Information from IEC TC65 to IEEE 802

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Establishing a joint group between IEC 65C/MT9 and IEEE 802.1 to an industry profile using TSN

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INDUSTRIAL PROCESS MEASUREMENT, CONTROL AND AUTOMATION
IEC TC 65

INDUSTRIAL-PROCESS MEASUREMENT, CONTROL AND AUTOMATION

Overview

- 380 Standards
- 58 working groups
- 1436 seats, 684 experts
- 30 countries
- 94 Publications in last financial year

Yellow are the groups that will be involved in Smart Manufacturing
IEC TC65 overview of today's Member Countries and Liaisons

30 Countries Inclusive SCs

50 Liaisons Inclusive SCs
TC65 provides today a framework of standards for the industry

- **Vertical**: from enterprise through control and sensors/actuators to the process/product
- **Life cycle phases**: from design, engineering, commissioning, operation to decommissioning
- **Horizontal**: all industry e.g. batch, continuous, discrete
- **Supply chain**: from inquiry to distribution and maintenance
- **System scope**:
  - interfaces to other domains e.g. Smart Grid,
  - open interfaces e.g. OPC UA for the office floor,
  - open integration of components and communication
- **Non functional requirements** are supported e.g. safety, security, real time responses, reliability, etc.

Maintenance for IEC 61158 (Fieldbus)

Industrial communication networks -

FIELDBUS SPECIFICATIONS -

IEC 61158 Fieldbus Types

PART 1: Overview and guidance for the IEC 61158 and IEC 61784 series

PART 2: Physical layer specification and service definition

PART 3, 4, 5 and 6:
Data / Application Layer protocol specification and service definition
Maintenance for IEC 61784-1 and IEC 61784-2 (Profiles)

Industrial communication networks -

IEC 61784-1, -2
Communication Profile Families (CPF)
and Communication Profiles (CP)

20 CPFs, 53 CPs (one CP in addition in IEC 62591)

PART 1: Fieldbus profiles

PART 2: Additional fieldbus profiles for real-time networks based on ISO/IEC 8802-3

Part x
Other 65C/WGs documents like: Functional Safety, Installation, etc.
83 published documents in 2014 on about 21 000 pages per language.

87 documents expected in the 2018 edition (2 more CPFs with each 2 additional documents)
TSN Objectives in Industrial Networks

- Convergence of multiple applications, which share a common network and get the required QoS each.

- Standardized interface for end-stations to gain guaranteed Quality of Service (QoS) for
  - Real-time communication,
  - Bounded low latency,
  - High availability.

TSN = multiple IEEE Standards:
(e.g.: IEEE 802.1ASbt, IEEE 802.1Qbu, IEEE 802.1Qbv, IEEE 802.1Qca, IEEE 802.1CB, IEEE 802.1Qcc)
Membership and Liaisons

Membership

- 65C/MT9 is convened by Ludwig Winkel (DE).
- 53 experts from 14 NCs plus 9 experts nominated from 9 D-Liaison partners.
TSN allows maintaining determinism with the confidence of being able to satisfy the requirements of less demanding traffic sharing the medium. The meaning of convergence in TSN is the successful convergence of critical control, non-critical control, and data streams on a single network.
TSN defines sub-standards – not a single protocol (see http://www.ieee802.org/1/pages/tsn.html)!
TSN Profile Objectives

- Configuration Models
- User Network Interface (UNI)
- Network Internal Interface (NII)
- Synchronization: IEEE 1588, IEEE 802.1AS
- TSN Features:
  - Traffic Scheduling and Shaping
  - Robustness and Redundancy
  - Security (MAC SEC)
Several different application domains were driving and influencing different Amendments of IEEE 802.1, so that not all of them make sense for "Industrial Automation Applications".

Examples of application domains:
- Audio/Video Bridging
- Measurement
- Industrial Automation
- Automotive
Effects of TSN
- Standard Ethernet becomes real-time capable even with a mixed traffic.
- „Any“ Ethernet based Communication can make use of real-time capabilities
  - OPC UA
  - ...
- TSN enables a technology-push based on Standard Ethernet Components

Precondition
- TSN supporting hardware, firmware and software
The motivation of IEC 65C/MT9 to establish a joint effort of IEC and IEEE is that we will have the competence of IEEE 802 on board to specify the profile and if there will be gaps to have a short and quick relation to amend the technology suitable for the industrial automation industries.

The process to form and work jointly together is described in the “Guide to IEC/IEEE Cooperation”; This brochure, as well as other documents and guidelines concerning IEC IEEE cooperation can be accessed at http://www.iec.ch/iec-ieee or directly on http://standards.ieee.org/develop/intl/iec_ieee_coop.pdf
THANK YOU!