Building the
New Economy of Movement

MOBI TRUSTED TRIP CREDENTIAL

BUSINESS REQUIREMENTS & TECHNICAL SPECIFICATIONS

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INTRODUCTION

MOBI is a nonprofit alliance of many of the world's largest vehicle manufacturers, startups, governments/transit agencies, NGOs, financial institutions, e-mobility providers, consultancies, suppliers, logistics providers, and blockchain protocols working to accelerate adoption and promote standards in blockchain, distributed ledgers, and related technologies.

MOBI is creating simple blockchain-based standards to identify vehicles, people, businesses, and the Trusted Trip in order to securely exchange and share data, and pay for mobility services, with the goal of making transportation more efficient, democratic, affordable, greener, safer, and less congested. MOBI itself is technology and ledger agnostic.

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Sincere thanks and appreciation are extended to those who contributed their unique insights to MOBI Trusted Trip Business Requirements and Technical Specifications.

AUTHOR

Rajat Rajbhandari, PhD, MOBI

REVIEWERS

- Daniel Bar-Lev, MEF Forum
- Roger Berg, DENSO
- Xinxin Fan, IoTeX
- Andreas Freund, MOBI
- Garrett Graham, Accenture
- Toru Kimura, Honda
- Christian Koebel, Honda
- Pramita Mitra, Ford
- Dermot O'Brien, EU Commission
- Johannes Sedlmeir, University of Bayreuth
- Alexander Sorokin, Global Battery Alliance

CONTRIBUTORS

- Ashish Acharya, Ford
- Loren Adams, Accenture
- Dan Adsit, Ford
- Aaron Fong, Honda
- Daniel Bachenheimer, Accenture
- Patrick Bartsch, AWS
- Manuel Bolsinger, BMW
- Michael Casey, GM
- Elena Carrasco, USAA
- Joshua Cartellone, Accenture
- Raullen Chai, IoTeX
- Xinxin Fan, IoTeX
- Stefano Ferretti, University of Urbino
- Amy Fisher, R3
- Michal Filipowski, GM
- Torsten Freund, Global Battery Alliance
- Sanshiro Fukao, ITOCHU
- Valentina Gatteschi, Politecnico di Torino
- Alan Gordon, Ford
- Joel Hartshorn, USAA
- Arjun Hassard, Nucypher
- Martina Huelz, BMW
- Mikael Johansson, Toyota Industries Corporation
- Sumita Jonak, USAA
- Yoji Kawanishi, ITOCHU
- Johannes Klepsch, BMW
- Christian Koetschan, Reply
- Karthik Krishnamurthy, AWS
- Subrata Kundu, Hitachi
- Shaowei Liu, CPChain
- Will Maney, USAA
- Piyush Manocha, Accenture
- Phil Masi, BMW
- Akhilesh Mishra, GM
- Hiroaki Murase, ITOCHU
- Heiko Musa, BMW
- Keisuke Nisugi, Toyota Industries Corporation
- Richard Nolk, CEVT
- Daniela Novaro, Reply
- Rodolfo Occari, Toyota Industries Corporation
- Rodolfo Occari, Toyota Industries Corporation
- Haruobu Ohmae, ITOCHU
- Marcus Olszok, Deutscher Auto Dienst GmbH (DAD)
- Larry Pang, IoTeX
- Dean Phillips, AWS
- Derek Pierre, Nucypher
- Eric Pilat, Cara7
- Rafael Presa, IOTA Foundation
- Peter Schiekofer, Reply
- Sudha Sririam, Ford
- Zhiyi Su, Hitachi
- Suresh Sundararaj, Ford
- Ryan Tabibian, Car IQ
- Vijai Thoppae, Ford
- Sukesh Tedla, Swedish Blockchain Association
- Hong Tran, Nara Institute
- Christaras Vasileios, EU Commission
- Christopher Wallstrom, CEVT
- Mathew Yarger, IOTA Foundation
- Sakai Yoshihide, ITOCHU
- Xiaoliang Zhu, Hitachi

MOBI TEAM

- Tram Vo, Co-director + Founder
- Chris Ballinger, Co-director + Founder
- Rajat Rajbhandari, Working Groups Lead
- Robin Pilling, Technical Lead
- Betul Kahya, Fellow
- Matt Shi, Fellow
- Griffin Haskins, Fellow
- Kelly Clark, Communications Manager
- Grace Pulliam, Community and Media Manager

CONTACT

info@dlt.mobi

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EXECUTIVE SUMMARY

The convergence of multiple rapidly maturing technologies, such as AI, IoT, and blockchain, permits any entity to have an identity, be intelligent, and transact with other things.

The convergence of multiple rapidly maturing technologies, such as AI, IoT, and blockchain, permits any entity — whether a person, vehicle, device, package, piece of infrastructure, or a data set — to have an identity, be intelligent, and transact with other things. These usage-based economy-of-things transactions will include decentralized mobility applications such as seamless multimodal transportation, urban road tolling, congestion pricing, usage-based insurance, incentivizing green and sustainable behavior, supply chain track and trace, and numerous other use cases that we have yet to imagine.

The need for security and rapid throughput will demand that these transactions be processed close to their source, at the "edge." They will require a new type of identity solution, one that is blockchain-based, self-sovereign, decentralized, and machine readable.

MOBI Trusted Trip links an entity's sovereign identity with its timestamped location in the form of credentials (hence, MOBI Trusted Trip Verifiable Credentials or MTTVC) and enables the linkage to be certified throughout a trip in a trusted network.

MOBI Trusted Trip is the key primitive of the multi-trillion dollar "New Economy of Movement."

The MTTVC is based on W3C's Decentralized Identity (DID) and Verifiable Credential (VC) Specifications. Utilization of DID allows holders, on their own terms, to share trusted data with another verified entity without disclosing identity-related information and other selective attributes. MOBI Trusted Trip allows a holder of such credentials to prove to verifiers that it was present, completed a trip, used a resource, provided a service, or performed other relevant activities on the trip while safeguarding its Personal (or organizational) Identifiable Information (PII). MOBI Trusted Trip is the key primitive of the multi-trillion dollar "New Economy of Movement."

GLOSSARY OF TERMS

Decentralized Identity (DID)

W3C Decentralized Identifier represents a globally unique identifier that can be resolved to a DID Document, or de-referenced on a specific distributed ledger network, much like a URL on the Internet.

Geographic Location

A physical space that can be represented by either a single latitude, longitude, or altitude, or a combination. Such locations can be warehouses, intersections, fixed locations on a highway, etc.

Holder

Device/user/entity/application holds a VC about a subject(s) and presents it to a verifier(s) in order to access goods/services.

Issuer

Device/user/entity/application that asserts claims about one or more subjects by creating a VC and providing it to a holder.

Location Authority

Device/user/entity/application that owns/operates the physical location/segment/service and has a way to identify the subject, detect physical presence of the subject, or confirm the service provided to the subject.

Location Presence Credential

A specific type of MTTVC that contains attributes of evidence to confirm the subject's physical presence at a location. For example, "here are the attributes to prove that I was present at a mile marker 6.4 on IH10. on 07.01.2021 at 8:00AM CST."

Personal Identifiable Information (PII)

PII is any information: (1) that identifies or can be used to identify, contact, or locate the person to whom such information pertains, (2) from which identification or contact information of an individual can be derived, or (3) that is or might be directly or indirectly linked to a natural person.

Physical Location

A site (an area, a structure, or group of structures) or an area within the site where something was, is, or will be located. For example, loading dock #4, berth at Terminal 1. Physical locations may be defined by an organization for its business operations and identified using Global Location Number (GLN).

Revocation

When entities use VCs or entries of a DLT/blockchain to prove their claims in a VP, there must be a means to disable their capability to create proofs from this when the reason why the issuance had happened ceases to be legitimate.

Service Provider

The service provider can play the role of an issuer to the holder by virtue of using its services. A system/application (preferably dApp) that provides a variety of services to a holder. It can be a ride hailing service, EV charging service, tolling service, carbon offsetting service, etc. The holder may use the service to complete trips, charge EVs, etc.

GLOSSARY OF TERMS

Start of Trip Verifiable Credential	A specific type of MTTVC that contains attributes of evidence to confirm the subject's commencement of a trip. A message set triggered by a device/user/entity/application that begins monitoring of data which initializes the start of a trip with associated parameters being recorded in parallel to proving the existence of such a proof.
Subject	A subject may be a device/user/entity/application. In many cases, the holder of a VC is the subject.
MOBI Trusted Trip Verifiable Credential (MTTVC)	An abstract credential consisting of a subject's information related to location and other attributes structured using W3C Verifiable Credential Data Model 1.0 standards.
Trip as an Activity	An act of traversing from one location to another location using any mode of transportation. For example, a trip from Chicago (location 1) to New York (location 2) using a vehicle.
Trip Completion Verifiable Credential	A specific type of MTTVC that contains attributes of evidence to confirm the subject's completion of a trip. For example, "here are the attributes to prove that I completed a trip from A to B on 07.01.2021 at 8:00AM CST."
Ubiety	The particular location in space and time of a person, entity, device, or thing.
Verifier	Device/user/entity/application that receives a VC from a holder to verify the credentials presented by the holder in order to provide goods/services to the holder.
Verifiable Credential (VC)	The W3C Verifiable Credentials Standard defines Verifiable Credentials as "a part of our daily lives; driver's licenses are used to assert that we are capable of operating a motor vehicle, university degrees can be used to assert our level of education, and government-issued passports enable us to travel between countries. This specification provides a mechanism to express these sorts of credentials on the Web in a way that is cryptographically secure, privacy-respecting, and machine-verifiable. In the context of Trusted Trip, an issuer/location authority/service provider/issuer provides a verifiable credential to the holder using digital signature that an activity/trip in fact occurred at the given location and time.
Verifiable Data Registry	It plays a role in mediating the creation and verification of identifiers, keys, VC schemas, revocation registries, issuer of public keys, etc. It may be a trusted database, government identity database, or distributed ledger/blockchain.
Verifiable Presentation (VP) by Holders	A holder sends a message set to a verifier, depending on the use case, various attributes about an activity/trip occurred along with proofs of issuer and holder.

BACKGROUND

The New Economy of Movement Requires MOBI Trusted Trip

The New Economy of Movement will unlock secure, privacy-preserving decentralized pay-as-you-go mobility services.

In order to facilitate decentralized transactions in the New Economy of Movement, the ecosystem requires a new type of digital identifier — one that is machine-readable and which anchors any subject (e.g., a person, organization, thing, data model, abstract entity, etc.) to relevant attributes, characteristics, and capabilities. Known as decentralized identifiers (DIDs), it enables the controller of the DID to claim ownership of information without requiring confirmation or permission from any other party.

One such information that is presented by the entities to any third party is location in time and space (or "Ubiety"). Being able to control and present them to third parties in a privacy preserving manner is the key objective of the MOBI Trusted Trip.

Definition of MOBI Trusted Trip

A Trusted Trip is a trip completed or in progress by a roaming entity, attributes of which can be verified by authorized entities (verifiers) in a consortium network.

MOBI Trusted Trip is a higher level concept and can be implemented as physical presence, trip completed or in progress by a roaming entity (such as a person, vehicle, smartphone, EV battery, package, or part), attributes of which can be presented by the holder of such information to anyone and easily verified by authorized entities (verifiers) without requiring a centralized third party.

Need for MOBI Trusted Trip

MOBI Trusted Trip enables an entity to provide a service or data without disclosing confidential data.

In the New Economy of Movement, a Trusted Trip is what establishes the potential to provide a service or data at that location in a decentralized environment without disclosing confidential data. In traditional use cases, a vehicle cannot prove presence at a location without disclosing geo-location breadcrumbs, license plate image read by a roadside device, etc. A vehicle cannot negotiate a right of way with another unless both vehicles reliably know each other's position without reconciling personally identifying information.

MOBI Trusted Trip's privacy-preserving nature means an increase in the volume and value of vehicular mobility data.

MOBI Trusted Trip also allows an entity to prove once and present credentials to separate unrelated entities for verification. This will reduce the need for multiple parties being onboarded and save cost of verifications and settlement of transactions. Savings could be substantial in mobility-as-a-service transactions, including urban road tolling, meter-free parking, congestion management, carbon and pollution taxing, usage-based insurance, vehicle fleet management, and many more. Because Trusted Trip is privacy-preserving, data sharing between roaming entities and institutions will become more desirable, which will increase the volume and value of data associated with vehicular mobility.

BACKGROUND

Objectives of MOBI Trusted Trip

MOBI Trusted Trip combines DID with trusted time-stamped location to enable seamless movement throughout the shared mobility network.

MOBI Trusted Trip allows any verifier to verify a set of digital proofs in the form of credentials presented by a roaming entity (holder) that it was present at a location, completed a trip from A to B (via C), traversed a segment in a trip, or started a new trip, or in a process of completing a trip (i.e., milestones), and performed other relevant activities on the trip. By design, MOBI Trusted Trip is a privacy-preserving predicate for the New Economy of Movement.

Mobility Use Cases

As the key primitive of the New Economy of Movement, MOBI Trusted Trip enables countless sustainable decentralized mobility use cases.

MOBI Trusted Trip enables many new mobility use cases, such as:

- Settle insurance claims and calculate premiums for usage-based insurance.
- Calculate and settle toll and congestion charges.
- Verify chain of custody of physical asset transfer and settle service payments.
- Verify emissions claims to issue carbon credits/offsets.
- Verify vehicle maintenance, battery state of health, etc.
- Verify route waypoints and safety parameters for both offroad and on-road assets.
- Other use cases that require location and time-based proofs of static and mobile assets.

In addition to use-based mobility use cases, MOBI Trusted Trip also supports use cases in supply chain, finance and securitization, telecommunications, and more.

Beyond usage-based mobility, MOBI Trusted Trip is a predicate for other use cases that support mobility:

- Supply chain; especially physical provenance of parts.
- Finance and securitization - e.g.,floor plan audits.
- Telecommunication and mobile connectivity (supports Trusted Trips) - e.g.,mobile home office, knowing the mobile assets location for security services, and mobile endpoints.

Full access to this Standard and other MOBI Standards are available to MOBI members.

If you are not part of the MOBI community and would like to become a member, please fill out our “Membership Inquiry Form” at dlt.mobi/join.

Members gain access to standards, working groups, and many other benefits. Join us in building the New Economy of Movement!

If you have any questions regarding the MOBI Trusted Trip working group, please email info@dlt.mobi

dlt.MOBI @dltMOBI MOBI @dltMOBI info@dlt.mobi