**Standardization roadmap for Q14/17 and overview of DLT standardization activities**

Standardization roadmap for Q14/17

Security of DLT which Q14/17 works on now and in the future can be divided into 3 groups. They are 1) Security for DLT platform, 2) Security management for DLT, and 3) Security for DLT applications. Q14/17 has 1 consented Recommendation which is X.1401, Security threats of distributed ledger technology, and 11 working items with boxes indicate the progress of the items with blue colour. The ones marked with white box, are considerable items or areas in the future. They are not confirmed and do not have any fixed time schedule. For the time schedule for existing working items, please refer Table 1.

The Security for DLT platform and Security management for DLT have immediate priority in this study period. The Security for DLT applications will benefit from the groundwork of The Security for DLT platform and Security management for DLT.

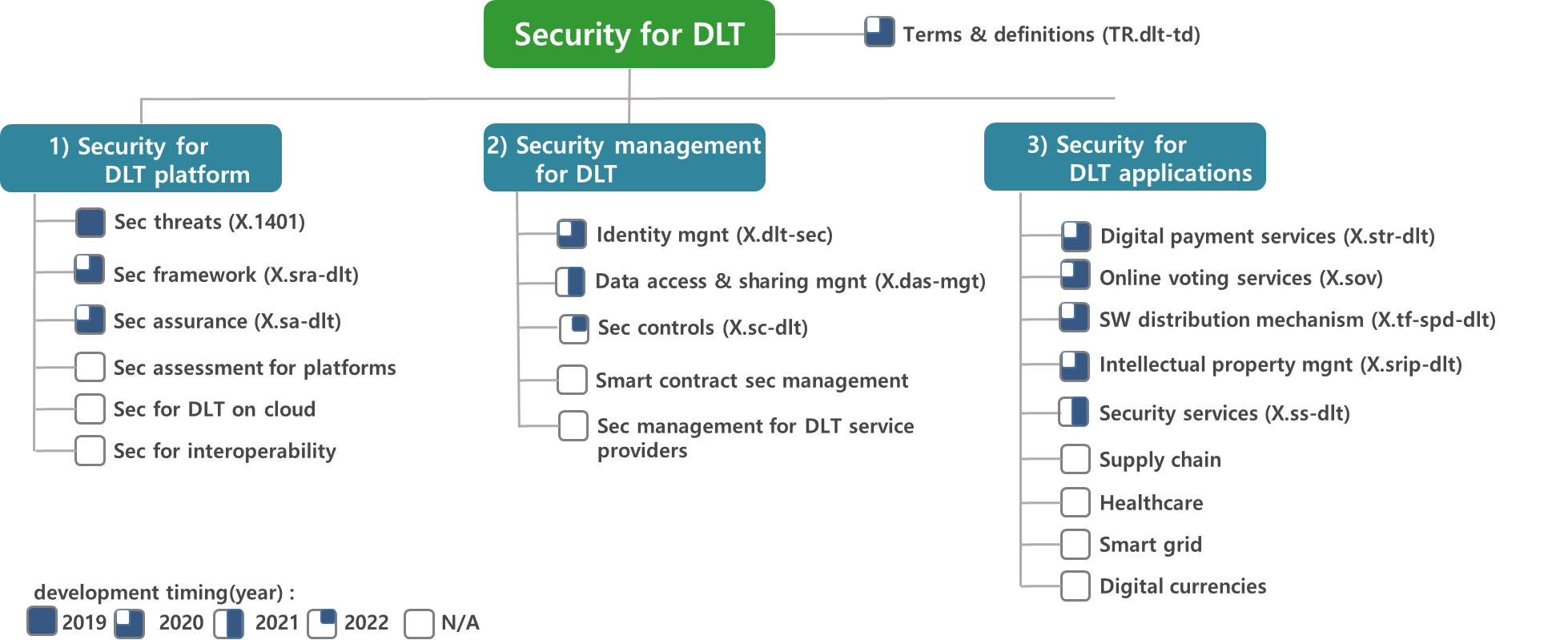


Table 1- The status of work items in Q14/17

| **Work item** | **Type of  text** | **Approval process** | **Priority** | **Timing** | **Liaison  relationship** | **Subject / Title** | **Base text(s)** | **Editor(s)** |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| X.sra-dlt | Rec | AAP | High | 2020-03 | ISO TC 307, ITU-T FG DLT, ITU-T SG13, ITU-T SG16, ITU-T SG20 | Security framework for Distributed Ledger Technology | [*TD2831R2*](https://www.itu.int/md/T17-SG17-200317-TD-PLEN-2831/en) | Xiaoyuan Bai, Petr Kalambet, Qiwi Kirill Ivkushkin, Bilyk Tatiana,  Min Shu |
| X.str-dlt | Rec | AAP | High | 2020-09 | SG 3, SG 13, SG 16, SG 20, FG-DLT, FIGI, ISO TC 307 | The security threats and requirements for digital payment services based on distributed ledger technology | [*TD2826*](https://www.itu.int/md/T17-SG17-200317-TD-PLEN-2826/en) | Kyeong Hee Oh, ChangOh Kim |
| X.1401 | Rec | AAP | Low | 2019-09 | ITU SG16,ITU SG20, ITU SG13, ITU FG DLT, ITU FG-DPM, ISO/TC 307 | Security threats of Distributed Ledger Technology | [*TD2351*](https://www.itu.int/md/T17-SG17-190827-TD-PLEN-2351/en) | Min Zuo, Ke Wang, Junjie Xia, Zhaoji Lin, Kai Wei, Heung Youl Youm, Ramy Ahmed Fathy |
| X.ss-dlt | Rec | AAP | Low | 2021-09 | ITU SG16,ITU SG20, ITU SG13, ITU FG DLT, ITU FG-DPM, ISO/TC 307 | Security Services based on Distributed Ledger Technology | [*TD2820*](https://www.itu.int/md/T17-SG17-200317-TD-PLEN-2820/en) | Min Zuo, Ke Wang, Junjie Xia, Zhaoji Lin, Kai Wei,  Min Shu, Yue Chen |
| X.dlt-sec | Rec | TAP | *High* | 2020-03 | IEEE, ISO/IEC JTC1/SC27 , ISO/TC 307 | Security considerations for using DLT data in Identity Management | [*TD2909*](https://www.itu.int/md/T17-SG17-200317-TD-PLEN-2909/en) | Abbie Barbir |
| X.sa-dlt | Rec | AAP | Medium | 2020-09 | ISO TC307, SG16, SG20, FG-DLT | Security assurance for Distributed Ledger Technology | [*TD2819*](https://www.itu.int/md/T17-SG17-200317-TD-PLEN-2819/en) | Mee Yeon Kim,  Heung Youl Youm,  Ke Wang |
| X.stov | Rec | AAP | Low | 2021-03 | ITU-T SG16, ITU-T SG20, FG-DLT, FG-DPM, ISO/TC 307, FIGI | Security threats to online voting using distributed ledger technology | [*TD2817*](https://www.itu.int/md/T17-SG17-200317-TD-PLEN-2817/en) | Keundug Park, ChangOh Kim, Heung Youl Youm, Byoung-moon Chin |
| X.das-mgt | Rec | AAP | Low | 2021-09 | ISO/TC 307, FG-DLT | Security threats and requirements for the data access and sharing management system based on the distributed ledger technology | [*TD2848R1*](https://www.itu.int/md/T17-SG17-200317-TD-PLEN-2848/en) | Mee Yeon Kim, Heung Youl Youm, Keundug Park, Zhiyuan Hu |
| X.tf-spd-dlt | Rec | AAP | Medium | 2020-09 | ITU-T FG DLT, IETF, ISO/TC307 | Technical framework for secure software programme distribution mechanism based on distributed ledger technology | [*TD1926*](https://www.itu.int/md/T17-SG17-190122-TD-PLEN-1926) | Bo Yu, Junjie Xia, Feng Gao, Ke Wang |
| X.srip-dlt | Rec | TAP | Medium | 2020-09 | ITU-T FG-DLT, ITU-T SG16 | Security requirements for intellectual property management based on distributed ledger technology | [*TD2816*](https://www.itu.int/md/T17-SG17-200317-TD-PLEN-2816/en) | Min Shu, Yunwei Zhao, Juhee Ki, Wenlei Wang, Yang Wu, Jung Yeon Hwang |
| X.dlt-td | Rec | AAP | Medium | 2020-09 | ISO TC307, ITU SG13, SG16, SG20 | Terms and definitions for distributed ledger technology | [*TD2821*](https://www.itu.int/md/T17-SG17-200317-TD-PLEN-2821/en) | Heung Youl Youm,  Ji Hye Kim |
| X.sc-dlt | Rec | AAP | Low | 2022-09 | ITU SG13, SG16, SG20, ISO TC307, ISO/IEC JTC 1/SC 27 | Security controls for distributed ledger technology | [*TD2358*](https://www.itu.int/md/T17-SG17-190827-TD-PLEN-2358/en) | Kyeong Hee Oh, Keundug Park, Preetika Singh, Kadio Kassy |

Other questions in SG 17

* Q11 is working on the 1st amendment to Rec. ITU-T X.509|ISO/IEC 9594-8:2017 *Information technology –* *Open Systems Interconnection – The Directory: Public -key and attribute certificate frameworks* Amd.1 to decentralized PKI.
* Q8 agreed to establish a new work item X.BaaSsec, *Guideline on Blockchain as a Service (BaaS) Security*
* Q10 and Q3 are cooperating to develop a new work item on decentralized identity.

Overview of DLT standardization activities

* Other Study Groups in ITU-T
  + SG2 started two new work items related with DLT, and SG12 started one. SG 13 published one and is working on 2 items, SG 20 have 5 item. SG 16 created new Question 22/16 for Distributed ledger technologies and e-services. Now SG 16 is working on 8 items related on DLT

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| --- | --- | --- | --- | --- |
| **SG** | **Title** | **Work Items** | | **Status** |
| 2 | Operational aspects | M.rmbs | Requirements for management of blockchain system | Under development in Q5 |
| M.immbs | Information model for management of blockchain system | Under development in Q5 |
| 13 | Future networks, with focus on IMT-2020, cloud computing and trusted network infrastructures | Y2342 (Y.NGNe-BC-reqts) | Scenarios and capability requirements of blockchain in next generation network evolution | Published by Q2 |
| Y.BaaS-reqts | Cloud computing - Functional requirements for blockchain as a service | Under development in Q17 |
| Y.trust-pdm | Framework for Trust based Personal Data Management | Under development in Q16 |
| Y.SCid-fr | Requirements and Converged Framework of Self-Controlled Identity based on Blockchain | Under development in Q22 |
| 16 | Multimedia | F.BVSSI | Scenarios and requirements for blockchain in visual surveillance system interworking | Under development in Q12 |
| F.DLS | Requirements for distributed ledger systems | Under development in Q22 |
| H.DLT | Reference framework for distributed ledger technology |
| F.DLT-AC | Assessment criteria for DLT |
| H.DLT-CD | Digital evidence services base on DLT |
| [F.DLT.HC.req](https://www.itu.int/ITU-T/workprog/wp_item.aspx?isn=15024) | Requirements of distributed ledger technologies (DLT) for human-care services | Under development in Q24 |
| [F.DLT.SM.PHR](https://www.itu.int/ITU-T/workprog/wp_item.aspx?isn=15025) | Service models of distributed ledger technologies (DLT) for personal health records (PHRs) |
| [F.HFS-BC](https://www.itu.int/ITU-T/workprog/wp_item.aspx?isn=14770) | Requirements and framework for blockchain-based human factor service models |
| 20 | Internet of things(IoT) and smart cities and communities(SC&C) | [Y.dec-IoT-arch](https://www.itu.int/ITU-T/workprog/wp_item.aspx?isn=14650) | Decentralized IoT communication architecture based on information centric networking and blockchain | Under development in Q3 |
| [Y.IoT-rf-dlt](https://www.itu.int/ITU-T/workprog/wp_item.aspx?isn=14962) | OID-based Resolution framework for transaction of distributed ledger assigned to IoT resources |
| [Y.BC-SON](https://www.itu.int/ITU-T/workprog/wp_item.aspx?isn=15093) | Framework of blockchain-based self-organization networking in IoT based environments | Under development in Q4 |
| [Y.IoT-BoT-fw](https://www.itu.int/ITU-T/workprog/wp_item.aspx?isn=14099) | Framework of blockchain of things as decentralized service platform |
| [Y.SSC-BKDMS-arc](https://www.itu.int/ITU-T/workprog/wp_item.aspx?isn=14949) | Reference architecture of blockchain-based unified KPI data management for smart sustainable cities | Under development in Q7 |
| 5 | Environment and climate change | A new Focus Group on Environmental Efficiency for Artificial Intelligence and other Emerging Technologies (FG-AI4EE) including DLT was established. The work of this group will address the environmental efficiency, as well as water and energy consumption of emerging technologies, and provide guidance to stakeholders on how to operate these technologies in a more environmentally efficient manner. | | |

* FG-DLT
  + FG-DLT closed in August 2019 and produced 8 deliverables in the form of technical specifications and technical reports focused on DLT.

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| --- | --- | --- | --- | --- |
| **WG** | **Title** | **Deliverables** | | **Status** |
| 1 | State of the Art: Ecosystem, Terms, Definitions, Concepts | D1.1 | DLT terms and definitions | Published as [TS](https://itu.int/en/ITU-T/focusgroups/dlt/Documents/d11.pdf) in 2019 |
| D1.2 | DLT overview, concepts, ecosystem | Published as [TR](https://itu.int/en/ITU-T/focusgroups/dlt/Documents/d12.pdf) in 2019 |
| D1.3 | DLT standardization landscape | Published as [TR](https://itu.int/en/ITU-T/focusgroups/dlt/Documents/d13.pdf) in 2019 |
| 2 | Applications & Services | D2.1 | DLT use cases | Published as [TR](https://itu.int/en/ITU-T/focusgroups/dlt/Documents/d21.zip) in 2019 |
| 3 | Technology Reference Framework | D3.1 | DLT reference architecture | Published as [TS](https://itu.int/en/ITU-T/focusgroups/dlt/Documents/d31.zip) in 2019 |
| D3.3 | Assessment criteria for DLT platforms | Published as [TS](https://itu.int/en/ITU-T/focusgroups/dlt/Documents/d33.pdf) in 2019 |
| 4 | Policy Reference Framework | D4.1 | DLT Regulatory framework | Published as [TS](https://itu.int/en/ITU-T/focusgroups/dlt/Documents/d41.pdf) in 2019 |
| 5 | Standardization Roadmap | D5.1 | Outlook on DLTs | Published as [TS](https://itu.int/en/ITU-T/focusgroups/dlt/Documents/d51.pdf) in 2019 |

* FG-DPM
  + WG3 produced 4 deliverables in the form of technical specifications and technical report focused on Blockchain.

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| **WG** | **Title** | **Deliverables** | | **Status** |
| 3 | Data sharing, interoperability and blockchain | D3.5 | Overview of IoT and Blockchain | Published as [TR](https://extranet.itu.int/sites/itu-t/focusgroups/dpm/Output/DPM-O-151.zip) in 2019 |
| D3.6 | Blockchain-based Data Exchange and Sharing Technology | Published as [TS](https://extranet.itu.int/sites/itu-t/focusgroups/dpm/Output/DPM-O-177.zip) in 2019 |
| D3.7 | Using blockchain to improve data management | Published as [TS](https://extranet.itu.int/sites/itu-t/focusgroups/dpm/Output/DPM-O-152.zip) in 2019 |
| D3.8 | Identity framework in blockchain to support DPM for IoT and SC&C | Published as [TS](https://extranet.itu.int/sites/itu-t/focusgroups/dpm/Output/DPM-O-178.zip) in 2019 |

* FG-DFC
  + FG-DFC WG3 closed in June 2019 and produced 2 deliverables in the form of technical reports but not exactly related DLT

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| --- | --- | --- | --- | --- |
| **WG** | **Title** | **Deliverables** | | **Status** |
| 3 | Security | 1 | * [Protection Assurance for Digital Currencies Report](https://www.itu.int/en/ITU-T/focusgroups/dfc/Documents/DFC-O-008_%20Security%20deliverable_Report_Protection%20Assurance%20for%20Digital%20Currencies.pdf) | Published as [TR](https://www.itu.int/en/ITU-T/focusgroups/dfc/Documents/DFC-O-008_%20Security%20deliverable_Report_Protection%20Assurance%20for%20Digital%20Currencies.pdf) in 2019 |
| 2 | [Proctection Assurance Use Case for a Payment transaction Report ​](https://www.itu.int/en/ITU-T/focusgroups/dfc/Documents/DFC-O-009_Security%20deliverable_Report_Protection%20Assurance%20Use%20Case%20for%20a%20Payment%20transaction.pdf)​ | Published as [TR](https://www.itu.int/en/ITU-T/focusgroups/dfc/Documents/DFC-O-009_Security%20deliverable_Report_Protection%20Assurance%20Use%20Case%20for%20a%20Payment%20transaction.pdf) in 2019 |

* FG-DFS
  + The Focus Group on Digital Financial Services (DFS) operated between June 2014 and 2016 to analyse projects that support financial inclusion and develop a strategy for standardisation of DFS.

| Title | Status |
| --- | --- |
| [Distributed Ledger Technologies and Financial Inclusion](https://www.itu.int/en/ITU-T/focusgroups/dfs/Documents/201703/ITU_FGDFS_Report-on-DLT-and-Financial-Inclusion.pdf) | Completed |
| [Competition Aspects of Digital Financial Services](https://www.itu.int/en/ITU-T/focusgroups/dfs/Documents/201703/ITU_FGDFS_Report-Competition-Aspects-of-DFS.pdf) | Completed |

* FIGI SIT WG
  + The FIGI (Financial Inclusion Global Initiative) symposium is organized by ITU, World Bank Group, Bank for international settlements, and Bill & Melinda Gates foundation. It has held on an annual basis over three years (2017-2020)
  + FIGI Security, Infrastructure and Trust working group (SIT WG) led by ITU has DLT workstream, which produced output documents

·“Security aspects of distributed ledger technologies”

·“Digital financial services security assurance framework”

·“Implementation of secure authentication technologies for digital financial services”

* ISO TC 307
  + TC 307 has six Working Groups, a Study Group, and one Ad-Hoc Group. Five items are published and 14 items are under development.

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| --- | --- | --- | --- | --- |
| **WG** | **Title** | **Work Items** | | **Status** |
| 1 | Foundations | ISO 22739 | Terminology | DIS ballot |
| ISO 23257 | Reference architecture | 3rd CD ballot |
| ISO TS 23258 | Taxonomy and Ontology | WD |
| Study item | Data flow and data taxonomy | Terminated |
| 2 | Security, privacy and identity | ISO TR 23576 | Security management of digital asset custodians | Publication |
| Study item | Security Evaluation of Consensus Models | Under study |
| 2&3 |  | Study item | Security Issues of Smart Contracts | Under study |
| 3 | Smart contracts and their applications | ISO TS 23259 | Legally binding Smart contracts | WD |
| ISO TR 23455 | Overview and interactions between Smart contracts in blockchain and DLT systems | Publication |
| Study item | Supply chain management & trade facilitation | Under study |
| 4 | JWG (Joint working group with ISO/IEC JTC1 SC27) | ISO TR 23244 | Privacy and personally identifiable information protection considerations | Publication |
| ISO TR 23245 | Security risks, threats and vulnerabilities | Publication (early revision) |
| ISO TR 23246 | Overview of identity management using blockchain and DLT | Publication |
| Study item | Trusted anchors for decentralized identity management | Under study |
| 5 | Governance | ISO TS 23635 | Guidelines for governance | WD |
| 6 | Use cases | TR 3242 | Use cases | WD |
| SP | Non-Functional Requirements | Under development |
| (17) | JWG (Joint working group with ISO TC26 SC11) | ISO TR 24332 | Information and documentation – Application of blockchain technology to records management – Issues and considerations | PWI |
| **SG** | **Title** | **Work Items** | | **Status** |
| 7 | Inter-operability | Study item | Interoperability framework | Under study |
| AHG | **Title** | **Work Items** | **Status** |  |
| 2 | Guidance for Auditing DLT Systems | PWI | Guidance for auditing DLT systems | Under study |

* ISO TC 46/SC 11/WG 17
  + ISO TC 46/SC 11/WG 17 proposed a PWI for application DLT to records management.

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| **WG** | **Title** | **Work Items** | | **Status** |
| 17 | Records in the cloud | ISO TR 24332 | Information and documentation – Application of blockchain technology to records management: Issues and considerations | PWI |

* ISO/IEC JTC 1/SC 29/WG 1
  + ISO/IEC JTC 1/SC 29/WG 1 published a JPEG White paper.

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| --- | --- | --- | --- | --- |
| **WG** | **Title** | **Work Items** | | **Status** |
| 1 | Coding of Still Pictures | White paper | Towards a Standardized Framework for Media Blockchain and Distributed Ledger Technologies | Published as [White paper](https://jpeg.org/static/whitepapers/jpeg-media-blockchain-whitepaper.pdf) in 2019 |

* IEEE

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| --- | --- | --- | --- |
| WG | Work item | Title | Status |
| Transactive Energy Working Group | P825 | Meshing Smart Grid Interoperability Standards to Enable Transactive Energy Networks | Under development |
| CEWG - Cryptocurrency Exchange Working Group | P2140.1 | Standard for General Requirements for Cryptocurrency Exchanges | Under development |
| P2140.2 | Standard for Security Management for Customer Cryptographic Assets on Cryptocurrency Exchanges | Under development |
| P2140.3 | Standard for User Identification and Anti-Money Laundering on Cryptocurrency Exchanges | Under development |
| P2140.4 | Standard for Distributed/Decentralized Exchange Framework using DLT (Distributed Ledger Technology) | Under development |
| P2140.5 | Standard for Custodian Framework of Cryptocurrency | Under development |
| BACWG - Blockchain Against Corruption Working Group | P2141.1 | Standard for the Use of Blockchain in Anti-Corruption Applications for Centralized Organizations | Under development |
| P2141.2 | Standard for Transforming Enterprise Information Systems from Centralized Architecture into Blockchain-based Decentralized Architecture | Under development |
| P2141.3 | Standard for Transforming Enterprise Information Systems from Distributed Architecture into Blockchain-based Decentralized Architecture | Under development |
| EIBCTWG - E-Invoice Business Using Blockchain Technology Working Group | P2142.1 | Recommended Practice for E-Invoice Business Using Blockchain Technology | Under development |
| CPWG - Cryptocurrency Payment Working Group | P2143.1 | Standard for General Process of Cryptocurrency Payment | Under development |
| P2143.2 | Standard for Cryptocurrency Payment Performance Metrics | Under development |
| P2143.3 | Standard for Risk Control Requirements for Cryptocurrency Payment | Under development |
| TIDMWG - Trusted IoT Data Management Working Group | P2144.1 | Standard for Framework of Blockchain-based Internet of Things (IoT) Data Management | Under development |
| P2144.2 | Standard for Functional Requirements in Blockchain-based Internet of Things (IoT) Data Management | Under development |
| P2144.3 | Standard for Assessment of Blockchain-based Internet of Things (IoT) Data Management | Under development |
| Blockchain working group  (BOG/CAG/blockchain\_wg) | P2418.1 | Framework of Blockchain Use in Internet of Things | Under development |
| Data Format for Blockchain  Systems (C/SAB/DBC) | P2418.2 | Standard Data Format for Blockchain Systems | Published |
| Distributed Ledger  Technology in Agriculture  (C/SAB/DTLA) | P2418.3 | Standard for the Framework of Distributed Ledger Technology (DLT) Use in Agriculture | Under development |
| DLT in Connected and  Autonomous Vehicles  (VT/ITS/DLTCAV) | P2418.4 | Standard for the Framework of Distributed Ledger Technology (DLT) Use in Connected and Autonomous Vehicles (CAVs) | Under development |
| Blockchain working group  (BOG/CAG/blockchain\_wg) | P2418.5 | Standard for Blockchain in Energy | Under development |
| BDLTH WG - Blockchain and Distributed Ledger Technology (DLT) in Health | P2418.6 | Standard for the Framework of Distributed Ledger Technology (DLT) Use in Healthcare and the Life and Social Sciences | Under development |
| BSCF\_WG - Blockchain in Supply Chain Finance Working Group | P2418.7 | Standard for the Use of Blockchain in Supply Chain Finance | Under development |
| BGAWG - Blockchain for Government Affairs Working Group | P2418.8 | Standard for Blockchain Applications in Governments | Under development |
| CBSTWG - Cryptocurrency Based Security Tokens Working Group | P2418.9 | Standard for Cryptocurrency Based Security Tokens | Under development |
| DAWG - Digital Asset Working Group | P2418.10 | Standard for Blockchain-based Digital Asset Management | Under development |
| BCGOVWG-Blockchain Governance Working Group | P2145 | Blockchain governance standards | Under development |

* W3C
  + Verifiable Claims Working group published 2 items.

|  |  |  |
| --- | --- | --- |
| **Title** | **Type of Document** | **Remarks** |
| Working on Verifiable Claims Use Cases | Working Group Note | Publication does not imply endorsement by the W3C Membership |
| Verifiable Claims Data Model and Representations | First Public Working Draft | This document is intended to become a W3C Recommendation |

* + DID Working group is working on
    - Decentralized Identifiers (DIDs) v1.0
    - Decentralized Characteristics Rubric v1.0
    - Use Cases and Requirements for Decentralized Identifiers
    - [W3C DID Test Suite and Implementation Report](https://github.com/w3c/did-test-suite)
  + Some of the Community groups are working on DLT.

The Blockchain community group, the Blockchain digital asset community group, the Chainpoint community group, and the Interledger payment community group are working but does not yet produce any community group reports.

The Credentials community group worked on decentralized identifiers and published the draft report of DIDs v.1.00.

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