



你的以太网，用我两芯就够

HARTING T1 Industrial

One pair is enough – The new Single Pair Ethernet

内容 Content

- ◆ 公司介绍 about Harting
- ◆ 以太网基础 Ethernet basic
- ◆ 单对以太网 SPE basic

营业额为**7亿6千2百万**
欧元

762 Mio.
euros in turnover



全球共有**44**家销售公
司
worldwide

44 sales companies



超过 **5000** 名员工
more than **5, 000** employees

14
家工厂
production plants

公司总部位于德国埃斯珀尔坎普
Company HQ in **Espelkamp, Germany**

创立于
founded in
1945

100 %
全资家族管有
owned by the Harting family



行业和产品 Target market and products



Pushing Performance



机械和机器人
Machinery & Robotics



自动化
Automation



轨道交通
Transportation



风能
Wind Energy



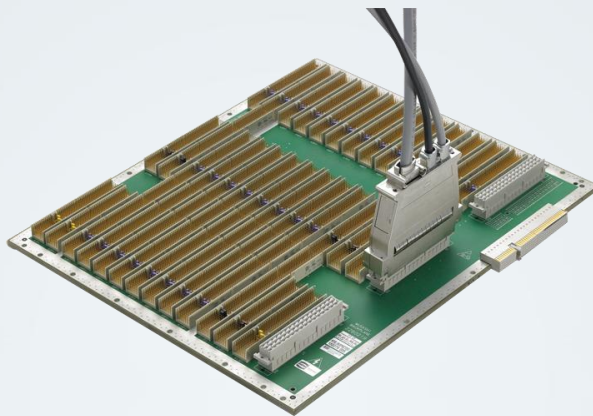
发电和配电
Power Generation
and Distribution



医疗
Medical



食品零售和零售业
Grocery retailing and
retailing

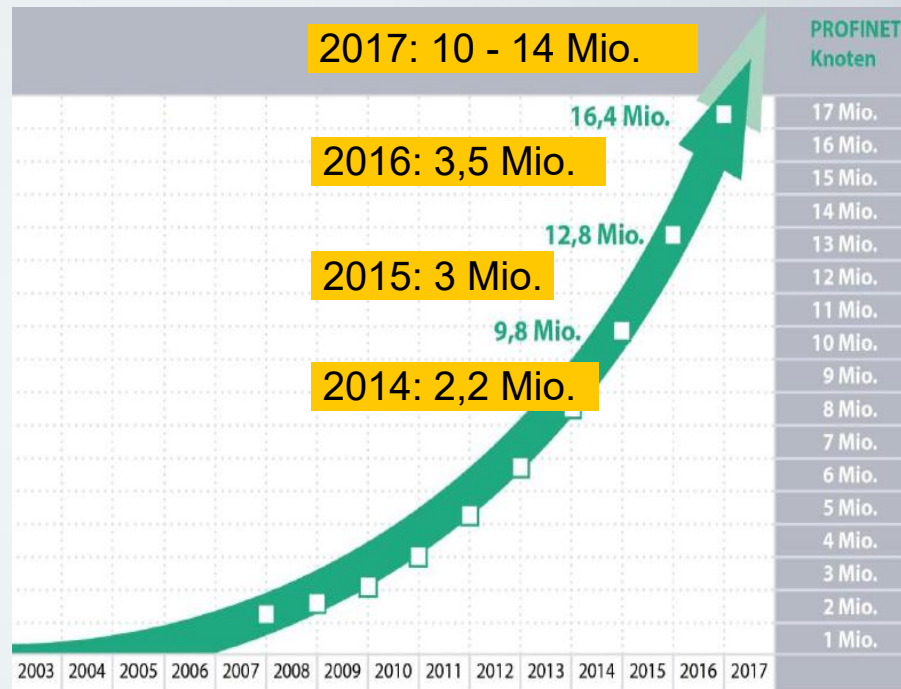


简单的说：一网到底全面起动！ Ethernet from the cloud to sensor



Pushing Performance

- 以太网(Ethernet)指的是由Xerox公司创建并由Xerox、Intel和DEC公司联合开发的基带局域网规范，是当今现有局域网采用的最通用的通信协议标准。
- 包括标准的以太网（10Mbit/s）、快速以太网（100Mbit/s）和10G（10Gbit/s）以太网。它们都符合IEEE802.3。
- 简单的说，以太网应用到工业控制场合后，经过改进使用于工业现场的以太网，就成为工业以太网。



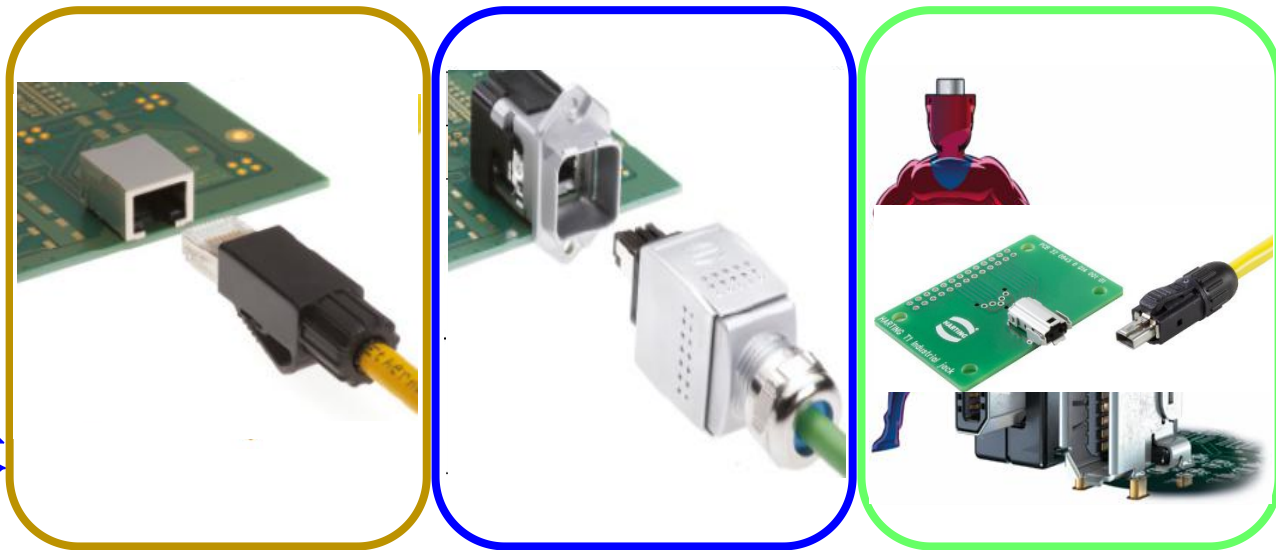
Industrial building, production lines and machinery 工业领域



Question :

- ① Ethernet Standard?
- ② Interface?
- ③ ix?

那么，大家见过哪些以太网接口呢？



单对以太网 Single Pair Ethernet

技术 Technology Overview

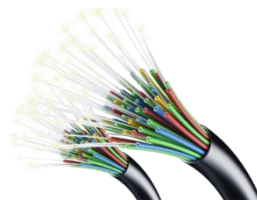


■ 当今以太网数据传输的几种不同介质 All kind of physical media are today used for Ethernet transmission:

— 无线传输: **wifi** Radio waves like WiFi



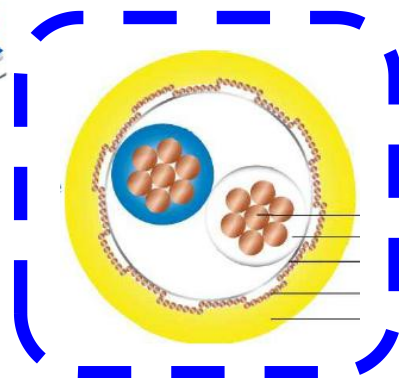
— 光纤传输: Fiber optic cables



— 2/4对铜导线: Copper cables with 2 or 4 twisted pairs (MPE)

— 单对铜缆: Copper cable with just 1 twisted pair

→ 全新的传输方式: **New physical media**
= Single Pair Ethernet (SPE)



单对以太网- 缘起 SPE Technology – Starting point?

■ 起源于Broadcom公司 Starting point of SPE was from Broadcom:

- 单对线最早应用车载以太网Automotive Ethernet standard realizes on a single-pair cable.
- 2011年正式推出 Officially released in December 2011, following the formation of The OPEN (One-Pair Ether-Net) Alliance Special Interest Group (SIG). <http://www.opensig.org/>
- 由以下汽车联盟支持 Support by a strong group of Industry's Leading Automotive & Tech Companies

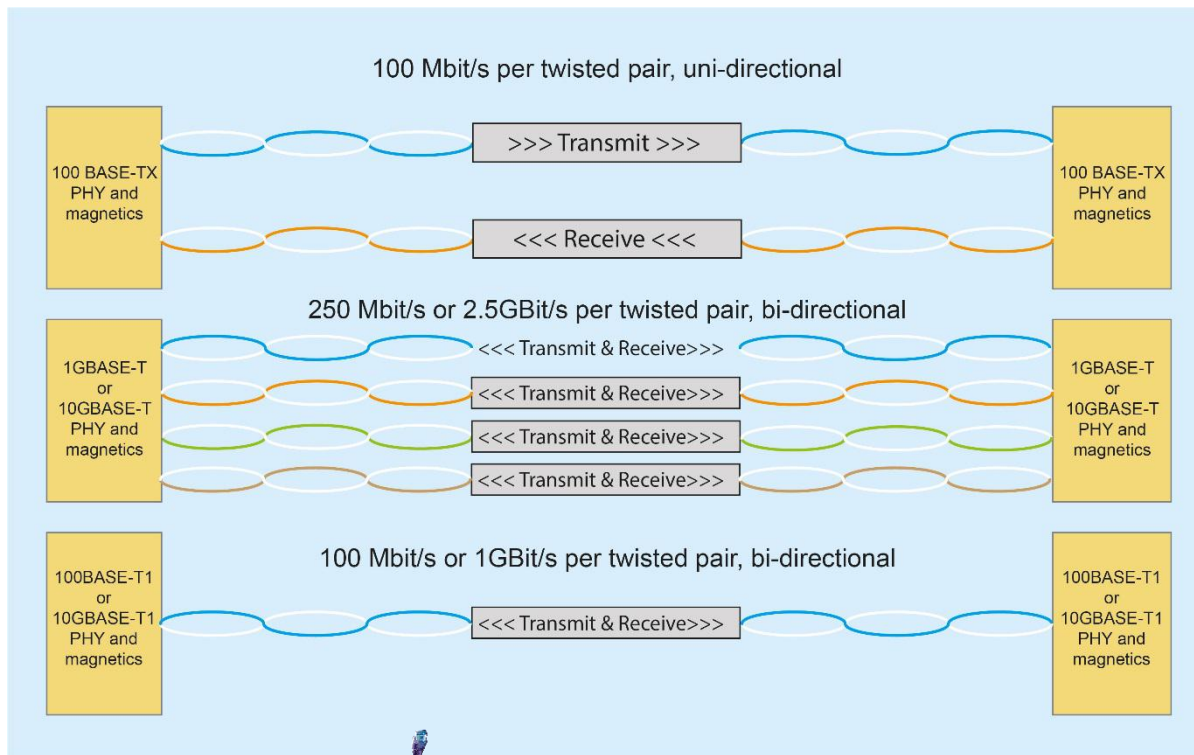


- 2015年标准发布 Standardized as IEEE 802.3bw – 2015



■ 与2/4对以太网的对比 How SPE is working in comparison to 2-pair or 4-pair Ethernet:

- 高速以太网用两对线进行数据传输，一对收一对发 Fast Ethernet use 2 pairs, one pair to transmit and one pair to receive data
- 千兆以太网采用4对线，每一对一收一发 Gigabit Ethernet use 4 pair for receive and transmit data
- 单对以太网只用一对线，一收一发 Single pair Ethernet use just one pair for receive and transmit data



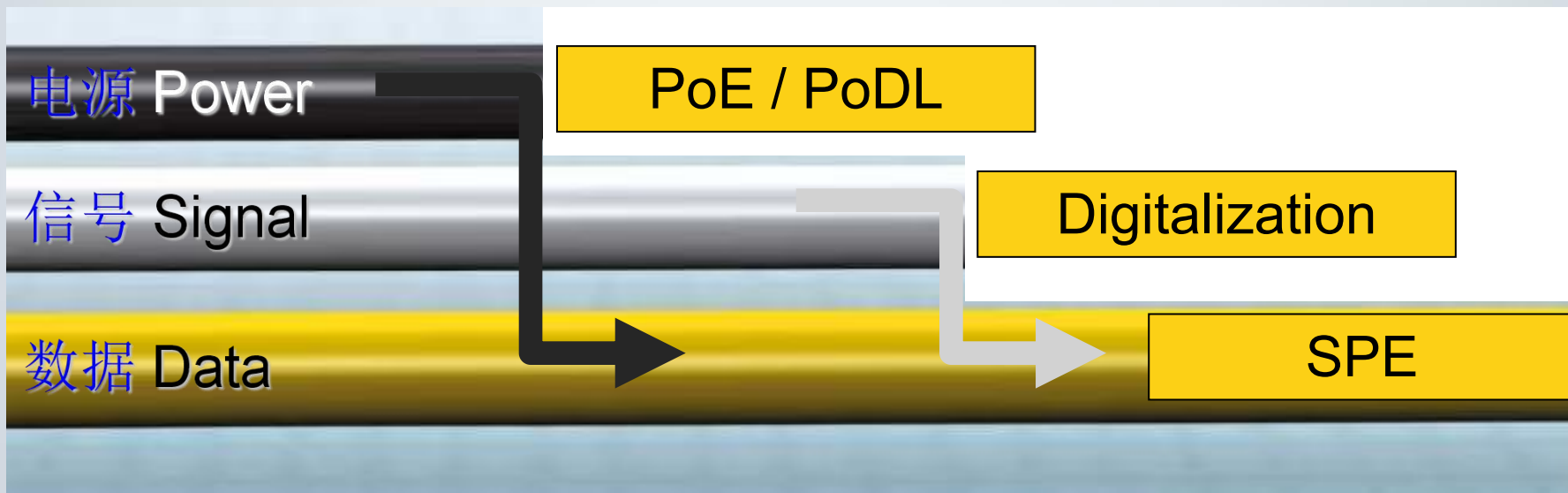
单对以太网- 工作原理 SPE Technology – The working principle?

愿景: The vision

现况 Today
connectivity



未来 Future
connectivity



- 只有汽车以外的行业也开始广泛使用这个接口才能获得成功， **SPE**不仅替代**RJ45** 还能替代**M12 D**编码和**X** 编码 **SPE will be only successful in the non automotive market if a standardized connector is defined and widely used. Similar like the RJ45 or also the M12 D- and X-coded connectors.**
- **HARTING** 已经取得以下进展 **HARTING tasks successfully done:**
-

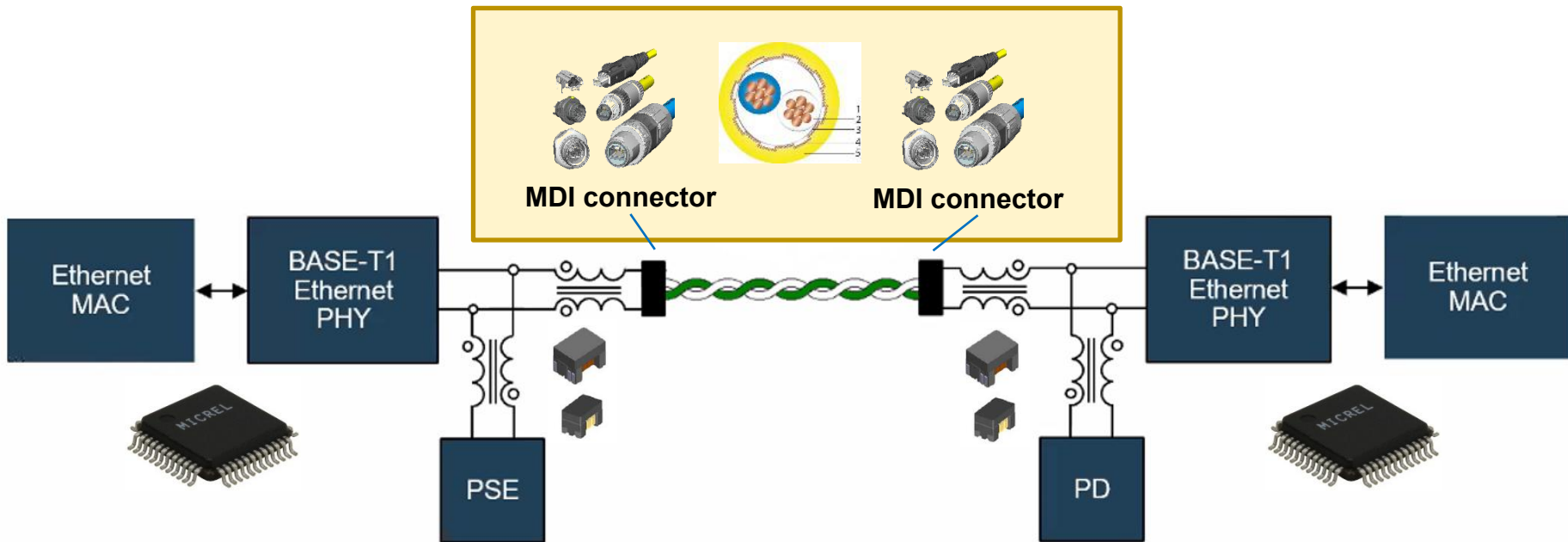
→ 主导制定了 **IEC 63171-6** 标准 Develop and standardize the SPE interface = IEC 63171-6

→ 将**SPE** 连接器定义为 **IEEE 802.3MDI**接口 Integrate our SPE connector as MDI (Media Depended Interface) to the IEEE 802.3 protocol standards

→ 将**SPE** 连接器定义**ISO/IEC** 和 **TIA 42** 线束接口标准 Integrate our SPE connector to the relevant cabling standards at ISO/IEC and TIA 42



■ SPE 带PoDL远程供电原理 Principe of a SPE link with PoDL remote powering:



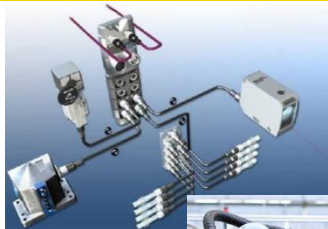
→ 链路上所有部件都需要符合SPE 标准

All single components must be available to start the design of SPE devices.



SPE 目标行业 - Use cases for Single Pair Ethernet (SPE) Technology

自动化行业
Automation



主要性能 Major Benefits:
防水 IP based

机器人 Robotics



轨道交通
Transportation



机械及其他 Machinery
and many others



节省安装时间 Shorter Installation Time for Field Devices

安装和维护简单 Easy Operation and Maintenance in a common IP-based Network

空间和重量大大减低 Space saving and weight reduction Cabling

与TSN完美应用于IoT和IIoT In combination with TSN the perfect infrastructure for IoT and IIoT



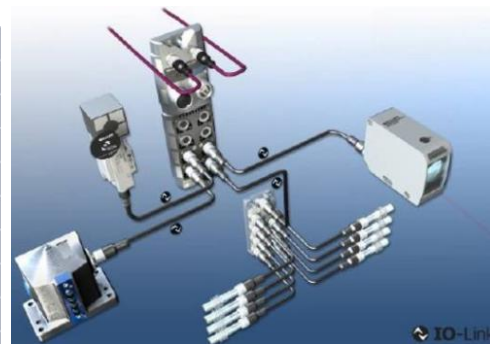
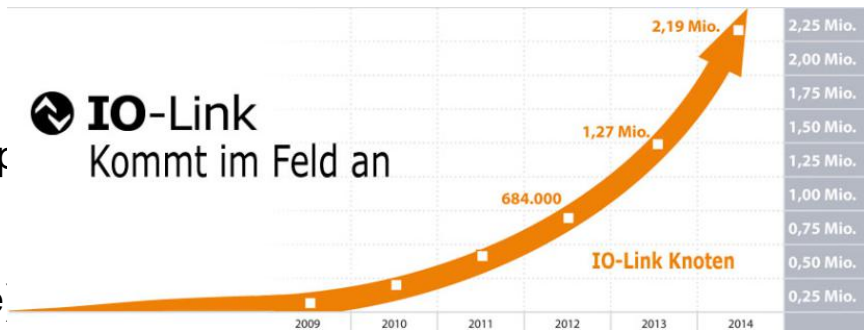
传感器，I/O 盒以及自动化设备 Sensors, I/O-Boxes, Industrial Devices, Automation

- yearly world market for M8 / M12 is huge
- big trend for sensors is digitalization
→ see market grow for IO-Link

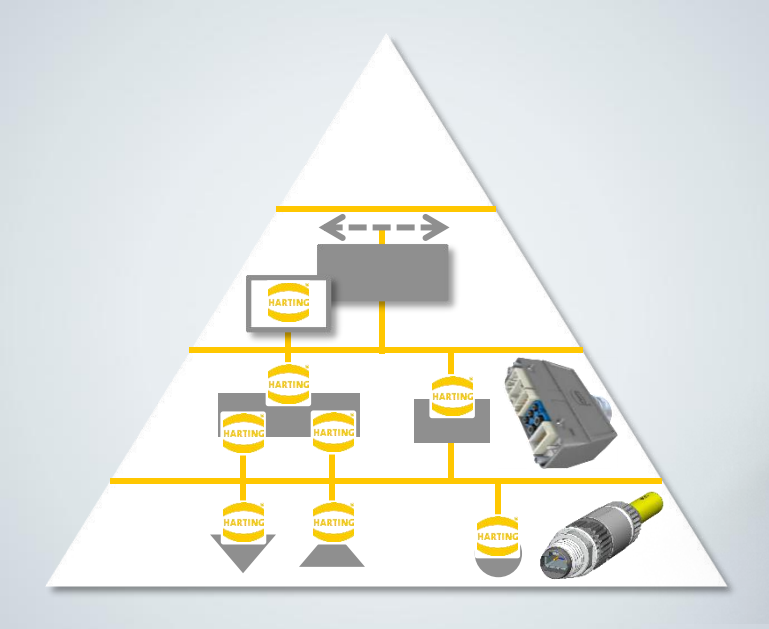


- big potential for T1-Ethernet because of the digitalization (Ethernet up to the sensor level, T1 perfect because it is simple and cost effective)

 **IO-Link**
Kommt im Feld an

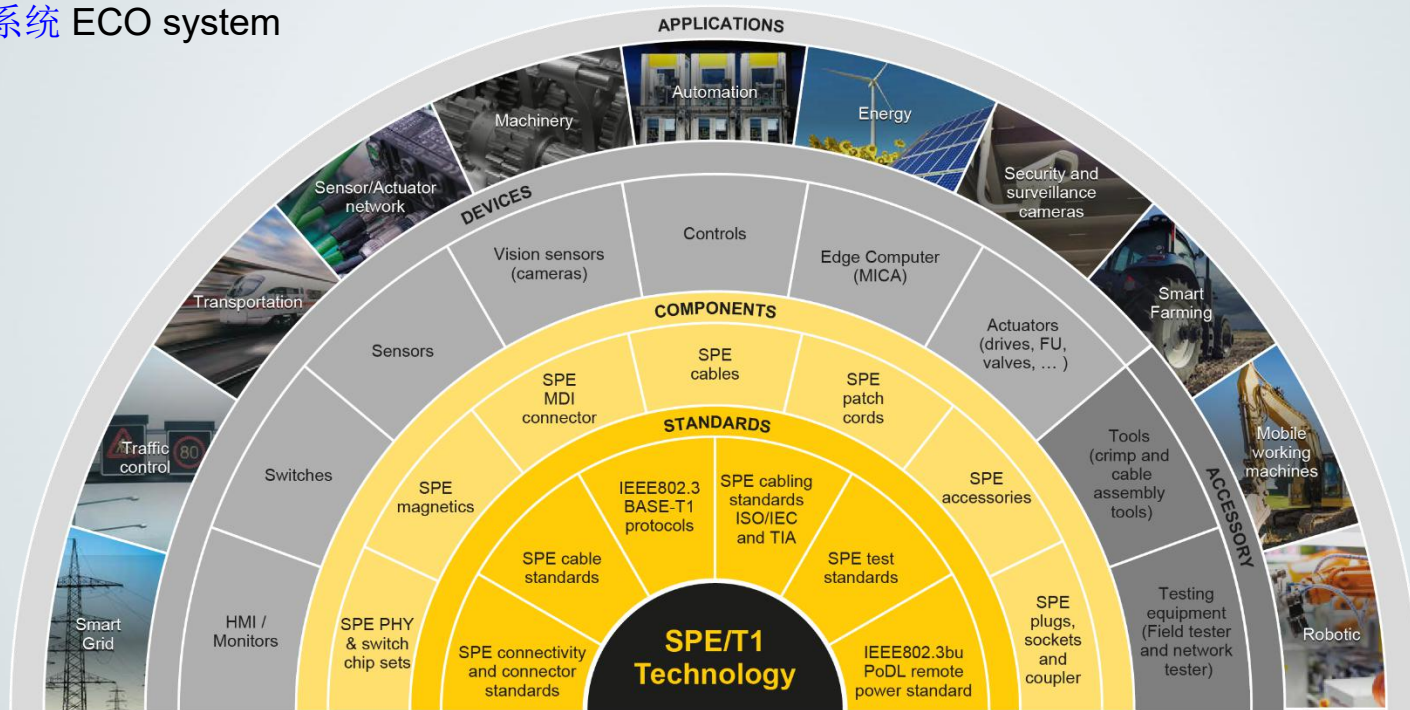


Specialist for Connectivity



HARTING T1 环保系统 HARTING T1 Industrial – SPE connectivity

- 绿色系统 ECO system



更多信息敬请点击 **YOU** found more information about Single Pair Ethernet (SPE) online here:

与我联系 ! Contact with Me !

邓文锋 daniel.deng@harting.com

<http://www.harting.com/en/T1-industrial>

T1 Industrial @ Yammer:



凡是过往，
皆为序章！

连接与网络
Connectivity & Networks



Han®

- 工业用连接器，因其最先进的**技术**以及极高的**可靠性**而著名。
Industrial connectors, that are known for their latest technology and high reliability.
- **HARTING Norm (浩亭标准)** – 浩亭定义了全球的行业标准
HARTING defined an industrial standard with worldwide acceptance – the **HARTING Norm**.



1954
首个自动点唱机
The first jukebox



1956 Han® 连接器专利
Application for the Han®
connector patent



1957
便携式唱片机
portable record player



1957
电子医疗设备，适用于短
波和高频疗法
Electromedical unit for
shortwave
and high-frequency
therapy



Thank you!

