IMS Technical Committee on Sensor Technology, TC-9 Report

(from October 1, 2019 to September 30, 2020)

General IMS TC Meeting

October 5, 2020

TC-9 Chair

Kang B. Lee

Activities to Report

- Most standards working groups under TC-9 are active in working on the various P1451.X standards and P1588 standard through collaborations within IMS and other IEEE societies, as well as with industry people aiming to,

  ➢ achieve interoperability among P1451 family of standards,

  ➢ achieve data interoperability with other IoT verticals via the P1451.99 IoT harmonization standard,

  ➢ complete standards to support industries.

- Organize the International IEEE International Symposium on Precision Clock Synchronization for Measurement, Control, and Communication (ISPCS)

  ➢ I started the first IEEE 1588 workshop at NIST in 2003.

  ➢ Then turned it into an annual IEEE conference called ISPCS, held first time at the Austria Academy of Sciences in Vienna, Austria, in October, 2007.

  ➢ Other than conference paper presentations, we also focus on a Plugfest – a venue for product vendors to test and verify devices and systems Interoperability based on the IEEE 1588 (PTP) standard.

  ➢ 2020 is our 14th year, however ISPCS 2020 had to be cancelled due to Covid-19.

  ➢ So we have just decided to hold ISPCS back to Vienna, Austria in October, 2021.

IEEE 1451 Family of Standards for IoT, IIoT, and CPS

✓ **The IEEE 1451 family of smart transducer interface standards for sensors and actuators consist of :**

1. P1451.0 – Common commands, functions, messaging, and transducer electronic data sheet formats (TEDS) -- Std being revised
2. P1451.4 – Mixed-mode Transducer Interface and TEDS for smart transducers --- Std being revised
3. P1451.5 – Wireless interfaces for smart sensors and actuators ----------- Std being revised
4. P1451.7 – RFID to sensor interface -------------------------------------- Std being revised
5. P1451.1.4 – XMPP Network Interface for secure sensor data access -- Std being developed
6. P1451.1.5 – SNMP Network Interface for secure sensor data access -- Std being developed
7. P1451.1.6 – MQTT Network Interface for secure sensor data access -- Std being developed
8. 21451-001-2017 – Signal treatments applied to smart transducers -------Std published
9. P1451.002 -- Low-power wireless operation for smart transducers –----- Std being developed
10. P1451.99 -- Harmonization of IoT devices and systems ------------------ Std being developed
11. P1451.8 -- Wind Turbine Condition Monitoring System –------------------- Std being developed
12. P1451.9 – Tidal Turbine Condition Monitoring System --------------------- Std being developed

➢ Some members of the P1451.X family have been adopted as:
- ISO/IEC/IEEE 21451-X family of standards through the ISO/IEEE Partner Standards Development Organization (PSDO) Cooperation Agreement with duel logo on document.

✓ Other standards developed in TC-9:
- IEEE 1588 -2019 (IEC 61588) – Precision Clock Synchronization Protocol for Networked Meas. & Control Systems.
- IEEE 2402-2017 - Standard Design Criteria of Complex Virtual Instruments for Ocean Observation

✓ Contributed in IEEE 1588™ Power Profile Certification at the IEEE-SA Conformity Assessment program (ICAP).

IEEE 1451 Family Reference Model for Smart Transducer (Sensor/Actuator) Networks for IoT, IIoT, and CPS Applications

Kang Lee and Eugene Song
5/1/2020
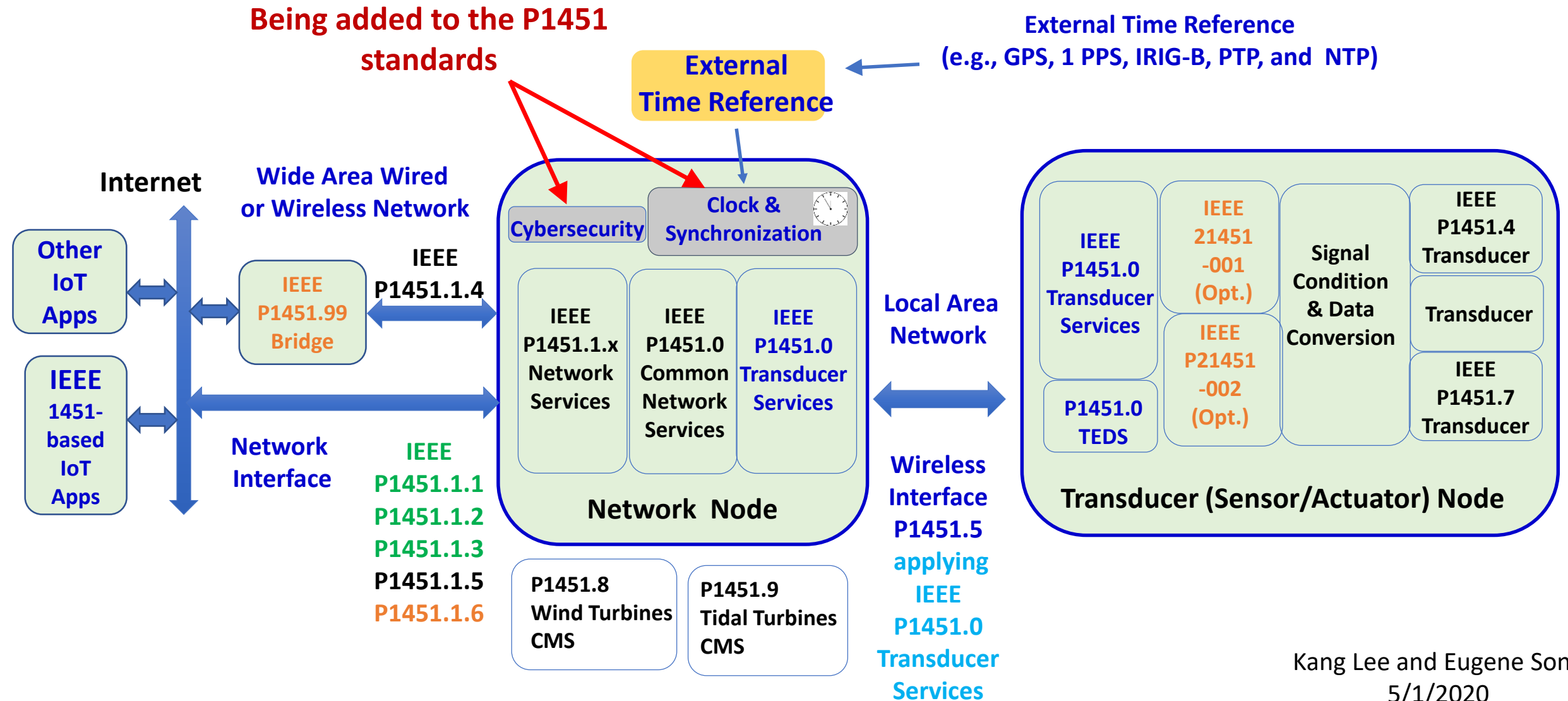
Activities to Report – cont'd

- Organize the International IEEE International Symposium on Precision Clock Synchronization for Measurement, Control, and Communication (ISPCS) – a forum for precision clock synchronization and distributed time-based applications.
  - ➢ I started the first IEEE 1588 precision clock synchronization workshop at NIST in 2003 and for 3 more years.
  - ➢ Later I turned it into an IEEE International Conference under IMS called ISPCS in 2007, first time held at the Austria Academy of Sciences on October 1-3, 2007 in Vienna, Austria.
  - ➢ Then hold annually in the September/October timeframe alternating yearly between North America and Europe. It was held first time in Asia - in Beijing China in 2015.
  - ➢ We have achieved our 13th conferences in 2019.
  - ➢ ISPCS 2020 was planned to be held on October 4-9, 2020 in Vienna, Austria.
  - ➢ Due to Covid-19, the Steering Committee has decided to move ISPCS back to Vienna, Austria to the fall of 2021.
  - ➢ The main features of ISPCS include a Plugfest, Symposium, and Sync School.

The ISPCS website

Activities to Report – cont'd

- The IEEE P1451.0, P1451.5, and P1451.99, etc., working groups try to hold meetings monthly working on their respective standards projects.

- An Ad Hoc Committee was formed to review and update the architecture of the IEEE 1451 Family of standards to fulfill the needs of IoT, IIoT, and CPS applications.

- A new standards project P1451.9, Tidal Turbine Health Monitoring Systems (HMS), was approved by the IEEE-SA New Standards Committee. The first working group meeting was held this past January to kick off the standards development effort.

- A revised IEEE Std 1588 -2019 has been approved by the IEEE-SA Standards Board as a full-use standard. Currently we are working with the IEEE-SA Editor to prepare the standards document for formal publication. Many in industries are anxiously waiting for its release so they can implement the standards specifications into their products.

  - This standard revision has taken ten years to complete in order to meet the needs of different industries globally including telecommunications, audio-video, automotive, industrial automation, broadcast, test and measurement, defense, aerospace, finance, semiconductor, medical, power generation, utilities, traffic control, and many more. IEEE-SA has published the standard on June 18, 2020. This standard was designated by industry as the PTP (precision time protocol), many orders of magnitude better than the existing NTP (network time protocol) that used on all computers.

Activities to Report – cont'd

- I have been collaborating with the Industrial Electronics Society (IES) Standards Committee to join their Interop of IES standards efforts to include Interop 1451. We are interested in testing of preliminary standards implementations for interoperability among the family of IEEE 1451 standards based on proposed specifications. I have encouraged all IEEE standards project working group chairs to participate in this Interop 1451 activity. Then the test results can be used by the chairs to modify and finalize their respective draft specifications for IEEE-SA sponsor balloting. Interop 1451 Testing aims to be conducted virtually in November 2020.

- As TC-9 Chair, I have attended regular meetings of IEEE-SA IoT Standards Steering Committee. They created IEEE IoT Initiative & IEEE IoT World Forum.

- As TC-9 Chair, I have attended regular meetings of IEEE Sensors Council Industry Liaison Committee meeting.

- As TC-9 Chair, I have attended regular meetings of IEEE-SA IoT/Foundational Technologies Steering Committee

- I have also initiated a project proposal to the IEEE TAB Committee on Standards requesting supports on standards-related development in the area of interoperability testing for the IEEE 1451 smart sensor standards in support of IoT, IIoT, and CPS use cases and applications. This project will require travels to conduct Interoperability testing. Unfortunately due to Covid-19, all travels have been terminated and no new project has been awarded that requires travels.

Activities to Report – cont'd

Pursue others to join I&MS and TSAC

- I have been working with the Chair of an ANSI N42 committee and coaching her to join I&MS and transfer her committee to I&MS by creating a new technical committee under I&MS Technical and Standards Activities Committee (TSAC).

- All the standards developed under N42 have been published by IEEE-SA. Currently, ANSI informed them that they have to become an IEEE Technical Committee in order to publish their N42 standards under IEEE-SA.

- The N42 committee has been developing and maintaining standards pertaining to design and construction, design performance criteria, performance testing against design criteria, calibration, and field response testing of radiological protection instruments, radiometrology instrumentation, and radiation detection for homeland security applications.

- So far, they have approximately 39 standards under N42. They are working on instrumentation and measurements related technologies and standards. Thus I strongly recommend N42 committee to join I&MS TSAC because it will be very beneficial to our society and its members.

- I coached and arranged the N42 Committee Chair Leticia Pibida to present a new TC petition at a special I&MS TSAC meeting on September 18, 2020. About a dozen of their member have join IMS and IEEE-SA.

Activities to Report – cont'd

I have re-nominated our TC-9 member Geoffrey Garner as a member of the IEEE Registration Authority Committee (RAC)

- The IEEE RAC is the oversight committee for the <u>IEEE Registration Authority</u>.
- The IEEE RAC is international in scope, assisting standard developing organizations in their establishment of unambiguous, sustainable registration authorities.
- The IEEE RAC considers the long-term interests of the ultimate users of these standards, while pragmatically addressing the needs of the affected organizations, industries, and IEEE.

In his previous term, Geoffrey has participated in the IEEE P1588 Working Group, IEEE 802.1 Working Group, and ITU-T SG15, Q13. With his board knowledge in these working groups, he has helped to resolve some of the registration issues associated with the IEEE 1588 standard.

For example,

- The IEEE PC37-238 committee had, contrary to IEEE Std 1588-2008, used a reserved PTP domainNumber without authorization; Geoffrey brought this to the attention of the RAC and attended, along with the RAC chair, the RevCom and SASB meetings where PC37-238 was being considered for approval (approval was not given at those meetings; instead, an ad-hoc committee was formed to resolve the issue). Finally, he recently participated in the review of a revision to the RAC Operating Procedures, and a few years ago I participated in the setting up of new registries for smaller blocks of MAC addresses (i.e., the MA-M and MA-S registries).