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## Single Pair Ethernet – The Sole Communication Standard?

High levels of automation and connectivity play a decisive role in mobile machinery when it comes to meeting the increasing demands for efficiency and productivity in the agricultural and construction industries. This significance of the role is augmented by the growing shortage of machine operators. Assistance systems or (partially) autonomous work processes can help alleviate the situation and master these challenges.

The prerequisite for this support includes the secure transmission of camera and sensor signals for the reliable and correct environmental perception and information processing that provide the foundation upon which the automation systems operate. The more detailed the information is, the more precise and secure the implementation of the mobile work processes can be. Humans and machines are protected, and the performance of the working machines increases.

However, what was lacking until now was a suitable and powerful data transmission standard for use on construction sites or in the agricultural and forestry sectors. This gap has now been closed in terms of technology with Single Pair Ethernet (SPE). SPE transmits bidirectional data at a rate of up to 1 Gbit/s via 1000BASE-T1. This creates the required conditions to securely

transmit huge data streams, such as those present in high-resolution video signals. With the advent of the high-speed Isobus standards, SPE is making inroads into the agricultural sector. At the same time, the technology reduces material, weight, and ultimately costs through the use of a single pair of cables.

Is SPE then the all-singing, all-dancing and sole future standard? The technology certainly has the potential for it. The only limitation is currently the maximum cable length (15 m unshielded, 40 m shielded). Limits could be reached in particularly large machines such as mobile cranes. The greatest obstacle for the widespread use of SPE is, however, the lack of standardized software protocols running on the defined hardware layer. Semiconductor chips for 1000BASE-T1 type B (40m) are missing as well. The ball is now in the court of component and machine manufacturers as well as operators, they need to arrive at a consensus as soon as possible. Only then can the numerous advantages of SPE be transported to the fields and construction sites – and thus ensure the urgently required increase in efficiency and productivity in order to focus on solving the huge challenges facing agricultural and construction engineering.