SIEMENS

A key to edge applications

Data optimization at the edge with local data processing

The industrial world is being driven more and more to close integration with cloud and other digital platforms. Industries need to start connecting their machineries and production to collective networks so that they can achieve, e.g., Industrie 4.0 compliant, data driven production.

The first step with centralized data collection was to get data into the central database where it could be processed and analyzed. In most of the cases, this was done by streaming all possible data to databases. This meant giga to terabytes of data being pushed over the networks into datacenters or clouds.

Processing locally

Now companies are starting to realize that simply streaming all data out and then back in isn't necessarily the most convenient way to do it. Data first needs to be processed close to the machines so that short-term, production relevant data can be quickly close-looped back to the machine's PLC and long-term data can be pre-processed and sent to central databases to be analyzed and archived.

Processing the data close to the production while having a fast and reliable connection to the machine's brains, which cannot process data on its own, requires a platform as well as a concept of how and where the data could be processed efficiently.

siemens.com/local-processing

SCALANCE LPE with ARM and Linux operating system for local processing demands

Body and soul for production

Hardware-wise this platform should have the same "body" and characteristics as the production machine itself meaning temperature endurance, maintenance free, industrial grade components that have the same life cycle as the machine.

ARM processor architecture with long life memory chip is a good solution for this task due to its fast and reliable operation and low power usage. This architecture is already being used in industrial network components and PLCs.

In addition to reliable hardware, the local processing engine needs to have "a soul", an operating system that can grow and evolve according to needs. This is most obviously a place for the Linux environment. By selecting the "mother" of all Linux distributions, "Debian" fills this place.

This platform needs to be able to do data processing, run security applications (IAD, IDS, Firewalls), analyzers, be open for customized solutions, be able to utilize containerized applications and establishing secure connections to the different platforms and ecosystems.

Faster and more flexible commissioning

By spicing up the operating system with fast and simple distribution of Edge application, Docker© platform offers a good and widely used solution.

Now, just by writing "apt-get" <application name>, "pull" <container name> in the command line or a couple of mouse clicks in containers or the Edge central management platform, you can commission various applications quickly and easily in all your local processing platforms.

This opens faster and more flexible ways to do commissioning for various applications and gives customers a breeding ground for their data processing projects.

Multitasker for the shopfloor

There are production machines that are connected to the factory network as segmented network cells. Communication between the cell and SCADA has already been set up and it is currently working.

Now the management wants to start a new project for big data mining from the production. It is determined which data needs to be collected and how often.

SCADA already collects data from the machines, but this is only for operation and monitoring of restricted data. Adding new data points and forwarding them to upper-level systems takes a lot of effort and might lead to an upgrade of the SCADA system. This is not wanted.

Placing a processing engine that can gather and process all kind of data flexibly inside or close to the cells sounds like a good option. Creating a cell dedicated small application that talks with the machine transparently without any effect on existing communications would be the solution. The next step is deciding who should create this application and how. A processing engine that allows open-source applications and container-based architecture helps to build tools that are needed. It is agreed that automation personnel do not have time or know-how to create needed applications and to maintain them.

It is decided that IT takes responsibility of the software development and automation takes responsibility for taking care of the hardware on the shopfloor.

While the data mining project is running, the automation gets a demand to improve their analyzing capabilities in their production to change from reactive troubleshooting to proactive and preventative ways.

Searching applications from different sources reveals that there are a lot of possibilities to implement existing applications from open sources. Automation wants to have thousands of applications that are simple to use and provide them with the relevant information.

They realize that these two software-based solutions should be hosted on the same hardware due to the same requirement from a data source connectivity and maintenance point of view. As a solution, they will need a multi-tasker platform for the shopfloor.
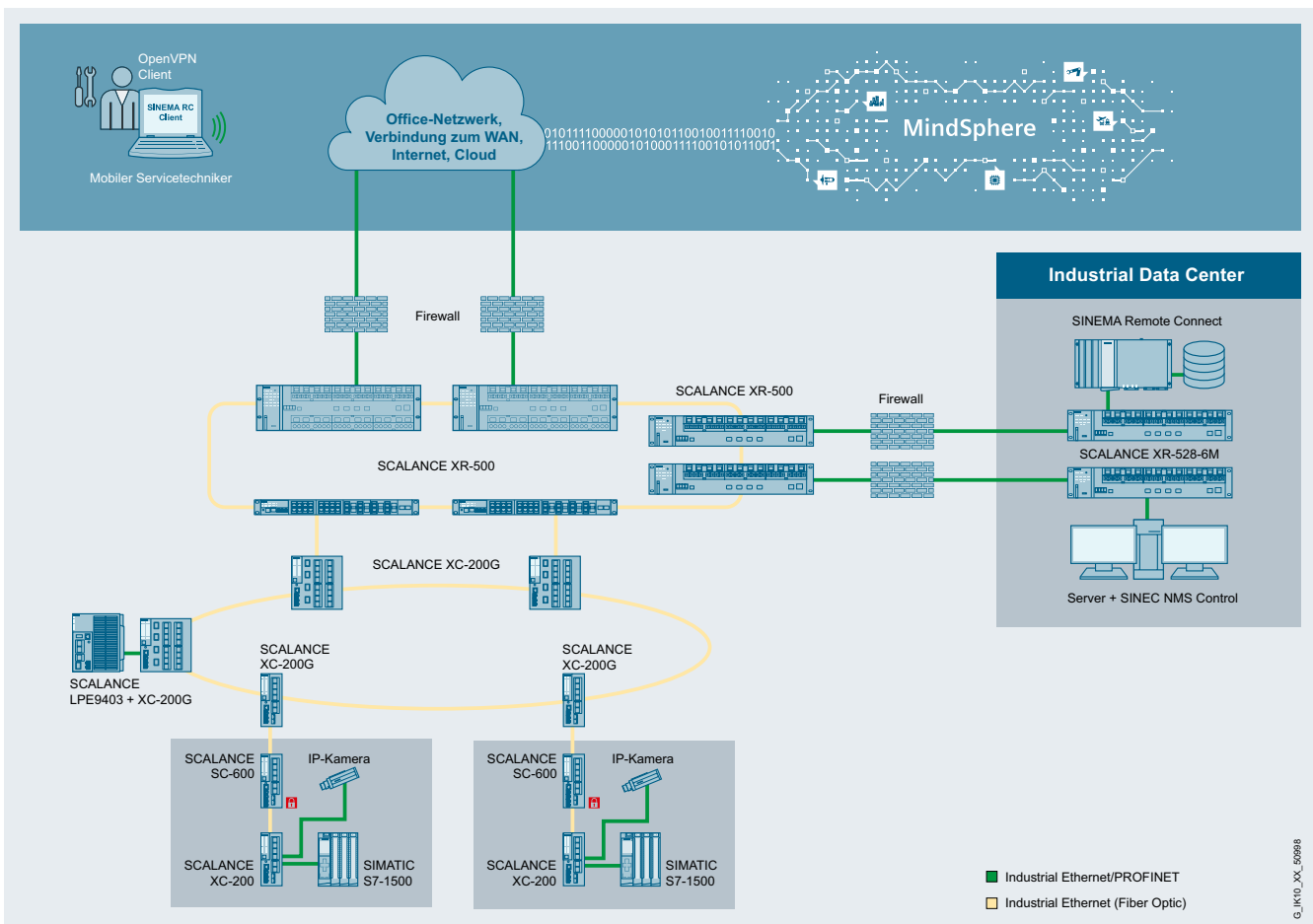
Local processing engine in the shopfloor

The perfect match for the application is found in a Siemens generated, industrial use application specially for process network analyzing. This application is also developed to run as container on an ARM based device called SCALANCE LPE.

This local processing engine has the power to run multiple applications simultaneously as containers. By locating SCALANCE LPE on a cell or aggregation level in the automation network, they can concentrate data gathering and analyzers in one hardware without compromising an application's availability.

siemens.com/local-processing