



## PROPOSAL FOR A NEW FIELD OF TECHNICAL ACTIVITY

**PROPOSER:**

**DATE OF CIRCULATION:**

**KATS**

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**CLOSING DATE FOR VOTING:**

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A proposal for a new field of technical activity shall be submitted to the Office of the CEO (to [tmb@iso.org](mailto:tmb@iso.org)), which will process the proposal in accordance with [ISO/IEC Directives, Part 1, Clause 1.5](#).

Furthermore, a proposal will be considered as complete if every information field is complete and follows the guidelines for proposing and justifying a new field of activity given in the [ISO/IEC Directives, Part 1, Annex C](#).

### TITLE

(Please see the [ISO/IEC Directives, Part 1, Annex C, Clause C.4.2](#))

### Positioning, navigation and timing (PNT) services

### SCOPE

(Please see the [ISO/IEC Directives, Part 1, Annex C, Clause C.4.3](#))

Standardization in the field of Positioning, Navigation and Timing (PNT) services at the service and application level, including architectures, terminology, service frameworks, data structures, interfaces and service-level performance criteria and assurance requirements enabling interoperable, reliable, secure and resilient PNT services across multiple sectors.

The work addresses service-level concepts such as interoperability, integrity, resilience, and service frameworks for the provision and management of PNT services and PNT-related information.

Sector-specific technologies and standards already covered by existing ISO, IEC or other international committees are excluded.

Exclude: Standardization covered by

- ISO/TC 8/SC 6: Navigation and ship operations
- ISO/TC 20/SC 14: Space systems and operations
- ISO/TC 22: Road vehicles
- ISO/TC 23/SC 19: Agricultural electronics
- ISO/TC 113/SC 5: Instruments, equipment and data management
- ISO/TC 172/SC 6: Geodetic and surveying instruments
- ISO/TC 204: Intelligent transport systems
- ISO/TC 211: Geographic information/Geomatics
- [ISO/IEC JTC 1/SC 6: Telecommunications and information exchange between systems](#)
- [ISO/IEC JTC 1/SC 27: IT Security techniques](#)

- [ISO/IEC JTC 1/SC 32: Data management and interchange](#)
- [ISO/IEC JTC 1/SC 38: Cloud Computing and Distributed Platforms](#)
- [ISO/IEC JTC 1/SC 41: Internet of Things and Digital Twin](#)
- [ISO/IEC JTC 1/SC 42: Artificial Intelligence](#)
- [IEC/TC 80: Maritime navigation and radiocommunication equipment and systems](#)
- [IEC/TC 100: Audio, video and multimedia systems and equipment](#)

**PURPOSE AND JUSTIFICATION (PLEASE USE THE FIELD IMMEDIATELY BELOW OR ATTACH AN ANNEX.)**

(Please see the ISO/IEC Directives, Part 1, Annex C, Clause C.4.13)

Positioning, Navigation and Timing (PNT) services are emerging as a foundational digital infrastructure supporting modern economies, comparable in importance to telecommunications and geospatial information infrastructures. Rapid technological advances and the growing reliance on location and timing information are expanding the role of PNT services in ensuring safety, efficiency, sustainability and economic growth across many sectors.

Despite the increasing dependence on PNT technologies, there is currently no cross-sector international standardization framework addressing PNT services as a global service ecosystem. Existing standards typically address sector-specific technologies or applications, such as maritime navigation, aviation navigation, road transport or geospatial information systems. A dedicated ISO technical committee focusing on PNT services would therefore provide a neutral international platform to harmonize service-level standardization across industries.

PNT services enable a wide range of applications that support modern society. These include transportation and logistics, aviation, maritime navigation, rail and road transport, telecommunications network synchronization, financial transaction timing, energy grid management, environmental monitoring, disaster response, surveying, construction, agriculture, smart cities and infrastructure management. In manufacturing environments, PNT services also provide essential data enabling robots to learn and replicate human operational behaviors, supporting advanced manufacturing environments such as AI-enabled and highly automated production systems (“dark factories”).

Standardization for PNT services is crucial to ensure interoperability between different GNSS systems, enhancing global navigation accuracy, reliability, and safety. It also promotes consistent performance across various applications and industries, fostering international collaboration and widespread adoption of PNT technologies by supporting the responsible and widespread utilization of GNSS (including RNSS) as the primary foundation for PNT services. Examples of major GNSS programmes and related developments include:

- The United States operates GPS, continuously upgrading it for improved accuracy and reliability with the latest GPS III satellites.
- Russia's GLONASS is undergoing modernization with GLONASS satellites to enhance performance.
- The European Union's Galileo: OSNMA (Open Service Navigation Message Authentication), managed by the European Union Agency for the Space Program, aims to provide highly accurate positioning and timing information, with a focus on interoperability with other systems.
- China's BeiDou system has expanded globally, enhancing its precision and reliability.
- Japan's QZSS and India's NavIC focus on regional services with plans for broader applications.
- Republic of Korea's KPS (Korean Positioning System) is being developed to provide high-precision positioning services over the Korean Peninsula.

Satellite-Based Augmentation Systems (SBAS) are designed to augment GNSS providing corrections and integrity by broadcasting additional signals from SBAS satellites. They are deployed worldwide: Wide Area Augmentation System (WAAS) in North America, European Geostationary Navigation Overlay Service (EGNOS) in Europe,

MSAS in Japan, GAGAN in India, SDCM in Russia, KASS in South Korea, BDSBAS in China, ASECNA/AFI SBAS in Africa, and Southern Positioning Augmentation Network (SouthPAN) in Australia and New Zealand.

In addition, inertial navigation system (INS), cellular and terrestrial network-based positioning, optical and visual navigation, GNSS augmentation including precise point positioning (PPP), PPP-RTK (Real-Time Kinematic), SBAS, etc. are to be utilized as the means of generating PNT data.

However, despite the existence of these technologies, existing standards are largely limited to system-level or sector-specific approaches, and there is currently no international standardization framework addressing PNT services from a cross-system and cross-sector service perspective. This gap highlights the need for a dedicated ISO Technical Committee to develop harmonized standards for interoperable, reliable and trusted PNT services.

PNT services also support the monitoring and management of moving objects and infrastructures across their lifecycle, enabling improved safety, operational efficiency and environmental sustainability. By supporting efficient transportation systems, smart infrastructure management and real-time environmental monitoring, PNT services contribute to global efforts to reduce emissions and improve resource efficiency.

The proposed ISO Technical Committee focuses on service-level standardization of PNT services rather than technology-specific systems, thereby complementing existing standardization activities in sectors such as space, transport, geospatial information and telecommunications.

Through these activities, international standardization of PNT services can contribute to improving safety, sustainability and quality of life while supporting innovation and economic development across multiple industries.

PNT services apply to a wide range of moving objects and infrastructures across multiple sectors worldwide throughout their lifecycle (or lifetime) from origin to destination, providing powerful tools for improving efficiency, safety and environmental sustainability. In particular, the monitoring and validation of PNT data is becoming increasingly critical for ensuring service integrity, reliability and resilience across safety-critical and large-scale applications.

- Monitoring and recording the moving objects: for ensuring they are safe, efficient and environmentally sustainable during the process of staying and moving from the origin to destination
- Certification and management of movement-related records: including life records (living things), aging records (non-living things), mobile (moving) records (by walking, driving, flying, delivering, etc.), traceability records, movement history, operational logs, and environmental performance data (e.g. mileage, emissions)
- Early and real-time warning mechanisms: signal interference detections (i.e. jamming and spoofing), solar activities and space weather warnings, geographical event detections, disaster detections at different levels such as national, regional as well as global

Based on the ISO Open Consultation, the need for new standards has been identified across emerging cross-sector PNT service domains, including:

- Digital PNT records by location with respect to timing for;
  - Living things (human being, animal, livestock, pet, etc.): Throughout their lifetime from origin to destination while moving in a certain amount of time
  - Non-living things (transport means, goods, infrastructure and facilities, etc.): Throughout their lifecycle (from the time of being manufactured/constructed to time of being disused/junked/demolished).
- PNT Service Levels for;
  - Location accuracy: milli/centimetre (or feet), meter, decameter, hectometer, kilometer (or mile)
  - Timing accuracy: nano/micro/millisecond, second, minute, hour, day, week, month, year
  - Navigation interval: real-time or non-real-time.
- PNT Service Requirements for;
  - Accuracy: Measure of PNT output deviation from truth

- Integrity: Ability of a service to provide timely warnings when the system should not be used for service
- Continuity: Likelihood that the PNT service supports accuracy and integrity requirements for duration of intended operation
- Availability: Fraction of time PNT service is usable (as determined by compliance with accuracy, integrity, and continuity requirements)
- Resistance to interference: privacy and cybersecurity
- Independence: user equipment and ground infrastructure
- Interoperability among PNT-capable systems: Wi-Fi, Bluetooth, and UWB communications
- Information on reliability and safety.

The proposed technical committee will provide a global platform for coordinated cross-sector standardization of PNT services. International coordination through ISO will enable harmonized development of PNT service standards and support global interoperability of PNT-enabled systems. The need for this work has been demonstrated through the ISO Open Consultation process, which involved 46 national standards bodies and approximately 260 experts worldwide.

PNT services can help improve people's lives globally by enabling safer, greener and more efficient management of moving objects, infrastructure and logistics, contributing to several UN Sustainable Development Goals.

**Table 1 Specific Manifestations of the Contribution of PNT Services to the Achievement of the UN SDGs**

| UN SDG                                                                              | Goal Name                               | Contribution                                                                                                                                                                                                                                         |
|-------------------------------------------------------------------------------------|-----------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|   | Affordable and Clean Energy             | PNT technology ensures precise timing for smart grids, enhancing energy distribution efficiency, reducing losses, and improving reliability. It also optimizes transportation routes, cutting fuel consumption and emissions.                        |
|  | Industry, Innovation and Infrastructure | PNT technology improves construction precision, supports infrastructure management with reliable data, and facilitates smart cities and innovative technologies. It is also vital for autonomous vehicles, providing precise navigation, and timing. |
|  | Sustainable Cities and Communities      | PNT services enhance urban planning with accurate geographic data, support public transportation through real-time tracking and route optimization, and reduce traffic congestion and pollution with smart traffic management.                       |
|  | Climate Action                          | PNT technology aids in environmental monitoring, improves disaster preparedness with accurate location data and real-time coordination, and lowers greenhouse gas emissions by optimizing transportation.                                            |
|  | Life below Water                        | PNT technology improves conservation and sustainable utilization of the oceans, seas and marine resources for sustainable development.                                                                                                               |
|  | Life on Land                            | PNT services improve monitoring of forests and wildlife, enhance land use planning, and support natural resource management with precise location-based data for conservation efforts.                                                               |

**PROPOSED INITIAL PROGRAMME OF WORK** (Please use the field immediately below or attach an annex)

Please see the [ISO/IEC Directives, Part 1, Annex C.4.4 and C-4.5](#))

For each item, the initial work programme shall define the deliverable type and target dates. The initial work programme shall also assign priorities to the different items.

The potential new work items are proposed as a recommendation to initiate the TC for PNT services.

1. PNT services architecture and terminology
  - This defines the overall conceptual structure and framework for Positioning, Navigation, and Timing (PNT) services.
  - It also includes the definition of terminology, ontology, and related concepts and policies for PNT services.
2. PNT services frameworks and governance
  - This defines standardization framework for a wide range of PNT services.
  - The focus may include generic service frameworks, data models, information exchange mechanisms and service interfaces applicable across multiple sectors.
3. PNT data monitoring and validation framework
  - Methods for monitoring PNT data quality
  - Detection of interference (jamming, spoofing)
  - Service-level integrity assurance

Proposed TARGET dates for key milestones

- Circulation of 1<sup>st</sup> Working Draft to experts: 2027-04-01
- Committee Draft consultation: 2028-04-30
- DIS submission: 2029-04-30
- Publication: 2030-04-30

Moreover, the following work items are to be considered as the additional proposals to facilitate the TC.

- PNT services data models and interoperability
- PNT services performance, integrity and reliability
- Service resilience, integrity assurance and trustworthiness of PNT services
- Cross-sector applications of PNT services

The implementation of PNT services in real life is not a single system, but a “system of systems”, i.e. a network of interoperable, managed, and certified domains that interact across all industrial and social boundaries.

The effective operationalization of PNT services standards requires implementation through interdependent functional layers that bridge technology and real-world practice, aligning them with market-oriented needs. This approach ensures that international standards not only enable interoperability and trust but also deliver tangible economic and societal value. The following market needs correspond to the functional domains of PNT services, illustrating how governments, industries, and communities can leverage standardized ecosystems to drive innovation, competitiveness, and sustainable growth. The following examples illustrate possible domains of future standardization activities and are provided for explanatory purposes:

- PNT infrastructure and facilities (PNT I&F): Physical systems that generate, transmit, and support PNT information
- PNT monitoring and sensing (PNT M&S): Detection, analysis, and assurance of PNT data and the environment
- PNT devices and equipment (PNT D&E): User hardware that receives, processes, and utilizes PNT information

- PNT recording and computing (PNT R&C): Software, algorithms, and data handling for PNT services
- PNT networking and communications (PNT N&C): Transmission, networking, and distribution of PNT information
- PNT certification and management (PNT C&M): Policies, standards, privacy, and security frameworks ensuring trusted PNT services
- AI-enabled PNT services (AI PNT): Application of AI to enhance PNT services performance, resilience, and security

## RELATION OF THE PROPOSAL TO EXISTING INTERNATIONAL STANDARDS AND ON-GOING STANDARDIZATION WORK

- ☒ The proposer has checked whether the proposed scope of the new committee overlaps with the scope of any existing ISO or IEC committee or JTC1 sub-committee
- ☐ If an overlap or the potential for overlap is identified, the affected committee has been informed and an agreement has been reached between proposer and committee on
- i. modification/restriction of the scope of the proposal to avoid overlapping (Annex B),
- ☐ If agreement with the existing committee has not been reached, please explain why the proposal should be approved.

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- ☐ Have proposals on this subject been submitted into an existing committee and rejected? If so, what were the reasons for rejection?

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## LISTING OF RELEVANT DOCUMENTS (SUCH AS STANDARDS AND REGULATIONS) AT INTERNATIONAL, REGIONAL AND NATIONAL LEVEL

(Please see the [ISO/IEC Directives, Part 1, Annex C, Clause C.4.6](#))

The project relates to existing international standards by addressing similar foundational principles. However, this project is to encompass standardization for PNT services that can be applicable to a wide range of moving objects and infrastructures across multiple sectors globally. The outlined the key aspects that differentiate it from existing standards are as shown below:

**Table 2: Relevant standards with PNT**

| Relevant standards                                                                         | Relation and/or differentiation of our project                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
|--------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| IEEE P1952, Standard for Resilient Positioning, Navigation and Timing (PNT) User Equipment | <p>This standard defines different levels of resilience for PNT user equipment. This enables users to select PNT equipment with appropriate resilience based on their risk tolerance, budget, and application criticality.</p> <p>While there are overlapping aspects in terms of the standard's focus from the user's point of view, our project focuses more on PNT services rather than user equipment. This approach provides a more service-specific standard that can support a broader range of PNT services. Our project can be applied not only to user equipment but also to the wider range of stakeholders listed in the section above.</p> |
| NIST IR 8323 Rev. 1, Foundational PNT Profile:                                             | This standard focuses on integrating cybersecurity with PNT services, emphasizing the responsible use of PNT through the application of a                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |

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| Applying the Cybersecurity Framework for the Responsible Use of PNT Services                                                                                                               | <p>cybersecurity framework. It is particularly strong in addressing the security aspects of PNT.</p> <p>Our project, which focuses on standards for PNT services for a wide range of moving objects and infrastructures across multiple sectors, could expand on this by incorporating not only cybersecurity but also other crucial aspects for PNT services, such as accuracy, integrity, continuity, reliability, and resilience across various applications beyond cybersecurity.</p>                                                                                                                                                                                           |
| ISO/AWI 22090-3, Ships and marine technology — Transmitting heading devices (THDs) — Part 3: GNSS principles                                                                               | <p>This standard is specific to GNSS principles in the context of transmitting heading devices for marine technology.</p> <p>The new standards could extend to cover a wider range of industries and applications, not just marine, ensuring a more comprehensive approach to PNT services that includes terrestrial and aerial navigation for moving objects.</p>                                                                                                                                                                                                                                                                                                                  |
| ISO/AWI 25082-1, Space systems — Assessment of GNSS-based positioning systems — Part 1: Definitions and system engineering procedures for the establishment and assessment of performances | <p>This standard covers the assessment of positioning system performances equipped with a given GNSS-based positioning terminal, with or without external augmentation data (SBAS, RTK, PPP, etc.). However, values of performance metrics for specific application certifications (such as autonomous guidance systems, road user charging applications, etc.) are not provided; only a template for application fields is given.</p> <p>Building on these standards, the linking system performances to various PNT services for a wide range of moving objects and infrastructures across multiple sectors are suggested to encourage the widespread use of PNT information.</p> |
| ISO 17438 series, Intelligent transport systems — Indoor navigation for personal and vehicle ITS stations                                                                                  | <p>These standards address indoor navigation for intelligent transport systems, including requirements and specifications of indoor map, indoor references for indoor positioning, and service interfaces. Our project could expand to ensure seamless integration between indoor and outdoor PNT services and extend its applications for moving objects across various sectors.</p>                                                                                                                                                                                                                                                                                               |
| ISO 6029 series, Intelligent transport system — Seamless positioning for multimodal transportation in ITS stations                                                                         | <p>These standards address requirements and specifications of interfaces for providing seamless positioning in various environments including indoor and outdoor. Our project could expand to ensure seamless positioning between various applications for moving objects across various sectors.</p>                                                                                                                                                                                                                                                                                                                                                                               |
| ISO 17123-8:2015, Optics and optical instruments — Field procedures for testing geodetic and surveying instruments - Part 8: GNSS field measurement systems in real-time kinematic (RTK)   | <p>This standard specifies field procedures to be adopted when determining and evaluating the precision (repeatability) of Global Navigation Satellite System (GNSS) field measurement systems in real-time kinematic (GNSS RTK) and their ancillary equipment when used in building, surveying, and industrial measurements.</p> <p>It is specialized in surveying-related fields, but we will explore ways to utilize GNSS in various fields, including surveying</p>                                                                                                                                                                                                             |
| ISO 19111: 2019, Geographic information – Referencing by coordinated                                                                                                                       | <p>This standard defines the conceptual schema for the description of referencing by coordinates. It describes the minimum data required to define coordinate reference systems.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| ISO/FDIS 17123-11: GNSS instruments                                                                                                                                                        | <p>This standard specifies a field procedure for the verification that a given Global Navigation Satellite System (GNSS)-based system and measurement procedure meets a required measurement uncertainty at the location and time of interest. It is designed to be applicable to the technically versatile GNSS systems on the market and can be used for any kind of GNSS based coordinate determination application, not only geodetic.</p>                                                                                                                                                                                                                                      |

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| ISO 22086 series, Intelligent transport systems (ITS) — Network-based precise positioning infrastructure for land transportation                                                                                           | These standards specify the functional requirements of nomadic devices for lane-level positioning and integrity monitoring with the network-based precise positioning infrastructure for land transportation. However, techniques and methods which can be different for each provider or vendor are not addressed in this standard. These standards are defining the requirements for precise positioning to increase PNT utilization but does not include a description of the technology that meets the requirements or how to utilize PNT services.                                                                                                                                                                                                                                                                                                                                                                |                |       |                |     |                |         |                |       |                |         |                |      |                |       |                |      |
| ISO/TS 22591:2021 Space systems — Space-based services for a high accuracy positioning system with safety requirements                                                                                                     | This standard specifies requirements and recommendations for space-based systems (using satellite radionavigation) that provide high-accuracy positioning for ground vehicles, particularly for operations requiring enhanced safety in low-visibility conditions. Also includes methods to verify system compliance, along with annexes covering mobile mapping, augmented positioning, and application examples.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                |       |                |     |                |         |                |       |                |         |                |      |                |       |                |      |
| ISO 18197:2015 Space systems — Satellite-based services for centimetre-level positioning                                                                                                                                   | This standard specifies requirements for wide-area, centimetre-level positioning using satellite-based augmentation services. It standardizes service goals and real-time capability.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                |       |                |     |                |         |                |       |                |         |                |      |                |       |                |      |
| ISO 19116:2019 Geographic Information — Positioning Services                                                                                                                                                               | This standard defines a standardized interface, including data structures and content, that enables communication between position-providing devices (e.g., GNSS receivers) and position-using devices (e.g., navigation systems). Its purpose is to ensure that position-using devices can unambiguously interpret position information, assess its reliability, and determine if it meets the needs of a specific application                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                |       |                |     |                |         |                |       |                |         |                |      |                |       |                |      |
| ISO 19161-1: 2020 international terrestrial reference system (ITRS)                                                                                                                                                        | This document provides the basic information and the requirements related to the International Terrestrial Reference System (ITRS), its definition, its realizations and how to access and use these realizations.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                |       |                |     |                |         |                |       |                |         |                |      |                |       |                |      |
| IEC 61108 Series, Maritime navigation and radiocommunication equipment and systems — Global navigation satellite systems (GNSS) — Receiver equipment — Performance standards, methods of testing and required test results | <div>These standards focus on performance standards and testing methods for various types of shipborne GNSS receiver equipment based on the relevant IMO resolution.</div> <table><tr><td>Part 1. (2003)</td><td>GPS</td><td>Part 5. (2020)</td><td>BDS</td></tr><tr><td>Part 2. (1998)</td><td>GLONASS</td><td>Part 6. (2023)</td><td>IRNSS</td></tr><tr><td>Part 3. (2010)</td><td>Galileo</td><td>Part 7. (2024)</td><td>SBAS</td></tr><tr><td>Part 4. (2004)</td><td>DGNSS</td><td>Part 8. (2028)</td><td>QZSS</td></tr></table> <div>While these are relevant to our project in terms of providing performance standards, our proposed standards offer a more comprehensive set of performance standards applicable to various PNT services beyond maritime navigation.</div>                                                                                                                                     | Part 1. (2003) | GPS   | Part 5. (2020) | BDS | Part 2. (1998) | GLONASS | Part 6. (2023) | IRNSS | Part 3. (2010) | Galileo | Part 7. (2024) | SBAS | Part 4. (2004) | DGNSS | Part 8. (2028) | QZSS |
| Part 1. (2003)                                                                                                                                                                                                             | GPS                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | Part 5. (2020) | BDS   |                |     |                |         |                |       |                |         |                |      |                |       |                |      |
| Part 2. (1998)                                                                                                                                                                                                             | GLONASS                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | Part 6. (2023) | IRNSS |                |     |                |         |                |       |                |         |                |      |                |       |                |      |
| Part 3. (2010)                                                                                                                                                                                                             | Galileo                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | Part 7. (2024) | SBAS  |                |     |                |         |                |       |                |         |                |      |                |       |                |      |
| Part 4. (2004)                                                                                                                                                                                                             | DGNSS                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | Part 8. (2028) | QZSS  |                |     |                |         |                |       |                |         |                |      |                |       |                |      |
| International Civil Aviation Organization (ICAO) Standards and Recommended Practices (SARPs) Annex 10 – Aeronautical Telecommunications                                                                                    | <div>ICAO establishes international standards and recommended practices (SARPs) to support PNT services in aviation. SARPs define Standards, which member states must comply with or formally notify ICAO if unable, and Recommended Practices, which are encouraged but not mandatory. Annex 10 – Aeronautical Telecommunications includes standards related to PNT services, covering GNSS performance requirements, integrity monitoring, and interoperability between aircraft and ground infrastructure. It also specifies standards for SBAS and Ground-based Augmentation System (GBAS), including operational procedures and performance requirements, ensuring reliable PNT services in aviation.</div> <div>This is a practical example of standardizing PNT services in the aviation industry. Our project could further extend the standardization of PNT services to a wider range of applications.</div> |                |       |                |     |                |         |                |       |                |         |                |      |                |       |                |      |

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| SAE1014, Standard for Interfacing Resilient GNSS Receivers                                                                                         | <p>This standard defines how a resilient GNSS receiver provides enough information for an alternative PNT source to be selected when the GNSS receiver does not meet the required levels of accuracy, availability, integrity, or continuity even when the GNSS signals are subject to interference.</p> <p>We are not going to define when the environment of PNT services is not smooth. Therefore, it will be a good example for creating much smoother PNT utilization environment for standardizing PNT services.</p> |
| SAE1027, Standard for Interfacing Resilient GNSS Receivers                                                                                         | <p>This standard establishes the minimum navigation system performance requirements for UAS operation within a specific use case.</p> <p>We will define the performance requirements according to the PNT service utilization plan in various fields of daily life including UAS. We may refer to the relevant standards in defining performance for UAS and its similar fields.</p>                                                                                                                                       |
| RTCA DO-229, Minimum Operational Performance Standards (MOPS) for Global Positioning System/Satellite-Based Augmentation System Airborne Equipment | <p>This standard contains Minimum Operational Performance Standards (MOPS) for airborne navigation equipment (2D and 3D) using the Global Positioning System (GPS) augmented by Satellite-Based Augmentation Systems (SBAS).</p> <p>While this standard is relevant to our project in terms of providing performance standards, our proposed standards could expand other GNSS systems beyond GPS. Furthermore, our standards are not stuck to SBAS and PNT services of airborne navigation.</p>                           |
| RTCA DO-253, Minimum Operational Performance Standards for GPS Local Area Augmentation System Airborne Equipment                                   | <p>This standard contains minimum operational performance standards (MOPS) for airborne navigation equipment using the Global Positioning System (GPS) augmented by the Local Area Augmentation System (LAAS).</p> <p>While this standard is relevant to our project in terms of providing performance standards, our proposed standards could expand other GNSS systems beyond GPS. Furthermore, our standards are not stuck to LAAS and PNT services of airborne navigation.</p>                                         |
| IMO Resolution MSC.401(95) - Performance Standards For Multi-System Shipborne Radionavigation Receivers                                            | <p>This standard defines the performance criteria for navigation receivers that support multi-GNSS installed on ships.</p> <p>While this standard is relevant to our project in terms of providing performance standards, our proposed standard defines for PNT services in various fields that are not specific to ship-related fields.</p>                                                                                                                                                                               |
| IMO Resolution A.1046(27) – Worldwide Radionavigation System                                                                                       | <p>The standards support safe navigation of ships by establishing standards (utilized equipment, accuracy, etc.) for wireless navigation systems that are used worldwide.</p> <p>On the other side, our standards define standards not only for the ship sector, but also for various areas of everyday life.</p>                                                                                                                                                                                                          |
| ITU-R recommendations related to GNSS; for example, ITU-R M.1318, M.1787, M.1901, M.1902, M.1904, M.1905, M.1906, M.2030, and M.2031               | <p>These standards specify a continuous interference model, system descriptions and parameters, high-level guidance/mapping, receiver protection in respective sub-bands, feeder-link space/earth station protection, pulsed interference model, and feeder-link protection in the adjacent band.</p>                                                                                                                                                                                                                      |
| EUROCAE ED-282 E-identification for UA Drone Remote ID (Europe)                                                                                    | <p>This standard specifies the minimum performance required for e-identification (Remote ID) systems in unmanned aircraft (UAS). It ensures UAS and their remote pilot stations can reliably broadcast surveillance data to other UAS and U-space/UTM services during routine operations</p>                                                                                                                                                                                                                               |
| ASTM F3411 Remote ID for UAS, for UAS identification based on PNT based services                                                                   | <p>This standard defines performance requirements for Remote Identification (Remote ID) of unmanned aircraft systems (UAS),</p>                                                                                                                                                                                                                                                                                                                                                                                            |

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|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                                                                                                                                                                                                                         | enabling government and public tracking for safety, security, and compliance while preserving pilot privacy.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| ISO 12188-2: 2012 Tractors and machinery for agriculture and forestry — Test procedures for positioning and guidance systems in agriculture - Part 2: Testing of satellite-based auto-guidance systems during straight and level travel | This standard specifies the process for evaluating and reporting the performance of agricultural vehicles equipped with automated guidance systems based on a global navigation satellite system (GNSS) when operating in an automatic steering mode. The main performance criterion is the lateral deviation of a representative point on the vehicle from a desired trajectory for that point.                                                                                                                                                                                                                                                                                           |
| CEN EN 16803 Space - Use of GNSS-based positioning for road Intelligent Transport Systems (ITS                                                                                                                                          | <p>This standard addresses the final stage of the performance management approach, i.e. the assessment of the whole Road ITS system performance equipped with a given Positioning System, using the Sensitivity analysis method. It addresses the identification and the definition the positioning performance features and metrics required for Positioning System assessment.</p> <p><u>Part-1</u>: Definitions and system engineering procedures for the establishment and assessment of performances, <u>Part-2</u>: Assessment of basic performances of GNSS-based positioning terminals, <u>Part-3</u>: Assessment of security performances of GNSS-based positioning terminals</p> |
| ISO/TC 204: Intelligent transport systems                                                                                                                                                                                               | <p>This committee focuses ITS applications and operational systems.</p> <p>The proposed PNT Services committee provides generic cross-sector service frameworks.</p> <p>Excluded from the scope are transport-domain ITS applications, operational architectures, traveller information services, cooperative ITS communications, mobility integration services, probe-data systems and ITS station architectures that are within the scope of ISO/TC 204.</p>                                                                                                                                                                                                                             |
| ISO/TC 211: Geographic information/Geomatics                                                                                                                                                                                            | <p>This committee focuses geographic information and geomatics.</p> <p>The proposed PNT Services committee focuses on service-level interoperability, integrity, resilience and governance of PNT services and does not address geographic information standards, coordinate reference systems, spatial data infrastructures or geomatics.</p>                                                                                                                                                                                                                                                                                                                                             |
| ISO/TC 172/SC 6: Geodetic and surveying instruments                                                                                                                                                                                     | <p>This committee focuses instruments, GNSS receivers and surveying equipment.</p> <p>The proposed PNT Services committee focuses on services and service ecosystems.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| ISO/TC 20/SC 14: Space systems and operations                                                                                                                                                                                           | <p>This committee focuses space systems and operations.</p> <p>The proposed PNT Services committee focuses on service utilization rather than satellite infrastructure.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| ISO/TC 23/SC 19: Agricultural electronics                                                                                                                                                                                               | <p>This committee focuses agricultural machinery, tractor guidance systems, machine control systems, precision agriculture applications, agricultural operational procedures.</p> <p>The proposed PNT Services committee addresses generic service-level capabilities, interoperability, integrity, resilience and performance requirements of PNT services rather than equipment specifications, machinery guidance functions, in-field communications, cybersecurity requirements or agricultural operational applications.</p>                                                                                                                                                          |

## **LISTING OF RELEVANT COUNTRIES WHERE THE SUBJECT OF THE PROPOSAL IS IMPORTANT TO THEIR NATIONAL COMMERCIAL INTERESTS**

(Please see the [ISO/IEC Directives, Part 1, Annex C, Clause C.4.8](#))

The broad participation of 46 national standards bodies and approximately 260 experts demonstrates significant global interest and market relevance for international standardization of PNT services during the ISO Open Consultation process for PNT Services in 2025.

Rep. of Korea, Australia, Austria, Brazil, Bulgaria, Canada, China, Colombia, Dominican Republic, Egypt, Eswatini, France, Georgia, Germany, Ghana, Indonesia, Iran, Italy, Jamaica, Japan, Jordan, Kenya, Macedonia, Mongolia, Pakistan, Poland, Romania, Russia, Rwanda, Saudi Arabia, Senegal, Singapore, Slovakia, South Africa, South Sudan, Spain, Swaziland, Sweden, Switzerland, Thailand, Uganda, United Kingdom, USA, Zambia, Zimbabwe, etc.

## **LISTING OF RELEVANT EXTERNAL INTERNATIONAL ORGANIZATIONS OR INTERNAL PARTIES (OTHER THAN ISO AND/OR IEC COMMITTEES) TO BE ENGAGED AS LIASONS IN THIS WORK**

(Please see the [ISO/IEC Directives, Part 1, Clause C.4.9](#))

There are several standards related to positioning, navigation and timing (PNT), which are developed in various committees, such as:

- ISO/TC 8/SC 6: Navigation and ship operations
- ISO/TC 20/SC 14: Space systems and operations
- ISO/TC 22: Road vehicles
- ISO/TC 23/SC 19: Agricultural electronics
- ISO/TC 113/SC 5: Instruments, equipment and data management
- ISO/TC 172/SC 6: Geodetic and surveying instruments
- ISO/TC 204: Intelligent transport systems
- ISO/TC 211: Geographic information/Geomatics
- [ISO/IEC JTC 1/SC 6: Telecommunications and information exchange between systems](#)
- [ISO/IEC JTC 1/SC 27: IT Security techniques](#)
- [ISO/IEC JTC 1/SC 32: Data management and interchange](#)
- [ISO/IEC JTC 1/SC 38: Cloud Computing and Distributed Platforms](#)
- [ISO/IEC JTC 1/SC 41: Internet of Things and Digital Twin](#)
- [ISO/IEC JTC 1/SC 42: Artificial Intelligence](#)
- IEC/TC 80: Maritime navigation and radiocommunication equipment and systems
- [IEC/TC 100: Audio, video and multimedia systems and equipment](#)

A few sectors in the world have also addressed the topic with various standardization activities, e.g. International Electrotechnical Commission (IEC), International Telecommunication Union (ITU), United Nations International Committee on GNSS (UN ICG), European Union Agency for the Space Programme (EUSPA), Civil GPS Service Interface Committee (CGSIC), European Position Determination System (EUPOS), European Organization for Civil Aviation Equipment (EUROCAE), International Association of Geodesy (IAG), International Cartographic Association (ICA), International GNSS Service (IGS), International Earth Rotation and Reference Systems Service (IERS), International Society for Photogrammetry and Remote Sensing (ISPRS), International Civil Aviation Organization (ICAO), Open Geospatial Consortium (OGC), International Maritime Organization (IMO), Society of Automotive Engineers (SAE International), Institute of Navigation (ION), Radio Technical Commission for Aeronautics (RTCA), Early Warning System (EWS) in World Meteorological Organization (WMO), National Marine Electronics Association (NMEA), Radio Technical Commission for Maritime Services (RTCM), American Society for Testing and Materials (ASTM), UN Global Geodetic Centre of Excellence (UN-GGCE), International Hydrographic Organization (IHO), UN Global Geospatial Information Management (UN-GGIM), Royal Institution of Chartered Surveyors (RICS), etc.

## **IDENTIFICATION AND DESCRIPTION OF RELEVANT AFFECTED STAKEHOLDER CATEGORIES**

(Please see [ISO Connect](#))

| Stakeholder Group                      | Examples                                                                             | Description                                                                                                                                               |
|----------------------------------------|--------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------|
| Industry and commerce – large industry | Automotive manufacturers                                                             | Use PNT data to optimize supply chain logistics, reducing costs and emissions.<br>Implement PNT services to guarantee safe and secure automated vehicles. |
| Industry and commerce – SMEs           | Small agricultural businesses                                                        | Employ PNT services for precision farming to increase yields and resource efficiency                                                                      |
| Government (different levels)          | National transportation agencies                                                     | Implement PNT-based traffic management to reduce congestion and improve public transport                                                                  |
| Consumers                              | Individual drivers                                                                   | Use PNT-enabled navigation apps to find efficient routes and reduce travel time                                                                           |
| Labour                                 | Delivery drivers                                                                     | Benefit from optimized delivery routes through PNT data, enhancing job efficiency and safety                                                              |
| Academic and research bodies           | Universities                                                                         | Conduct research on PNT technologies to improve environmental sustainability                                                                              |
| Standards application businesses       | Standards development organizations                                                  | Develop and maintain standards for the reliable and safe use of PNT technologies                                                                          |
| Non-governmental organizations         | Environmental NGOs                                                                   | Advocate for the adoption of PNT technologies in urban planning to lower emissions                                                                        |
| Public safety organizations            | Emergency services, such as search and rescue (SAR missions), health, security, etc. | Use PNT data to improve the efficiency and effectiveness of disaster response operations                                                                  |
| PNT industry and providers             | GNSS equipment manufacturers<br>GNSS service providers                               | Develop and deliver PNT technologies and services that ensure accurate and reliable information for various applications                                  |

## EXPRESSION OF LEADERSHIP COMMITMENT FROM THE PROPOSER

(Please see the [ISO/IEC Directives, Part 1, Annex C, Clause C.4.12](#))

If the proposal is accepted, KATS is willing to undertake the work of secretariat of the new TC, and is committed to providing all resources to successfully run the secretariat.

☒ **The proposer confirms that this proposal has been drafted in compliance with ISO/IEC directives, part 1, annex c**

## SIGNATURE OF THE PROPOSER

KATS

## COMMENTS OF THE ISO CENTRAL OFFICE (IF ANY)

Click or tap here to enter text.