**Department of Commerce (DOC) Fiscal Year 2024 Agency Report**

1. **Please provide a summary of your agency's activities undertaken to carry out the provisions of OMB Circular A-119, "Federal Participation in the Development and Use of Voluntary Consensus Standards and in Conformity Assessment Activities" and the National Technology Transfer and Advancement Act (NTTAA). The summary should contain a link to the agency's standards-specific website(s) where information about your agency's standards and conformity assessment related activities are available.**

The Department of Commerce's (DOC) mission is to create the conditions for economic growth and opportunity for all communities. Through its 13 bureaus, DOC works to drive the United States (U.S.) economic competitiveness, strengthen domestic industry, and spur the growth of quality jobs in all communities across the country. DOC serves as the voice of business in the Federal Government, and at the same time, touches and serves every American every day. DOC fosters the innovation and invention that underpin the U.S. competitive advantage. Its scientists and engineers research emerging technologies and actively provide their knowledge to the voluntary standards development process. Data collected and analyzed by DOC is used by federal and local governments as well as by businesses. Companies benefit from DOC laboratories in conducting research and development (R&D) and in scientific and technical leadership. DOC advances R&D across several critical and emerging technology areas and uses intellectual property (IP) protections to ensure American innovators profit from their work. Together with other branches of DOC, the five branches listed in this report support the strategic goals of enhancing U.S. leadership, accelerating job creation, strengthening U.S. economic and national security, fulfilling constitutional requirements, and delivering excellent customer service. The following report compiles information about how these organizations used their engagement in voluntary consensus standards and conformity assessment activities during FY2024 to support these critical mission areas in fulfillment of the Office of Management and Budget (OMB) and the National Technology Transfer and Advancement Act (NTTAA) reporting requirements.

**The U.S. Census Bureau (Census Bureau)**

The Census Bureau applies voluntary consensus standards from organizations such as the International Organization for Standardization (ISO), the American National Standards Institute (ANSI), the Open Geospatial Consortium (OGC), and the Federal Geographic Data Committee (FGDC) to all Census Bureau statistical surveys, economic analysis, geographic programs, and products.

The 2024 Census Bureau geographic products include TIGER/Line shapefiles for the most current administrative, legal, and statistical boundaries and names collected by the Census Bureau. These include boundaries for American Indian Areas, States, Counties, Minor Civil Divisions, Incorporated Places, Urban Areas, Congressional Districts, State Legislative Districts, and other geographic areas. Harvesting the metadata to the GeoPlatform.gov and Data.gov using ISO metadata standards is a requirement of the Geospatial Data Act (GDA) of 2018 for the Census Bureau's National Geospatial Data Asset (NGDA) datasets.

Standards Development and Policies: In 2024, the following activities exemplified the Census Bureau's direct application of standards policies, membership in standards bodies, ISO standards licensing, and continued development of voluntary consensus standards to implement within the GSP and its geospatial data products.

1. The Census Bureau continues to provide leadership to the United Nations Committee of Experts on Global Geospatial Information Management (UN-GGIM), helping to promote innovation, leadership, frameworks, and partnerships to enhance geospatial information management globally. The Census Bureau is the appointed Chair of the full UN-GGIM Committee of Experts (along with Belgium and Cote d'Ivoire), Head of the U.S. Delegation to the UN-GGIM, and Co-Chair for the High-level Group on the Integrated Geospatial Information Framework (IGIF). The IGIF guides country-specific action plans for policies, development, endorsement, adoption, implementation, and/or use of standards to facilitate the interoperability of geospatial information. The IGIF published the *UN-IGIF Part 2 Implementation Guide* with specific guidance, options, and actions for each of the nine strategic pathways, including standards. In addition, *A Guide to the Role of Standards in Geospatial Information Management* is available online to increase awareness of the benefits of a standards-based approach to geospatial data management to contribute to innovation, new technologies, and data sources to support the Sustainable Development Goals (SDGs).
2. The Census Bureau co-leads the Commerce Geospatial Working Group (CGWG), which provides monthly updates to the DOC's Data Governance Board on key Commerce Geospatial Strategic Action Plan milestones and accomplishments. These often refer to open international standards, standards initiatives, metadata standards implementation, and standards development to support enhanced interoperability and equitable access to all DOC geospatial data users.
3. The Census Bureau co-leads the Commerce Geospatial Standards Users' Group (CGSUG) which continued to leverage geospatial expertise and innovation in standards in FY24. This group met quarterly to raise awareness of critical geospatial topics standards-related activities. The CGSUG has developed an agency repository to hold supporting metadata and standards research and meeting documentation, complied with voluntary consensus standards requirements, collaborated with the OGC, and participated in discussions on best practices for metadata standards and the FGDC endorsement process. DOC members of the CGSUG also participated in the FGDC Executive Committee's Standards Task Team to establish the FGDC standards endorsement process and were later nominated to the newly formed FGDC Standards Working Group.
4. Census Bureau staff participate in geospatial standards development through the International Committee for Information Technology Standards (INCITS) Technical Committee GIS - Geographic Information Systems (INCITS-GIS) and the U.S. Technical Advisory Group to the ISO Technical Committee 211 Geographic Information/Geomatics (TC 211).
5. The Census Bureau's NGDA datasets represent a portfolio of geospatial datasets derived from the MAF/TIGER System. The Census Bureau's TIGER/Line shapefiles for

these NGDA datasets are accessible to the public and discoverable on Census.gov, GeoPlatform.gov, and Data.gov. Each year, over 33,000 metadata files representing the Census Bureau's NGDA datasets are harvested to these open data portals, adhere to FAIR principles (Findable, Accessible, Interoperable, Reusable), and utilize ISO metadata standards (listed below in item 6).

6. The Census Bureau submitted responses to the FGDC for the upcoming 2025 update to the NGDA Baseline Standards Inventory Survey (NBSI) and identified fourteen (14) critical ISO standards and their amendments applied to the NGDA datasets in the FGDC's Governmental Units and Administrative and Statistical Boundaries Theme portfolio. The Census Bureau maintains annual subscriptions to these and multiple standards from the ANSI. The Census Bureau staff accesses all licensed ISO standards from the Standards Connect portal provided by ANSI. The following ISO standards and amendments were documented in FY24 for the NBSI update and added to the Governmental Units Geospatial Standards page on the Governmental Units Theme community hub site on the GeoPlatform:

- **INCITS 31-2009 (R2019)** Information Technology - Codes for the Identification of Counties and Equivalent Areas of the United States, Puerto Rico, and the Insular Areas
- **INCITS 38-2009 (R2019)** Information Technology - Codes for the Identification of the States and Equivalent Areas within the United States, Puerto Rico, and the Insular Areas
- **INCITS 446-2008 (R2018)** Information Technology - Identifying Attributes for Named Physical and Cultural Geographic Features (Except Roads and Highways) of the United States, Territories, Outlying Areas, and Freely Associated Areas, and the Waters of the Same to the Limit of the Twelve-Mile Statutory Zone
- **INCITS 454-2009 (R2019**) Information Technology - Codes for the Identification of Metropolitan and Micropolitan Statistical Areas and Related Statistical Areas of the United States and Puerto Rico; For the following NGDAIDs only:
- **INCITS 455-2009 (R2019)** Information Technology - Codes for the Identification of Congressional Districts and Equivalent Areas of the United States, Puerto Rico, and the Insular Areas; For the following NGDAIDs only:
- **ISO 19103:2015 (R2022)** Geographic information - Conceptual schema language
- **ISO 19107:2019 (2023)** Geographic information - Spatial schema
- **ISO 19108:2002 (R2013)** Geographic information - Temporal schema
  - **ISO 19108/Cor1:2006 (R2020)** Geographic Information – Technical Corrigendum 1
- **INCITS/ISO 19110:2016 (2018)** Geographic information -- Methodology for feature cataloging
- **INCITS/ISO 19111:2019 (2020)** Geographic Information - Referencing by Coordinates
  - **INCITS/ISO 19111:2019/AM1:2021 (2022)** Geographic information - Referencing by coordinates - Amendment 1

- **ISO 19115-2:2009** Geographic information - Metadata - Part 2: Extensions for imagery and gridded data
  - **INCITS/ISO 19115-2:2019/AM1:2022 (2022)** Geographic information – Metadata – Part 2: Extensions for acquisition and processing - Amendment 1.
- **ISO 19136-1:2020** Geographic information - Geography Markup Language (GML) - Part 1: Fundamentals
- **INCITS/ISO/TS 19139-2:2012 (2017)** Geographic information - Metadata - XML schema implementation - Part 2: Extensions for imagery and gridded data
- **INCITS/ISO 19157:2013 (R2019**) Geographic information - Data quality
  INCITS/ISO 19157:2013/AM 1:2018 (2020) Geographic information — Data quality — Amendment 1: Describing data quality using coverages

7. The following FGDC Standards have been evaluated for the thirty-one (31) Census Bureau NGDA Datasets within the Transportation Theme, Governmental Units, and Administrative and Statistical Boundaries Theme portfolios in accordance with the Geographic Information Framework Data Standard established by the FGDC. The FGDC initially developed these standards through the Geospatial One-Stop e-Government initiative.
   - Geospatial Positioning Accuracy Standards Part 3: National Standard for Spatial Data Accuracy FGDC-STD-007.3-1998, https://www.fgdc.gov/standards/projects/FGDCstandards-projects/accuracy/part3/chapter3.
   - United States Thoroughfare, Landmark, and Postal Address Data Standard, FGDCSTD-016-2011, https://www.fgdc.gov/standards/projects/address-data.

**International Trade Administration (ITA)**

ITA strengthens the competitiveness of U.S. industry, promotes trade and investment, and ensures fair trade through the support of rigorous enforcement of U.S. trade laws and agreements. Through its participation on U.S. delegations addressing global standards development and trade-related standards issues, ITA works to improve the global business environment and helps U.S. organizations compete at home and abroad.

In FY2024, ITA participated in a variety of international standards activities, including standards development, policy dialogues, and capacity building efforts. ITA experts participated in the International Electrotechnical Commission (IEC) Systems Committee for Smart Manufacturing, International Organization for Standardization (ISO)/ Technical Committee (TC) 199 on Safety and Machinery, TC 313 on Packaging Machinery, and TC 347 on Data-driven agrifood systems through ITA's Market Development Cooperator Program (MDCP).

Continued U.S. leadership in these forums is required to overcome efforts by non-likeminded countries -- which include both China and the European Union (EU) -- to advance their national interests, sometimes resulting in barriers to trade for U.S. companies. For example, the Standardization Administration of China (SAC) proposed two new areas of work in ISO committees which presented potential economic or national security challenges for the U.S. One of the areas related to the development of standards for ports and terminals and the other for express

services. In both instances, stakeholders expressed concern and engaged with ITA to work with the American National Standards Institute (ANSI), the U.S. representative to ISO, to oppose the measures, or to otherwise shape them so as to reduce the potential negative effects on U.S. industry.

ITA regularly notifies relevant U.S. stakeholders about opportunities to participate in new standards development activities that might have trade implications with the aim of preventing future market access issues for U.S. exporters. In FY2024 ITA worked with NIST, the National Telecommunications and Information Administration (NTIA), and the Department of State to produce a monthly newsletter highlighting international standards development activities in critical and emerging areas where U.S. engagement could support U.S. industry.
In FY2024 ITA worked on standards projects in the Asia-Pacific Economic Cooperation (APEC) forum and the Association of Southeast Asian Nations (ASEAN) in areas including digitization of standards, cybersecurity, autonomous and electric vehicles, and conformity assessment. ITA engaged on standards issues with the ASEAN Consultative Committee on Standards and Quality (ACCSQ), including by organizing workshops and discussions on advanced manufacturing and Artificial Intelligence (AI) standards. ITA also participated in work on standards for critical and emerging technologies through the Quad (Australia, India, Japan, and U.S.) in areas including AI and advanced communications.

ITA participated in ongoing bilateral engagement on standards issues with various trading partners including through the U.S.-Brazil Commercial Dialogue, and the U.S.- European Union (EU) Trade and Technology Council (TTC), among others. ITA maintained Standards Attaché postings in Beijing, Brussels, Johannesburg, Mexico City, Riyadh, and Sao Paulo, and coordinates regular communications between the Attaches and interested Department of Commerce components.

ITA staff serve as part of the U.S. delegation headed by the Office of the U.S. Trade Representative (USTR) to the World Trade Organization's (WTO's) Committee on Technical Barriers to Trade (TBT) that addresses specific standards-related trade concerns. ITA supported USTR in pursuing standards and conformity assessment-related trade concerns on the floor of the WTO TBT Committee against a number of countries in FY2024, including but not limited to China, India, and the European Union. During FY2024, ITA participated as part of the U.S. delegations for Trade and Investment Framework Agreements (TIFA) with Saudi Arabia, Argentina, and in collaborative discussions with Kenya on standards as part of the Strategic Trade and Investment Partnership (STIP).

Finally, ITA co-manages the Industry Trade Advisory Committee on Standards and Technical Trade Barriers (ITAC 15) with USTR which provides input to the Secretary of Commerce and the Trade Representative on standards-related policy and trade matters.

**National Institute of Standards and Technology (NIST)**

NIST's mission is to promote U.S. innovation and industrial competitiveness by advancing measurement science, standards, and technology in ways that enhance economic security and

improve quality of life. NIST champions the United States' industry-led, market-driven, and voluntary approach to international standards development, securing American companies as leaders in the global marketplace, stimulating American economic prosperity and global trade, and catalyzing U.S. leadership in the industries of the future. NIST leverages its unique research and standards expertise to work with the private sector to advance American strength and agility in international standards development, especially within sectors of national importance. NIST's activities in several high-priority areas address practical aspects of critical and emerging technologies and fundamental research. As the nation's premier laboratory, NIST is poised to work with industry at every step to support U.S. manufacturing and technological capacity in critical and emerging technologies (CETs), including artificial intelligence (AI), quantum technology, biotechnology, semiconductors, and next-generation communications.

*Standards Coordination Activities*

As specified in the NTTAA, in authorizing legislation, and in OMB Circular A-119, NIST, through its Standards Coordination Office (SCO), assists and guides federal agencies in leveraging voluntary consensus standards and private sector conformity assessment mechanisms in their programs, procurement, and regulatory activities. NIST chairs the Interagency Committee on Standards Policy (ICSP) and works closely with federal agencies to reduce unnecessary duplication and complexity in standards and conformity assessment practices. Formally chartered working groups of the ICSP include the following four areas: Advanced Communications Technologies, Artificial Intelligence, Conformity Assessment and Semiconductors and Microelectronics. In FY24 NIST developed and launched an interagency standardization portal for USG staff providing a mechanism to share best practices and track USG participation in standards developing committees. SCO provides consultation and advice to other federal agencies in implementing conformity assessment programs, including providing support to the development of the Build America Buy America program. SCO also hosts www.Standards.gov to serve as a standards and conformity assessment related resource for federal agencies, industry, and the public. In FY24, SCO provided standards and conformity assessment training to 1,045 federal employees, including its annual Standards Boot Camp offering to a cohort of 15 federal employees.

*Leadership and Participation in International Standards*

The Department of Commerce is committed to working with Interagency partners to champion the private sector-driven standards ecosystem to ensure transition of best practices to international standards. NIST and NTIA continue to participate in collaborations like the Alliance for Telecommunications Industry Solutions (ATIS) NextG Alliance, which facilitates consensus building, promotes U.S. leadership, and expedites the development of 5G and 6G standards. NTIA serves as the U.S. Government coordinator for 3GPP, meeting with industry and Interagency partners to address new and enhanced services, features, and capabilities for 5G and 6G. NIST leads the NextG Channel Model Alliance, a public-private partnership that promotes the development of wireless measurement and methods to expedite the development of next generation wireless communications standards. NIST's measurements and evaluation methods are used to

accelerate the development of secure and robust 5G/6G standard specifications in several 3GPP working groups. NIST's cryptographic standards are leveraged within 3GPP's 5G standards, and the NIST Post-Quantum Cryptography (PQC) standards are expected to form the foundation for secure and resilient 6G.

Both NIST and NTIA are members of the Open Radio Access Network (O-RAN) Alliance where NIST's contributions enhance the quality and utility of product testing specifications and NTIA advances commercialization for 5G and 6G. NIST works to integrate zero trust security principles throughout the Radio Access Network (RAN) standards and develop standards that enable the use of RAN intelligent control for improved resilience. NTIA leads a U.S. government effort for referencing O-RAN Alliance standards within 3GPP, a decision which would mainstream O-RAN and help establish it as the default configuration for 6G RAN.

*5G/6G and Network Security*

NIST contributes to 5G/6G standards development organizations to improve the security and resilience of 5G/6G mobile networks. NIST wireless measurements, evaluation, and testing methods accelerate the development of secure and robust 5G/6G standard specifications in several 3GPP RAN and CT working groups. NIST's contributions to RAN1 have led to enhancements of the TR38.901 channel models to evaluate new capabilities under consideration for 5G advanced and 6G specifications.

NIST participates in the 3GPP's SA3 working group to modernize the cryptographic protocols used in 5G networks. Through participation in these 5G security-focused standards setting groups, NIST provides contributions and impact specifications relevant to various areas of NIST cybersecurity expertise. Some of these areas include cybersecurity risk management, identity and access management, anomaly detection, and cryptography—including quantum safe cryptography.

NIST is a member of the Open Radio Access Network (O-RAN) Alliance, where NIST has made several contributions in the areas of security, testing, and intelligent control. NIST contributions on security focused on zero trust architecture, continuous monitoring, systems management and orchestration, and the transition to post-quantum cryptography. NIST contributions on testing focused on the definition of a new Security Assurance Program and the incorporation of Implementation Conformance Statements for security requirements. NIST contributions on RAN intelligent control focused on enhancing service models and controls necessary to support interference mitigation use cases.

*Artificial Intelligence*

NIST made numerous contributions to the International Organization for Standardization/International Electrotechnical Commission (ISO/IEC) Joint Technical Committee 1 Subcommittee (JTC 1 SC) 42 (Artificial Intelligence (AI)) across multiple working groups. NIST participates in the U.S. Technical Advisory Group (TAG) for SC 42 and submitted detailed comments for U.S. TAG consideration on 9 drafts and project proposals on topics such as AI

testing, human oversight, reliability assessment, descriptive frameworks, and terminology. NIST also participated heavily in developing content for early-stage projects on conformity assessment and a system classification framework. NIST has been very active in ISO/IEC JTC 1 SC 27 Information security, cybersecurity, and privacy protection, which has progressed ISO/IEC 27090 *Cybersecurity — Artificial Intelligence — Guidance for addressing security threats and failures in artificial intelligence systems* to Committee Draft stage. ISO/IEC 27090, in its final form, will provide guidance for organizations to address security threats and failures in AI systems.

*Automotive Industry Cybersecurity*
NIST leads the U.S. Technical Advisory Group (TAG) to ISO/IEC TC 22 SC 32 WG 12 Software Update for Road Vehicles which published the first international standard on updates to vehicles *ISO 24089:2023 – Software update engineering for road vehicles.* NIST staff served as the co-chair for the Cybersecurity Assurance Levels (CAL)/Targeted Attack Feasibility (TAF) project group that is working on follow-up work to the first international standard on automotive cybersecurity under the Joint Working Group for ISO and Society of Automotive Engineers (SAE) International.

*Biometrics*
NIST serves as Chair of ISO/IEC JTC 1/SC37 Biometrics standardization. NIST staff also participate in various working groups (WG) in SC37 providing leadership, technical input, and editing for terminology, testing, quality, and interoperability across multiple modalities that include fingerprint, face, and iris. Additionally, NIST participates with INCITS/Biometrics (formerly INCITS/M1) which serves as the U.S. TAG for ISO/IEC JTC 1/SC37. NIST participates with Common Criteria Working Group Biometric Security iTC (BIO-iTC) focused on biometric security testing. NIST continues to maintain and update the standard: ANSI/NIST-ITL-2011 Update:2015 Data Format for the Interchange of Fingerprint, Facial & Other Biometric Information. NIST as the Ombudsman for the National Information Exchange Model (NIEMOpen) Biometrics Subcommittee is trusted among NIEMOpen members to ensure NIEMOpen output is conformant to the ANSI/NIST-ITL standard. NIST participates in American Society for Testing and Material (ASTM) International Collaboration Area Capturing Iris Image for Use with Iris Recognition Systems to shepherd OSAC documents through the open consensus process to achieve international standardization.

*Biotechnology*
NIST has participated in ISO TC276 Biotechnology since its inception in 2013. NIST served as the convenor of WG3 on analytical methods until it became a sub-committee (SC1) under TC276 in January 2024. NIST staff now serve as the Chair and Secretariat of TC276/SC1. NIST has several staff in leadership roles throughout the committee to include convenors, secretaries, and project leaders. ISO TC 276 develops standards and reports addressing biobanks and bioresources, analytical methods, bioprocessing, data processing, and metrology related to biotechnology. NIST also manages and chairs the U.S. TAG to ISO TC 276 on Biotechnology and the U.S. TAG to ISO TC276/SC1 on analytical methods.

*Blockchain*

NIST actively participates and holds leadership positions in ISO TC 307 on Blockchain and Distributed Ledger Technologies and its U.S. mirror committee. NIST has contributed several projects such as ISO 25126 *Information security controls based on ISO/IEC 27002 for distributed ledger services* and ISO 23042 *Reference architecture for DLT-based decentralized identity systems*. NIST has been instrumental in the launch and progression of a U.S. led project on Physical Assets disposition: ISO 20435 A *Framework for Representing Physical Assets Using Tokens*. NIST is very active in several other projects on identity, security, and interoperability, including in support of a joint effort between ISO TC 307 Blockchain and ISO TC 68 Financial Services.

*Cyber Infrastructure*

NIST served in key leadership roles in support of cyber infrastructure standardization. NIST served as the INCITS Subcommittee Vice Chair for ISO/IEC JTC 1 SC 38, the WG 3 Ad-Hoc Chair within SC 38, and the SC 38 Advisory Group Stakeholder Engagement Chair. NIST served as Head of Delegation and drafted U.S. positions for the SC 38 plenary meetings. NIST also led the development of federal cloud computing capabilities for the ISO/IEC 5140 *Information technology — Cloud computing — Concepts for multi-cloud and the use of multiple cloud service*, which was published in 2024 NIST engaged in outreach activities that included ensuring a successful cloud computing standards event on World Standards Day 2024.

NIST actively participated within ISO/IEC JTC 1/SC 41 (IoT and Digital Twins) WG 3, and as lead architect, spearheaded the publication of *ISO/IEC 30141 Internet of Things Reference Architecture ed2*. NIST served as Chair and Secretary to the US TAG to SC41. NIST also served as Chair of the Digital Twins Consortium Architecture, Patterns, and Stack Task Group supporting the development of key concepts and technology stack definitions.

NIST participated in SC 7 (Software and Systems) WG 42 (Architecture) and served on Advisory Group 8, also within ISO JTC 1, on Meta Reference Architecture and Reference Architecture for Systems Integration. NIST also participates in the development of ISA/IEC 62443 which covers cybersecurity for industrial systems. NIST engaged on the ISA99 committee which authors the standards and leads the effort focusing on the intersection of industrial internet of things and industrial cloud services.

NIST also participated in the Conformity Assessment Steering Committee on the development of test methods for timing interfaces for the IEEE 1952 Standard for Resilient Positioning, Navigation and Timing (PNT) User Equipment.

*Cybersecurity and Privacy Risk Management*

NIST contributes to various international standards development efforts related to cybersecurity risk management. The latest revision of ISO/IEC 27002 information security controls was published in February 2022 and contains attributes and concepts that align with the functions of the NIST Cybersecurity Framework. NIST serves as editor for a project (ISO/IEC 27028) developing guidance on using the attributes in ISO/IEC 27002 and will remain active within ISO/IEC JTC 1 SC 27 to help promote alignment between ISO standards and NIST resources, including the transition to the NIST Cybersecurity Framework Version 2.0. NIST also served as

co-editor of recently published ISO/IEC 27070 - *Security techniques — Requirements for establishing virtualized roots of trust*. NIST participated in revisions to ISO/IEC 27017 - *Security techniques — Code of practice for information security controls based on ISO/IEC 27002 for cloud services* and ISO/IEC 27008 - *Security techniques — Guidelines for the assessment of information security controls*. NIST serves as project editor for the revision of ISO/IEC 27018 – *Security Techniques —Code of practice for protection of personally identifiable information (PII) in public clouds acting as PII processors,* which is updating privacy controls for use by cloud service providers.

*Cryptography and Post-Quantum Cryptography*
NIST has made contributions to the revision of ISO/IEC 18031 *Information technology — Security techniques — Random bit generation* to facilitate alignment with NIST Special Publication (SP) 800-90 *Recommendation for Random Number Generation Using Deterministic Random Bit Generators.* NIST also contributed to ISO/IEC14888-4 *Information security – Digital signatures with appendix – Part 4: Stateful hash-based mechanisms* to facilitate alignment with the stateful hash-based signatures specified in NIST SP 800-208. NIST staff has served as a co-editor on ISO/IEC preliminary work item (PWI) 19541 -- *Inclusion of key encapsulation mechanisms for Post-Quantum Cryptography*.

*Cryptographic Module Validation*
The Cryptographic Module Validation Program (CMVP) is the validation authority for Federal Information Processing Standard (FIPS) 140-3. FIPS 140-3 "Security Requirements for Cryptographic Modules" and NIST SP 800-140 "FIPS 140-3 Derived Test Requirements (DTR): CMVP Validation Authority Updates to ISO/IEC 24759" align with the following ISO/IEC standards: ISO/IEC 19790 and ISO/IEC 24759, respectively. Two NIST staff members participated in ISO/IEC JTC 1 SC 27 WG 3 activities to develop both standards.

*Digital Evidence and Forensic Science*
NIST staffs a program office that administers the Organization of Scientific Area Committees (OSAC) for Forensic Science which brings together 800 volunteer participants to facilitate the development of forensic science standards in collaboration with private sector Standards Developing Organizations (SDO). OSAC maintains a registry of standards that it encourages the forensic science community to implement those standards into their operations. At the end of FY24, there were 206 standards on the registry and acknowledgement from 207 forensic science service providers that they have implemented relevant standards from this registry.
NIST served as Liaison to the Scientific Working Group on Digital Evidence (SWGDE) Executive Committee and as Project Lead on Quality Management for SWGDE. NIST also served as Vice Chair for the Organization of Scientific Area Committees Digital Evidence Sub-Committee and participated in the ASTM International E30 Committee on Forensic Sciences. NIST served as a member-at-large on the Forensic Standards Science Board of the Organization of Scientific Area Committees (OSAC) for Forensic Sciences, as Vice Chair for the OSAC Digital Evidence Subcommittee, as the statistician on the OSAC Seized Drug Subcommittee, as the statistician and Secretary on the OSAC Speaker Recognition Subcommittee, as the statistician on the OSAC Toxicology Subcommittee, as the statistician on the OSAC Crime Scene Investigation and

Reconstruction Subcommittee, and as a member of the OSAC Facial and Iris Identification Subcommittee. NIST also served as the Liaison to the OSAC Statistics Task Group and on numerous OSAC Task Groups responsible for drafting individual standards, maintaining terminology, and improving OSAC operations. NIST served as Liaison to the Scientific Working Group on Digital Evidence (SWGDE) Executive Committee, as a member of the Digital/Multimedia SAC, and as Project Lead on Quality Management for SWGDE.

*Identity Management and Authentication*

NIST participates in several committees and standardization initiatives related to identity management and authentication, including ISO/IEC 24760 series - A framework for identity management, ISO/IEC 23220 - Building blocks for identity management via mobile devices series, ISO/IEC 18013 Part 5 - Mobile driving license (mDL) application and Part 7 - Mobile driving license (mDL) add-on functions and Web Incubator Community Group where web interface is being defined for digital identities. NIST actively participates in the revision of ISO/IEC 29115 *Entity authentication assurance framework* and the effort across several international committees to harmonize and reduce gaps for a variety of Digital Wallet for identity credentials efforts. NIST is also engaged in the World Wide Web Consortium's (W3C) Federated Credential Management Community Group and participates across multiple working groups within the Open ID Foundation and the FIDO Alliance.

*Interoperable Health Information*

NIST held leadership positions within Health Level Seven (HL7) as Conformance Work Group Co-chair, Healthcare Device Work Group Co-chair, Version 2 Management Board Member, Terminology Services Management Work Group, and HL7 Unified Terminology Governance Subcommittee and Terminology Infrastructure Work Group. A NIST representative held a leadership position as the SDO IEEE-Standards Association Vice-Chair for the ISO/IEEE 11073 Point-of-Care Device Work Group. A NIST representative served as the test lead for Integrating the Healthcare Enterprise (IHE) Devices (DEV) domain and participated in IHE-DEV technical and planning committees and International "Connectathon" events as a lead test monitor. NIST Representatives held testing advisory positions and developed and supported the Department of Health and Human Services (HHS) Centers and Disease Control and Prevention (CDC), American Immunization Registry Associations (AIRA) Measurement for Assessment & Certification Advisory Workgroup (MACAW), Association of Public Health Laboratories (APHL) and the HHS Assistant Secretary for Technology Policy/Office of the National Coordinator (ASTP/ONC).

*Internet Protocols*

NIST continues to advance protocols for secure Internet routing in the Internet Engineering Task Force (IETF). NIST has provided standards contributions on core protocols as well as being active in operational focused groups in the IETF. NIST also participates in IETF working groups focused on the Domain Name System (DNS) and authentication and authorization protocols used to support zero trust.

*Internet of Things (IoT)*

NIST is actively engaged within JTC 1 SC 27 WG 4 on IoT Security activities, including significant

contributions to ISO/IEC 27404 - Cybersecurity labelling framework for consumer IoT and ISO/IEC 27402 - IoT security and privacy - Device baseline requirements. Within IETF, NIST co-chairs the Software Updates for Internet of Things (SUIT) working group focused on designing a firmware update solution suitable for constrained IoT devices.

*Quantum Technologies*
NIST has contributed to the establishment of IEC/ISO/Joint Technical Committee (JTC) 3 Quantum technologies and has also been selected as the administrator of the US Technical Advisory Group (TAG), whose job it is to facilitate U.S. consensus positions for all international developing standards and ballots. The U.S. is among 26 participating countries, that are supplying active experts, and 9 observing countries. The first Plenary meeting was held on 28-30 May 2024 in Seoul, Korea. The result of this meeting was the establishment of 6 Adhoc Groups (AHG) to explore approaches to quantum standards development in quantum terminology and metrics, quantum computing and simulation, quantum secure communication, quantum sensors, quantum enabling technologies, and quantum random number generation, as well as an advisory group on Strategic planning. The United States is convening AHG 2 Quantum terminology and metrics. The 2nd Plenary meeting was held on October 21 –22, 2024 in Edinburg, United Kingdom. At this meeting, formation of Project Team (PT) 63622 Quantum Photonics Vocabulary was approved. NIST is leading PT63622 and working to establish terminology for quantum photonics.

*Usability*
NIST contributed to standards on the testing of usability-related information. As experts in Joint Working Group 28 of ISO/IEC JTC 1 SC 7 on software and systems engineering, NIST participated in writing the ISO TC 159 SC 4 and ISO 2506x series of standards on Common Industry Formats (CIF) for Usability Reports. NIST also worked on revisions for ISO 25062 – Reporting usability evaluations and ISO 25066 – Evaluation report.

*Virtual Reality (Immersive Visualization)*
NIST staff participate in working groups of The Khronos Group related to immersive interfaces (OpenXR), advanced rendering (ANARI), and 3D Formats. NIST also participated in two sub-groups within the OpenXR working group: namely, the OpenXR tutorial development committee, and the Monado open-source development committee. NIST staff were elected as "outreach officers" for the 3D Interoperability and 3D Commerce groups of the Khronos Group. NIST is also a member of the W3C Immersive Web committee involved in promoting the integration of XR/VR into web browser interfaces. NIST is actively engaging with the Wikimedia Commons group responsible for Wikipedia to bring glTF as a format to allow 3D objects to be embedded within Wikipedia pages. In addition, NIST recently became a member of the Metaverse Standards Forum (MSF), which is playing a key role in ensuring that the many institutions involved with standards development of the metaverse talk to each other in a productive manner. NIST actively participates in the 3D Asset Interoperability Group there.

*Wireless Body Area Networks*
NIST is a voting member of IEEE802.15 and actively participates in the Task Group 6ma (TG6ma).

TG6ma is tasked with the revision of the standard IEEE 802.15.6–2012 on Wireless Body Area Networks (BAN). The task group objective is to enhance the dependability of BAN applications in high-density scenarios while coexisting with other wireless systems operating in the unlicensed Ultra-WideBand frequency spectrum. NIST contributed a statistical channel model to the channel modeling document of TG6ma under CM2.1, Scenario S2.1 (Implant (upper body) to Body Surface).

**National Oceanic and Atmospheric Administration (NOAA)**

NOAA's mission hinges on the effective sharing of its data for use by the public, industry, and academia. That sharing is underpinned by standardization of data acquisition and data management practices. NOAA's requirements and procedures for data management are included in the NOAA Data Management Handbook associated with NOAA Administrative Order 212-15B: Management of NOAA Data and Information. NOAA seeks to establish and use voluntary standards with selected industrial associations, academia, and national organizations of state and local governments (e.g., the American Association of State Climatologists), as well as through participation in professional societies (e.g., American Meteorological Society (AMS)) and Standards Development Organizations (e.g., Open Geospatial Consortium (OGC)) as well as international organizations (e.g., United Nations (numerous committees) and International Hydrographic Organization (IHO))). All NOAA line organizations participate in standards development activities, which are coordinated through NOAA's Data Governance Committee (DGC), which is chaired by the NOAA Chief Data Officer.

Standards used in many NOAA activities are established in conjunction with other Federal agencies either through joint participation in national (e.g., Federal Geographic Data Committee (FGDC)) and international (e.g., United Nations committee of experts on Global Geospatial Information Management (UN-GGIM)) organizations or by means of bilateral and multilateral agreements with other nations.

The following presents highlights examples of the ways that NOAA actively engages in not only the adoption of but also the development of voluntary consensus standards:

- NOAA is an active leader, participant, and contributor to the Federal Geographic Data Committee (FGDC), the lead entity (established by Geospatial Data Act of 2018 (GDA)) for the development, implementation, and review of policies, practices, and standards relating to geospatial data across the Federal government. The National Spatial Data Infrastructure (NSDI), which per Executive Order 12906 (Coordinating Geographic Data Acquisition and Access) is the technology, policies, standards, and human resources necessary to acquire, process, store, distribute, and improve utilization of geospatial data. NOAA leads four NSDI data themes and contributes to many others.
    - The Department of Commerce Geospatial Working Group (CGWG) is co-chaired by NOAA and Census, and has an active seat on the new FGDC Standards Working Group (SWG). The SWG is currently reviewing the NARA Geospatial Format Guidance, NARA Metadata Guidance, ISO 19115, Coastal and Marine Ecological Classification Standard (CMECS), Classification of Wetlands and Deepwater Habitats of the United States, and Wetlands Mapping Standard. They are considering an approach on interoperability standards.
- NOAA leads the Integrated Ocean Observing System (IOOS), a part of the Global Earth

Observing System of Systems (GEOSS), which ascribes to the GEOSS data sharing principles as a core capacity. The U.S. IOOS Program Office implements policies, protocols, and standards to implement IOOS and oversee the daily operations and coordination of the System. For more information on IOOS standards, visit the IOOS Data Standards and Requirements webpage.

- NOAA's National Geodetic Survey (NGS) represents the US on the UN Committee of Experts on Global Geospatial Information Management (UN-GGIM)'s Subcommittee on Geodesy (UN SCoG), which developed the Global Geodetic Reference Frame (GGRF). The GGRF includes infrastructure, education, training, governance and the adoption of internationally accepted standards. NGS participates in the ISO Technical Committee 211 (TC211) related to Geospatial Information, TC20 related to Satellite systems (including GNSS/GPS satellites), and TC172 related to geodetic and surveying equipment. NGS staff worked within TC211 to maintain the US NSRS definitions with the ISO Geodetic Registry and refine ISO Standards 19127 and 19135 as a part of ongoing standards reviews. NGS initiated efforts to update the ISO 19111 standard which provides the fundamental definitions for all geospatial data through the United States and the world. NGS worked with the Open Geospatial Consortium on defining and developing consistent standards from the sea to shore.
- NOAA's Center for Operational Oceanographic Products and Services (CO-OPS) represents the US on the Global Sea Level Observing System Group of Experts (GLOSS GE), a component of the IOC/Global Ocean Observing System (GOOS), whose efforts are focused on establishing high quality, global water level data sets to support a broad research and operational user base. GLOSS's main work is to establish and disseminate best practices and standards for operating water level stations and support international data centers.
- NOAA's Office of Coast Survey (OCS) and the Center for Operational Oceanographic Products and Services (CO-OPS) represent the US in the International Hydrographic Organization (IHO), an international organization that coordinates the activities of national hydrographic offices, promotes uniformity in nautical charts and documents, and issues survey best practices, provides guidelines to maximize the use of hydrographic survey data and develops hydrographic capabilities in Member States. OCS is also active in several regional hydrographic commissions.
- NOAA has a long-standing relationship with the Open Geospatial Consortium[1] (OGC) through its annual membership, and continues championing open standards and innovation at OGC. As a lead, NOAA supports the consortium's OGC API and cloud-native geospatial modernization efforts by championing the standards applicable to Findable, Accessible, Interoperable, and Reusable (FAIR) environmental data (such as OGC API - Environmental Data Retrieval), and benefit from, and contribute to, the OGC Community's collective problem solving via the OGC Innovation Program. NOAA

[1] *Open Geospatial Consortium (OGC):* OGC's free and open geospatial standards define interoperable approaches to data encoding, data access, data processing, data visualization, and metadata and catalogue services. NOAA has embraced its Strategic Member role in OGC by sponsoring several pilots – Climate Resilience Pilot (Phase 1) and Federated Marine SDI (Phase 4) – with continued support of these pilots in 2024.

sponsored two OGC pilot projects: The Climate Resilience Pilot (focused on improving interoperability for climate resilience information systems) and produced two deliverables: (1) the Analysis Ready Data Maturity Report which evaluates the maturity of crucial ARD sources for disaster risk response and climate assessments focusing on NOAA data sources, and (2) a generative AI-based virtual assistant designed to streamline access to climate-related information. The Federated Marine SDI pilot (focused on understanding the power of FAIR data in the context of the marine environment) and delivered a framework of best practices document for 'Bridging Land and Sea.' For more information on OGC's efforts to ensure geospatial information interoperability, visit the OGC Standards webpage.

- NOAA contributes US expertise to help the global community deal with the meteorological, climatological and hydrological threats via its membership in and engagement with the World Meteorological Organization (WMO), an agency of the Nations (UN) that serves as the international standardization organization in the fields of meteorology, hydrology, climatology and related environmental disciplines. The WMO's standards and recommended practices include Technical Regulations, an international framework for standardization and interoperability, which consists of standard and recommended practices and procedures adopted by World Meteorological Congress for universal application by all Members, as well as Guides, which describe practices, procedures and specifications which Members are invited to follow or implement in order to achieve compliance.
- NOAA National Weather Service (NWS) meteorological data and reports comply with WMO Standards. NOAA serves as one of the WMO Information System (WIS) Global Information System Centres (GISC) and provides a portal to search all WMO Region IV data center metadata. Additionally, NOAA operates several WMO-recognized global centers, including the Aviation Weather Center (AWC), the Space Weather Prediction Center (SWPC), the National Hurricane Center (NHC), and the Ocean Prediction Center (OPC). For more information on the NWS role in support of the WMO, visit the NWS' WMO webpage.
- NOAA participates in national standards organizations ANSI and INCITS and the international standards organization ISO TC211 (standardization in the field of digital geographic information).
- NOAA applies standards set by the International Standards Organization (ISO), an independent, non-governmental international organization with a membership of 167 national standards bodies, specifically environmental management standards, to NOAA data. Examples of ISO standards in use in NOAA include:
    - ISO 14721: "Open Archival Information System (OAIS)" which defines the reference model for an open archival information system (OAIS). This standard is the basis for archival activities supporting NOAA environmental data. ISO 26324: "Information and documentation - Digital object identifier system" which specifies the syntax, description and resolution functional components of the digital object identifier system. NOAA assigns unique, resolvable, and persistent identifiers to archival datasets and technical reports. Building upon this standard, NOAA recently developed a report on DOI recommendations for use across NOAA

and is in the process of updating its Public Access to Research Results (PARR) Plan to also address DOIs.
    - ISO 19115: "Geographic information – Metadata" which defines the schema required for describing geographic information and services by means of metadata. NOAA participates in the ISO TC211, a committee that focuses on standardization in the field of digital geographic information, and maintains standards for Geographic information/Geomatics.
    - ISO 19139: "Geographic information — XML schema implementation" which defines XML based encoding rules for conceptual schemas specifying types that describe geographic resources. The encoding rules support the UML profile as used in the UML models commonly used in the standards developed by ISO/TC 211.
- U.S. marine fisheries are scientifically monitored, regionally managed, and legally enforced under a number of requirements, including ten National Standards, and principles that must be followed in any fishery management plan to ensure sustainable and responsible fishery management. As mandated by the Magnuson-Stevens Fishery Conservation and Management Act, NOAA Fisheries has developed guidelines for each National Standard. For more information on the standards, visit the NOAA Fisheries National Standard Guidelines webpage.
- NOAA's National Centers for Environmental Information (NCEI) is the Nation's leading authority for environmental data and manages one of the largest archives of atmospheric, coastal, geophysical, and oceanic research in the world. In this role, NCEI follows and implements the ISO metadata standard to facilitate data search and discovery._Metadata at NOAA can be represented in number of different standards and formats including Directory Interchange Format (DIF), Ecological Metadata Language (EML), Sensor Model Language (SensorML), Climate Science Modeling Language (CSML), and NetCDF Markup Language (NcML). NCEI uses the ISO 14721 Open Archival Information System (OAIS) Reference Model standard as the basis for archival activities supporting NOAA environmental data. NCEI also provides distributed data access via the Open source Project for a Network Data Access Protocol (OPeNDAP) compliant THREDDS and ERDDAP data servers.

**National Telecommunications and Information Administration (NTIA)**

As the manager of federal spectrum and principal advisor to the President on communications and information policy, the **National Telecommunications and Information Administration (NTIA)** engages broadly in next-generation communications issues and standards development. NTIA contributes to the development and application of national and international telecommunication standards by leading, participating in, making technical contributions to, and collaborating with various voluntary national and international telecommunication standards development organizations (SDOs) such as the 3rd Generation Partnership Project (3GPP), the O-RAN ALLIANCE, International Telecommunication Union (ITU-R, ITU-T), the Institute of Electrical and Electronics Engineers (IEEE) Standards Association, WInnForum, Radio Technical Commission for Aeronautics (RTCA), and Alliance for Telecommunications Industry Solutions (ATIS).
In FY 2024, staff from six separate offices of NTIA held 145 positions in 15 standards bodies,

including 19 Chair/Co-Chair/Vice-Chair positions. This includes positions within the International Telecommunications Union.

- NTIA staff filled key leadership positions in the ITU, including Head of the U.S. Delegation to ITU-T Study Group (SG) 20 (Internet of Things, smart cities and communities); Head of the U.S. Delegation to ITU-R SG1 (Spectrum management), SG3 (Radiowave propagation), and SG7 (Science services); Head of Delegation to SG1 Working Party (WP) 1A; Head of Delegation to SG5 (Terrestrial services) WP 5B and 5C; International Chair of SG5 WP 5A; Deputy Head of Delegations to SG5 WP5A and WP5D, and SG7 WP 7C; International Vice-Chair and U.S. Chair of SG3 WP 3L; U.S. Chair of Working Parties 3J and 3K; and Chair of Correspondence Groups CG-3L-7 (Radio Noise), CG-3J-11 (Reference Standard Atmospheres), CG-3J-26 (Modelling lunar radiowave propagation), CG-3J-1 (Gaseous attenuation in Recommendation ITU-R P.676), and CG-3K-3M-9 (Aeronautical Propagation).
- Within the Inter-American Telecommunications Commission (CITEL), NTIA held the International Chair of WRC WG 5 (Preparation for World Radiocommunication Conferences).
- NTIA's Institute for Telecommunication Sciences (ITS) established and continues to play a significant role in the Video Quality Experts Group (VQEG), which performs technical validation that is a prerequisite to standardization of video quality metrics and subjective video quality test methods in the ITU-T.

*International Telecommunications Union (ITU)*

NTIA is one of the primary U.S. Government agencies engaged in the ITU, working closely with colleagues at the U.S. Department of State, Federal Communications Commission, Department of Defense, and other interested agencies. (Because the ITU is a treaty-based organization, the Department of State acts as the Government's convener of ITU engagement.)

In FY 2024, NTIA's Office of International Affairs (OIA) followed and/or provided inputs to ITU-T Study Groups 3 (Tariff and accounting principles and international telecommunication/ICT economic and policy issues) and 20 (Internet of Things, smart cities and communities), while ITS participated in Study Group 12 (Performance, QoS and QoE). NTIA's work in ITU-T focuses on industry-led, bottom-up, consensus-based standards and appropriately working with U.S. government colleagues to help ensure the ITU-T avoids duplication of efforts with other standards development organizations such as ISO/IEC, 3GPP and IETF.

OIA also represented NTIA on the U.S. Delegation to the World Telecommunications Standardization Assembly, the ITU's conference on technical standards. (Note that the WTSA-24 itself took place during FY 2025—October 15-24, 2024, in New Delhi, India). In FY2024, OIA focused on the U.S. Delegation's preparatory process for the conference. This work included: representing NTIA and its interests in preparatory meetings of the U.S. Delegation, advising the U.S. Delegation on positions for WTSA Resolutions of interest to NTIA (e.g., Internet, OTTs, and the digital economy, the World Summit on the Information Society, and others), and representing U.S. Delegation positions at external ITU/CITEL meetings as appropriate. More specifically, OIA served as the U.S. spokesperson for several Inter-American Proposals (IAPs) and leveraged our position as U.S. Head of Delegation to ITU-T SG20 to assist the U.S. delegation's positioning on Resolution 2 (Study Group mandates).

NTIA's Office of Spectrum Management (OSM) plays a leading role at the ITU's Radiocommunications Sector with the U.S. Department of State, the Federal Communications

Commission to advance the interests of the U.S. government in spectrum management and the use of the spectrum resource. This includes enabling the harmonized allocation of spectrum and supporting technical rules for commercial and government terrestrial and non-terrestrial uses such as 5G and beyond and defense purposes. This work supports the development of the ITU Radio Regulations at a treaty level.

OSM has served as head of the U.S. Delegation to the following ITU-R study groups and working parties: Study Group (SG) 1 (Spectrum management), SG7 (Science services); SG5 (Terrestrial services) including Working Party (WP) 5B and 5C; and Deputy Head of Delegation to SG5 WP5A and WP5D, and SG7 WP 7C. OSM has also served as Chairman of several ITU SGs and WPs including SG5 WP 5A (Terrestrial; services) WP4C SWG 2 (Additional Mobile Satellite Service Spectrum). In addition, NTIA serves as the U.S. spokesperson for numerous ITU study group and working parties In the ITU-R sector and OSM has also been active in other WPs, such as WP4B (systems, air interfaces, performance and availability objectives for FSS, BSS and MSS, including IP-based applications and satellite news gathering) that focus on standards development.

ITS leads U.S. efforts at the ITU-R Study Group 3 (SG3), the technical group that focuses exclusively on radio wave propagation. At SG3, ITS contributes inputs and ensures the technical accuracy and correctness of international radio wave propagation standards. SG3 Recommendations on radio wave propagation are treaty-level agreements and play a role in international agreements on spectrum allocations and sharing scenarios, such as the on-going discussions of 5G mid-band spectrum and mmWave spectrum.

In FY2024, ITS led seven SG3 U.S. Preparatory Meetings, ultimately leading to approval of 12 U.S. input contributions, seven of which were authored or coauthored by ITS. In FY2024, ITS hosted the May-June 2024 ITU-R Working Party meetings in Denver, CO. A new Correspondence Group for opening discussions on modeling lunar radiowave propagation was formed during these meetings, which is chaired by ITS. ITS also participated in SG6 (Broadcasting services).

Within the Inter-American Telecommunications Commission (CITEL) Permanent Consultative Committee II: Radiocommunications (PCC.II), NTIA OSM held the International Chair of sub-working group 1 (SGT-1) of the World Radiocommunication Conference (WRC) preparation group last cycle. NTIA currently serve as the deputy head of the U.S. delegation, the international chair of the SGT-5 and vice chair of the SGT-1 of the WRC Group, and rapporteurs for several WRC agenda items. The CITEL PCC.II develop regional positions for WRC and develop recommendations and reports on spectrum management throughout the Americas.

*3rd Generation Partnership Project (3GPP)*

Direct participation by NTIA in the 3rd Generation Partnership Project (3GPP), the leading global consortium developing technical specifications for wireless telecommunications networks, allows NTIA to advance U.S. commercial, economic, and government interests by providing technical input to promote strong unbiased standards that support fair competition in next generation/5G cellular technologies. There is no direct membership to 3GPP; the Partnership Project unites seven regional SDOs, each representing a different part of the globe and individual member delegates come to 3GPP via their organization's membership in one of the regional SDOs; the Alliance for Telecommunications Industry Solution (ATIS) is the North American founding partner. 3GPP is organized into three technical specification groups (TSGs)— the Radio Access Network (RAN), Service & Systems Aspects (SA), and Core Network & Terminals (CT)—each of

which is itself composed of multiple Working Groups (WGs) focused on specific TSG subtopics. NTIA technically holds two Individual Memberships (IMs) in 3GPP: one held by the First Responder Network Authority (FirstNet), and one held jointly by NTIA's Office of Policy Analysis and Development (OPAD), ITS, and OIA.

FirstNet's authorizing legislation explicitly tasks the organization with representing the interests of public safety users before domestic and international standards bodies. FirstNet thus represents first responders in 3GPP across the vast majority of 3GPP's Working Groups. FirstNet's focus in 3GPP is to evolve both LTE and 5G Public Safety communication features and enablers to meet First Responder needs. FirstNet's standards team also leads the work relating to LMR (land mobile radio) and LTE/5G interoperability through 3GPP, TIA, and ATIS organizations. Mission-critical services are a key part of 3GPP's work, as evident in 3GPP Releases 12 through 18.

ITS and OPAD engage in 3GPP TSGs for RAN and SA at a Plenary level and participate in 3GPP Working Groups for Services (SA WG1) and Security and Privacy (SA3); OPAD is engaged in TSG SA and SA WGs 1 and 3; ITS participates in SA WGs 1 and 3, as well as the RAN Plenary. The RAN Plenary defines the functions, requirements, and interfaces of the wireless systems, and covers several areas, including radio performance, physical layers, network interfaces, and operations and maintenance requirements. SA1 WG work focuses on system requirements; SA3 WG work focuses on the security and privacy aspects of currently deployed and future wireless technologies. OSM attends RAN Working Groups 1 and 4. OSM's goals are to: gain a more in-depth understanding of 3GPP standards and models used in compatibility studies; monitor 3GPP proposals that have potential to impact federal operations; identify 3GPP spectrum standards that could be adopted for federal systems; and verify that 3GPP standards are being properly used in domestic and international spectrum sharing studies. In FY2024, ITS continued to brief client federal agencies on 3GPP New Radio and deployment scenarios in response to agency-specific concerns related to spectrum sharing, vehicle-to- everything communication, non-terrestrial networks, unmanned aerial vehicles, and integrated sensing and communication.

*ATIS*

ATIS is a member-driven organization that develops critical industry standards in information and communications technology (ICT). ATIS' NextG Alliance brings together 80 organizations and over 600 subject matter experts from industry, academia and government to advance North American mobile technology leadership. OPAD tracks activities of the NextG Alliance, and FirstNet participates in relevant Working Groups as a NextG Alliance government member and engages in the Alliance's work related to Land Mobile Radio (LMR). FirstNet is also an active participant in the ATIS 3GPP planning meetings.

*Telecommunications Industry Association (TIA)*

The Telecommunications Industry Association (TIA) acts as a catalyst for the wireless industry to develop and maintain public safety standards for digital equipment and systems through TIA-102 (also known as Project 25). This initiative is supported by industry, government agencies and public safety communications officials, including the Department of Homeland Security's National Communications System (NCS), the Department of Defense, and NTIA. FirstNet's standards team participates in Project 25 efforts, particularly as related to LMR (land mobile radio) standards interoperability with LTE and 5G mission critical services.

*O-RAN ALLIANCE*

The O-RAN ALLIANCE was founded in 2018 by several large mobile broadband network operators to develop technical specifications for Open Radio Access Network (Open RAN, or ORAN) architecture. The O-RAN ALLIANCE initially discouraged membership by governmental entities, but after extensive discussion in 2022, governmental agencies are now permitted to join as members. ITS and OPAD actively participated in O-RAN ALLIANCE technical meetings in FY2024. ITS participation spanned across various Work Groups (WG) covering broad research work in Architecture workgroup (WG1), Near Real Time RAN Intelligent Controller (WG3), Cloud and Orchestration (WG6) and Focus Groups (FGs) on Next Generation Research (nGRG), Testing and Integration (TIFG), and Sustainability (SuFG).

*Telecom Infra Project (TIP)*

The Telecom Infra Project (TIP) is a non-profit organization focused on accelerating the development and deployment of open, standardized, and interoperable networking technologies. TIP plays a pivotal role in the Open RAN initiative by conducting research, development, and collaboration among industry stakeholders. In FY2024, the ITS team led the effort to join this organization on behalf of NTIA and obtained full membership for the agency to participate and collaborate with TIP members worldwide. ITS became a full member as of September 2024. Planned work includes continued engagement with key stakeholders to research and develop test cases for different network elements in Open RAN.

*Wireless Innovation Forum (WInnForum)*

ITS participates as a member of WInnForum. Following the 2015 FCC allocation of the 3550-3700 MHz spectrum band for the Citizens Broadband Radio Service (CBRS) through a three-tiered access system that includes Environmental Sensing Capability (ESC) sensors and Spectrum Access System (SAS) databases, ITS participated in the development of the underlying standards for this three-tiered access system and, in collaboration with the FCC and industry CRADA partners, developed the certification test requirements to assess compliance with the standards. The final certification test system for ensuring SAS conformance with Part 96 of the FCC's rules, which includes the test harness component developed through WInnForum, was delivered to the FCC in FY2023. On-demand support and training continued in FY2024 as the FCC prepared to authorize commercial laboratories to certify SAS providers in FY2025.

*Radio Technical Commission for Aeronautics (RTCA)*

RTCA is the standards body for aircraft manufacturers and operators. OSM is a voting member of RTCA and previously co-chaired Special Committee 239 (SC-239) on Low Range Radar Altimeters. This committee continues to develop technical documentation of the future capabilities for radio altimeters towards a new RTCA standard (Minimum Operating Performance Standard – MOPS) for radio altimeters operating in the frequency bands where new commercial 5G systems have recently begun, or shortly plan to begin, operating.

*Video Quality Experts Group (VQEG)*
Since the creation of VQEG in 1997, ITS has supported VQEG with leadership and electronic working methods. VQEG conducts open meetings, which enables broad international participation from industry, academia, and governments. These open meetings facilitate knowledge sharing and collaborative research on unsolved issues that hinder new video products and services.

VQEG provides a mechanism for a wide variety of video quality experts to contribute to ITU work items. In FY2024, ITS used VQEG as a venue to enable subject matter expert contributions to an ITU led effort to validate no reference (NR) metrics that assess video quality. This independent performance testing evaluates the precision and accuracy of NR metrics, with a goal of identifying at least one NR metric that meets U.S. industry specifications for deployment in products and service workflows (e.g., broadcasting, video streaming, public safety, and object recognition). Efforts in 2024 focused on developing a test plan that is expected to begin in 2025 and finish 2026.

*IEEE Standards Association (SA)*
The Institute of Electrical and Electronics Engineers (IEEE) is the world's largest technical professional organization dedicated to advancing technology for the benefit of humanity. The IEEE Standards Association (IEEE SA) is the consensus building body of IEEE, which develops and advances global technologies through standards development processes. OPAD participates in the IEEE Government Engagement Program on Standards (GEPS), giving NTIA official Observer Status on the IEEE Standards Board. ITS participates in the development of individual standards as driven by its research portfolio. In FY2024, ITS staff participated in the IEEE Communications Society/Mobile Communications Networks Standards Committee (Com/MobiNet SC) Working Group for Project P.1944 seeking to develop standard channel models for simulating wireless systems. NITA-ITS holds the P.1944 Secretary position and Chair position for the Subgroup on UAV and V2V Channel Models.

*Other International Standards Engagements*
OIA continues to monitor Internet Engineering Task Force (IETF) work, particularly on matters involving internet governance, including activities of the IETF's Internet Architecture Board (IAB). OSM-ISPD staff participate in International Civil Aviation Authority (ICAO) meetings which develop international procedures for civil aviation; International Maritime Organization (IMO), a treaty level organization for development of requirements for commercial maritime operations including safety of ships and ports; and North Atlantic Treaty Organization (NATO) spectrum management committees which develop positions and recommendations for World Radio Conferences (WRCs). Finally, OSM-ISPD staff participate in the CITEL PCC II (Radiocommunication and Broadcasting) meetings to develop regional positions for WRC and to develop recommendations and reports on spectrum management throughout the Americas.

*Standards-Related Committees and Other Fora*
The American National Standards Institute (ANSI) oversees standards and conformity assessment activities in the United States and is the sole U.S. representative to the International

Organization for Standardization (ISO) and to the International Electrotechnical Commission (IEC). ANSI does not issue standards, but promotes the use of U.S. standards internationally, advocates U.S. policy and technical positions in international standards organizations, and encourages the adoption of international standards as national standards where they meet the needs of the community. NTIA participates in the ANSI Government Member Forum (GMF) and generally keeps abreast of ANSI activities and developments.

NTIA currently participates in the Interagency Committee on Standards Policy (ICSP) though the Advanced Communications Technologies Working Group (ACTWG), which aims to facilitate coordination of federal agency advanced communications technologies standards activities, respond to requests for information, and develop recommendations.

The Interagency International Cybersecurity Standards Working Group (IICS WG) was established by the National Security Council's Cyber Interagency Policy Committee to coordinate on major issues in international cybersecurity standardization and enhance federal agency participation. OPAD attends IICS WG's periodic meetings.

ITS participates in the U.S. National Committee (USNC) for the International Union for Radio Science (URSI), which is sponsored by the National Academy of Sciences as the U.S. adhering body of URSI. While URSI is an international scientific union affiliated to the International Council for Science (ICSU) and does not issue standards as such, a primary mission of URSI is to encourage the adoption of standardized methods of measurement and standardization of measuring instruments. ITS holds the Chair-Elect seat at the USNC, Chair of USNC Commission E (Electromagnetic Environment and Interference), Vice-Chair of Commission A (Electromagnetic Metrology), and participates in Commissions C (Radiocommunication Systems and Signal Processing) and F (Wave Propagation and Remote Sensing).

**United States Patent and Trademark Office (USPTO)**

USPTO contributes to the development of international standards for patent and trademark information and documentation primarily through participation of USPTO scientific and technical experts to the Committee on WIPO Standards (CWS) of the World Intellectual Property Organization (WIPO). The standards developed are used by the USPTO and other international intellectual property organizations around the world to harmonize intellectual property information practices. The standards harmonize practices regarding electronic data processing procedures with respect to filing, examination, and publication of intellectual property data. The standards facilitate the exchange, sharing, dissemination, access and retrieval of intellectual property data and documents. USPTO staff also participate in standardization activities of the International Patent Classification (IPC) Union. The IPC provides a hierarchical system for the classification of patents according to different areas of technology. The worldwide access to patent and trademark data and documents supports U.S. industry and organizations' knowledge of national and international intellectual property. https://www.uspto.gov/patents-application-process/patent-search/understanding-patent-classifications/international.

**2. Please note that GUS which are still in effect from previous years should continue to be listed, thus the total number in your agency's report will include all GUS currently in use (previous years and new as of this FY).** None.