5G in Factories and Manufacturing

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In contrast to its earlier iterations (2G, 3G, 4G) the fifth generation of wireless cellular communications (5G) is going beyond its traditional boundaries which are serving mobile broadband and voice services to human consumers. One of the intentions of 5G is to approach new markets, one of which is 5G in factories and manufacturing. A major difference is the changed value chain. Traditionally this value chain consisted of vendor (system design, e.g. Nokia and Ericsson) → network operator (system operation, e.g. Verizon and Telia) → smart-phone user (service consumer). With 5G for factories and manufacturing this is changed to either vendor → factory floor owner (such as Bosch and Daimler AG) → factory floor equipment or alternatively, depending on the preferences of the factory floor owner, vendor → network operator → factory floor owner → factory floor equipment. In the former case network operation is done in-house, in the latter a network operator is in charge. So, a new set of players are about to enter the scene of mobile communications opening up new opportunities and also challenges.

Providing communication services for the production of goods in an industrial environment is significantly different than doing so e.g. in traditional out-door settings both w.r.t. rolling the system out and its operation. With traditional out-door settings major investments by the network operator both for renting the sites for installing his equipment and for the required construction work, e.g. for connecting the different sites to each other and the core network, are required. Within an industrial environment the owner of the communication system is also the landlord. So, site acquisition is much simpler. Furthermore, wired connections between the different elements of the network need not to be installed underground in an industrial in-door environment.

Another major difference is the fact that communication networks in an industrial setting are not necessarily active 24/7 (depending on the production cycle of the factory floor). This allows the system to e.g. perform house-keeping during the down-times. As a negative side-effect the control-plain of the system may experience a flood of network entries when the factory floor is powered up.

Finally, a big opportunity arises by allowing the communication system to directly interconnect with the production control system (e.g. SCADA). By doing so both subsystems can make use of specific characteristics reported by the other system to optimize its own procedures. For example, with the communication system having insights on the specifics of the production cycles, the management of the radio resources may be optimized. The other way around the production floor management system may benefit from knowing the achievable transmission qualities within given areas of the production floor.

My presentation will give you insights on both the opportunities and the challenges this move brings forward both for the industries from ICT (Information and Communications Technology) and OT (Operational Technology). I will highlight how 5G is designed to provide solutions to those challenges and which additional functionalities 5G adds to the table to enable new use cases.

I will conclude my talk be presenting some ongoing co-operations with various players from the OT industry targeting to trial and showcase those new opportunities.