Instruments

Seven sensor types are available in 2023, twelve will be added in 2024. Hence, all “classical” sensor types are ready and available for projects: level, flow, pressure and temperature, each with several underlying measurement principles. One positioner is available, too, for position control of valves. Softing reported the availability of a “commModule APL”. It fulfills all requirements in the table but is a hardware module to be built into instruments for the implementation of Ethernet-APL field devices. Therefore, it can serve as a basis for efficient implementation of APL field instruments but is out of the core scope of our survey from an end user’s perspective.

FDI is the new standard for device integration and, very convincingly, as such, supported by all vendors! In addition, since PA-DIM is broadly implemented, NOA now can become reality!

In Table 1, the columns “PROFINET support with device specific drivers/gsdml (yes/no)” and “PROFINET support with profile drivers/gsdml according to PA 4.02 (yes/no)” have been skipped since all replies said “yes”. On the other hand, support for additional protocols, such as Ethernet/IP and others, can be considered as very limited at the moment and for the near future. Therefore, PROFINET is the way to go for the moment, considering field device and DCS support, as well as proxy functionality for PA in field switches. It is supported by all vendors that reported back!

3.2 Results for Field Switches

Four vendors are offering field switches for Ethernet-APL, a fifth will join in 2024. The switches are supporting 2, 8, 12, 16 or 24 ports with different power classes (A, B, C) and protection classes ia or ic. The majority offers a mirror port for network diagnosis.

- » In Table 2, the column “PROFINET conformance class A, B, C, D or non” has been answered with “B” by all participants – therefore, all field switches are or will be certified by the PI organization and feature crucial functionality for system redundancy and diagnostics.
- » No vendor indicated the support for any other protocol via the “Any other certified protocol conformance” column.
- » Therefore, both columns (“PROFINET conformance class” and “any other protocol conformance”) were skipped in the table.
- » The vendors’ answers strengthen the statement that, for the moment, PROFINET is the protocol to choose when heading down the APL journey.

3.3 Results for Distributed Control Systems

Table 3 shows the answers from DCS vendors concerning protocol support. One has to mention here that support for protocols is at the first stage decoupled from the decision of APL or not – one can employ a specific protocol also for connection to electrical equipment in the switch room, for instance. Nonetheless, support for a protocol is an important prerequisite to interface field devices that support specific protocols with the DCS.

Six vendors, all except one, are offering support for PROFINET for their Distributed Control Systems already. On the other hand, only three vendors support Ethernet/IP. OPC UA clients and HART IP are supported in addition by some systems. However, especially the usage of OPC UA for field level connectivity is still long way with additional standardization and development work to be done within the next years. Summarizing, also from the DCS viewpoint, PROFINET is the protocol to choose at the moment when implementing APL.

3.4 Results for Asset Management Systems

Table 4 shows that five vendors already offer some degree of APL-support for their Asset Management Systems, the sixth to be released in 2024. A crucial result is that six out of seven AMS support or will support FDI for device integration. In addition, all support the usage of legacy packages, such as EDD or FDT, if needed. Three systems are supporting external connectivity via OPC UA with PA-DIM data representation or will do so in 2023.

4. Conclusion: No Excuses

All in all, my conclusion is: all components needed for an APL-based field installation are available on the market now and many more are committed for the next year. Since infrastructure for explosion protection zone1 (Ex 1) is on the horizon for 2024, installation in brownfield retrofits is also possible – no matter whether 4-20 mA or fieldbus is used today. Hence, there is no reason for “wait and see” anymore.

Instead, the opposite is true: new technologies need time for training and implementation. Therefore, it is important to gain first hands-on experiences in 2024 to prepare for general roll-outs in the future. As Emanuel Trunzer hold in his interview, four real production projects have been decided already, and market availability allows many more. Great news for end users!

5. Acknowledgement

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6. Literature

- [1] Interview G. Niedermayer, atp magazin 11-2021, p. 16-19
- [2] atp magazin with focus on APL: 2022-07
- [3] S.Seintsch: APL in der Prozessindustrie. atp-magazin 2021-09, p.86-90
- [4] A.Meurer, M.Risser, M.Roser: Ethernet-APL für hochverfügbare Sicherheitsanwendungen, atp 2022-05, p.76-81

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