Connectivity as Smart Microsystem

Mark Maas – Industrial Digital Factory & Innovation Lead

mark.maas@te.com
Content

About TE Connectivity

Our view on IIoT and SMART connectivity

Challenges & Capabilities

Questions
We Sense and Connect the World

TE Connectivity is a world leader in connectivity and sensor solutions

Aerospace & Defense  
Appliances  
Automotive  
Commercial Transportation  
Data & Devices  
Energy  
Industrial Equipment  
Medical  
Oil & Gas  
Sensors  
Subsea Communications

$12.2B  
FY16 SALES  
Partnering with CUSTOMERS IN NEARLY 150 COUNTRIES  
120B COMPONENTS MADE ANNUALLY

Connectors, sensors, circuit protection, identification, sealing and protection, antennas, relays, etc.
TE Connectivity enables a more connected world. We develop highly engineered products and integrated solutions for reliable data, power, and signal transmission in harsh environments, where failure is not an option.

80% FY16 SALES IN HARSH ENVIRONMENT APPLICATIONS

LEADER IN HARSH ENVIRONMENT CONNECTIVITY and SENSING
Pressure
Vibration
High Voltage
Moisture
Temperature
A World Leader in Sensors

TE has an unmatched range of sensor technology
An Industry Leader with Resources Near Customers

$12.2B
FY16 SALES WORLDWIDE

**AMERICAS**
$4.2B

**EMEA**
$4.0B

**Asia**
$4.0B

<table>
<thead>
<tr>
<th>Region</th>
<th>Manufacturing Sites</th>
<th>Employees</th>
</tr>
</thead>
<tbody>
<tr>
<td>AMERICAS</td>
<td>44</td>
<td>23,000</td>
</tr>
<tr>
<td>EMEA</td>
<td>35</td>
<td>23,000</td>
</tr>
<tr>
<td>Asia</td>
<td>25</td>
<td>29,000</td>
</tr>
</tbody>
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*Including India
Innovation Leadership

14,000 PATENTS granted or pending

$644M Invested in R&D and engineering FY16

7,000+ ENGINEERS globally

CNBC IQ 100 INDEX
TE CONNECTIVITY RECOGNIZED AS 2016 INNOVATION LEADER

2016 TOP 100 GLOBAL INNOVATORS
Clarivate Analytics
6 YEARS IN A ROW
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Internet of Things (IoT) is hot

No One Really Knows, but EVERYONE Agrees Market Opportunity is STAGGERING, and IT’S GOING TO HAPPEN!

<table>
<thead>
<tr>
<th></th>
<th>2015</th>
<th>2020</th>
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<tbody>
<tr>
<td>World Population (Billions)</td>
<td>7.2</td>
<td>7.6</td>
</tr>
<tr>
<td>Connected Devices (Billions)</td>
<td>15</td>
<td>26 – 50B</td>
</tr>
<tr>
<td>Economic Value Add (US$ Billions)</td>
<td>200</td>
<td>1.900 – 19.000</td>
</tr>
<tr>
<td>Data Volume (Exabytes = 10^9 G)</td>
<td>1.0</td>
<td>4.0</td>
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</table>

Cisco / IDC / Gartner

“Trying to determine the market size of the Internet of Things is like trying to calculate the market for plastics, circa 1940. At that time, it was difficult to imagine that plastics could be in everything”

Michael Nelson, Professor of Communication, Culture & Technology at Georgetown University
The Internet of Things connects devices such as everyday consumer objects and industrial equipment onto the network, enabling information gathering and management of these devices via software to increase efficiency, enable new services, or achieve other health, safety, or environmental benefits. The term was first proposed in 1999 by Kevin Ashton of MIT.

But IoT is about DATA, not THINGS
Industrial IoT (IIoT) and its building blocks

Internet of Things **connects devices** (everyday objects and industrial equipment) **onto the network**, enabling **information gathering and management** of these devices via software **to increase efficiency, enable new services, or achieve other** health, safety, or environmental **benefits**. The term was first proposed in 1999 by Kevin Ashton of MIT.

**Sensors** & actuators

Giving our world a digital nervous system

**Smart Connectivity**

Inputs are digitized and put onto networks/clouds

**People & Processes**

Combine networked inputs into systems that integrate data, people, processes and systems for **better decision making**
Connected Factories

**IoT Extended Forecast, 2011-2025**

Source: IHS research

Reduced Unscheduled Downtime
Real-Time Optimization (Flexibility)
Seamless Cooperation with Human
Higher Quality
Lower Resource Need
Higher Efficiency (OEE)

Tool 3A: I need maintenance in 2 weeks
Relay 12: I’m defective
Motor 4 & 5: you can save energy as your neighbor is in error
Sensor 345: I detect a human in range, so will slow down
Conveyor C: please change to program A for the next product
Robot 4: I need to add task B as my neighbor has a problem
The Smart connectivity challenge

Need for RELIABLE connectivity.

Survive in HARSH environments.

Sense AND connect.

CONNECT to people & processes.

Maximize GRANULARITY.

Field UPGRADEABLE.
Smart Connectivity: Example 1
M30 Ariso

- Coil and antenna
- Electronics
- Contact system
- M30 housing
Smart Connectivity: Example 2
M8 active connector - details

- M8 connector housing
- Electronics
- Polymer waveguide (cable)
- Contact system
- 60GHz RF module
- Antenna

Connector size comparison

Industrial RJ45
M12 X-code
Mini IO
Industrial USB
M8 Active Connector
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Challenges

Available space
• Electronics printing for metal tracks and sensing
• Flex PCB’s
• Wire bond
• Direct Die Attach, Flip Chip on board

Reliability in harsh environments

Cost
Smarter Factory

**Vision**

Next day (customer specific) products, no waste, no stock

**Mission**

State-of-the-art factory for new products and processes

- Transform current model shop to the first fully digital (prototype) Smarter Factory within TE
- Be a one-stop-shop for IND A&C, IB, Rail and Advanced Development
- Deliver best in class prototypes, samples, tooling and processes for Digital Factory and (Advanced Engineering)

**Strategy**

- Fast prototype / product delivery
- Validation & Qualification of new products and processes
- Experience Center
Capabilities within TE Connectivity

MEMS: Design, Wafer processing, Wafer back-end

ASIC: Design, Wafer processing

BLM: Thick film screen printing, Assembly, Final Test and Calibration
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Capabilities and Challenges

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