

Executive Summary for Bicycle Industry and Advocacy Leaders

Open Bicycle Digital Identity Standard

Discussion draft

September 21, 2026

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Audience: Executives in the bicycle and drivetrain industries; national and global bicycle manufacturers; national and international bicycle, trail, and access organizations; public-land partners; and standards stakeholders

The decision before the bicycle industry

The bicycle industry has spent years building a workable legal distinction among Class 1, Class 2, and Class 3 electric bicycles. That classification framework has helped advocates persuade legislatures and land managers that bicycles are not a single, undifferentiated category. It has also enabled the most consequential trail-access argument available today: a land manager can permit a defined class of bicycle without permitting every motorized device sold as an e-bike.

That policy framework now needs an information framework.

The central operational problem is straightforward: **a law, ordinance, or trail policy can specify which bicycle class is allowed, but a ranger, police officer, retailer, consumer, or land manager often has no reliable and efficient way to determine what a particular bicycle or e-bike was manufactured to be – or whether its current configuration remains within that class.** A conventional class label is useful, but it is static, visually limited, inconsistently applied,

and easily separated from the underlying product record. It cannot reliably communicate configuration history, selectable operating capabilities, later modification, current attestation, or a jurisdiction-specific eligibility decision.

The proposed **Open Bicycle Digital Identity Standard, or OBDI**, closes that implementation gap. It gives each bicycle a durable, privacy-preserving digital identity that can be read from an NFC tag or QR code and resolved to authoritative information about the bicycle. Manufacturers can establish and expose the bicycle's original configuration at manufacture. Owners can attest to current configuration when a program requires it. Municipalities, agencies, and land managers can evaluate those facts against their own rules and display a clear field result.

That manufacturer-originated record is a critical path toward consumer trust. A buyer, retailer, advocate, or public official should be able to determine from an authoritative source what a specific bicycle was designed and configured to do when it left the factory – not merely what a decal, product name, or seller represents it to be.

OBDI does not create a new bicycle class, dictate access policy, or ask manufacturers to surrender control of proprietary systems. It supplies the missing information layer that allows existing class-based policy to remain credible, enforceable, and scalable.

Why this matters now

National advocacy has succeeded in making classification central to bicycle policy. PeopleForBikes has emphasized that access decisions should recognize distinctions among bicycle classes and allow land-manager discretion across different types of infrastructure. IMBA continues to advocate specifically for expanding **Class 1** eMTB access to nonmotorized trails through public land-management processes. Manufacturers such as Trek explain the same three classes to consumers and advise riders that the legality of each class depends on the place where it is used. ([PeopleForBikes](#), [IMBA](#), [Trek](#))

These positions share an unstated dependency: **the class distinction must be meaningful at the individual-bicycle level.**

That dependency is becoming more important as the market evolves. Some products can operate across more than one class or can change behavior through software, settings, accessories, controllers, throttles, or aftermarket modification. Product names and frame appearance do not reliably reveal operating capability. A person enforcing a Class-1-only trail policy should not have to search manufacturer websites, interpret controller menus, identify motors from appearance, or trust a sticker without any supporting record.

If class-specific rules cannot be administered in the field, land managers face three unattractive choices:

- allow all products marketed as bicycles, regardless of actual capability;
- create complicated local inspection and registration systems; or
- prohibit bicycles broadly because a narrower rule appears unenforceable.

The third outcome is the central advocacy risk. A credible identity and information standard makes a more precise policy easier to adopt and defend.

What OBDI would do

OBDI would associate a physical bicycle with a durable digital identity. The most economical implementation is a paired **NFC and QR identity** installed by the manufacturer or added after sale. With connectivity, either method opens the same authoritative, mobile-friendly web record. The online record remains the source of truth, allowing facts and status to be corrected, updated, suspended, or revoked without replacing the physical tag.

The NFC profile should also support field use where cellular or Wi-Fi service is unavailable. A compatible handheld device could read a compact, privacy-safe, digitally signed subset of public manufacturer attributes directly from the tag—for example, manufacturer, model, model year, original assist type, assist cutoff, throttle capability, applicable motor-rating fields, operating-mode capability, record version, and integrity signature. Once connectivity returns, the reader could reconcile that snapshot with the authoritative online record and current credential status.

Neither the URI nor the offline field record should contain owner identity, contact information, payment information, or location history. The architecture separates public product facts from private account and ownership records.

The standard separates three questions that are too often collapsed:

Question	Primary source	What the record establishes
What bicycle is this	Manufacturer identity, serial relationship, permanent or aftermarket tag	The physical bicycle associated with the record

What was it built to do	Manufacturer or validated model data	Original motor, assistance, cutoff, throttle, operating-mode, market, and configuration facts
What is it allowed to do here	Current configuration evidence plus the responsible authority's versioned ruleset	Whether the bicycle is presently represented as eligible under that specific local policy

The result can be simple for a field official:

Eligible under this agency's Class 1 policy

Manufacturer configuration verified

Owner attestation current

No suspension or revocation

Bicycle description and photograph match

The same bicycle could receive a different result under another jurisdiction because the identity is permanent while policy remains local. That is a feature, not a defect. OBDI standardizes facts and resolution; it does not nationalize land-management decisions.

Why an open standard is better than isolated programs

Without an open standard, each city, park district, state, manufacturer, and access program can create its own tag, database, terminology, and verification page. That fragmentation would impose recurring costs on manufacturers, confuse riders, and make field enforcement less credible.

An open standard creates a shared foundation:

- **One bicycle can support multiple programs.** A permanent manufacturer tag, an aftermarket tag, and an agency credential can all resolve to the same canonical bicycle record.
- **Manufacturers can publish once.** Standard fields and APIs can communicate original configuration to many participating programs without custom integration for every jurisdiction.

- **Agencies retain policy authority.** Each authority decides which classes or configurations it permits and publishes its own versioned ruleset.
- **Advocates gain an implementation answer.** When a land manager asks how a Class-1-only rule could be administered, advocates can point to a common verification method rather than promise perfect voluntary compliance.
- **Consumers receive clarity.** A buyer can understand what the bicycle was designed to be and where a participating authority recognizes it.
- **Enforcement becomes targeted.** Officers can distinguish a recognized compliant bicycle from an unknown, expired, suspended, altered, or out-of-policy bicycle without turning every trail interaction into a technical inspection.

The standard should remain vendor-neutral, use established NFC and web conventions, minimize public data, and permit competition among registries, tag suppliers, software providers, and credential programs.

Trust requires independent stewardship

Manufacturer data must originate with the manufacturer, but the common specification, field vocabulary, conformance rules, and cross-industry registry relationships should not be controlled by any single company, advocacy organization, or government agency. The credibility of OBDI depends on neutral stewardship.

The recommended governance model is an independent nonprofit consortium composed of senior representatives from major bicycle manufacturers, drivetrain and control-system suppliers, national and global bicycle organizations, trail and access organizations, land managers, enforcement practitioners, privacy and cybersecurity experts, and technical standards specialists. Ideally, the same consortium would develop the OBDI standard, maintain its versioned schemas and conformance tests, accredit or recognize compatible registries, and oversee an open process for amendments.

Independent stewardship would provide several forms of trust:

- **Consumer trust:** factory attributes use a consistent vocabulary and can be traced to their source.
- **Manufacturer trust:** no competitor controls the standard, and proprietary information beyond the agreed public fields remains protected.
- **Agency trust:** eligibility decisions rely on documented provenance, versioned rules, and auditable status rather than self-applied labels alone.

- **Advocacy trust:** the system serves durable access policy rather than the commercial interests of one brand or one credential provider.
- **Technical trust:** conformance, security, privacy, and interoperability requirements are maintained transparently and tested consistently.

The consortium need not operate every registry or consumer service. Its essential role is to hold the standard in trust, define how authoritative manufacturer assertions are recognized, and ensure that competing implementations remain interoperable.

Strategic value by stakeholder

Bicycle and drive-system manufacturers

For manufacturers, OBDI is a product-integrity, consumer-trust, and market-access tool. It gives reputable brands a durable way to distinguish products engineered for a defined legal class from products that merely offer a compliant mode among higher-powered or differently configured modes.

Participation could begin without embedding new hardware. A manufacturer could provide model-level data, a serial-number lookup, a signed batch file, or an API. Over time, manufacturers could install a permanent NFC identity in a frame or motor and print a corresponding QR code at the documented tap location. Existing product-registration and service systems could remain in place; OBDI would provide an interoperable public identity and configuration layer above them.

The minimum manufacturer contribution should be a structured record of the bicycle's configuration at manufacture. Publishing that limited set of authoritative facts gives consumers confidence that the product matches its claimed class, gives retailers a reliable explanation of the product, and gives agencies a defensible factual basis for class-specific decisions. It does not require publication of proprietary firmware, engineering data, customer information, or private service records.

The commercial benefit is not limited to compliance. A durable identity can support registration, service history, theft recovery, product notices, warranty routing, resale, and digital product information—provided those uses remain properly separated and privacy-protective. The immediate industry case, however, is access: **a bicycle that can reliably demonstrate its intended class is easier for advocates and land managers to defend.**

PeopleForBikes and national policy organizations

For national advocacy organizations, OBDI operationalizes the class-based policy architecture they have already advanced. Model legislation defines categories; the information standard makes those categories easier to apply to real products in real places.

This strengthens advocacy in several ways:

- reduces the gap between statutory definitions and marketplace behavior;
- gives policymakers a practical alternative to registration mandates or blanket prohibitions;
- supports consistent terminology and manufacturer data across states;
- allows programs to adapt when definitions change without replacing physical tags; and
- provides aggregated, privacy-protective evidence about participation and compliance that may improve future policymaking.

OBDI should be framed as voluntary infrastructure that supports – not replaces – sound legislation, responsible product design, consumer education, and appropriate enforcement.

National and regional trail-access advocates

For National, regional, and local trail organizations, the standard directly addresses a recurring obstacle in access discussions: the concern that a Class-1-only opening will be impossible to distinguish from permission for faster, throttle-equipped, multi-class, or modified machines.

No information system can eliminate misconduct. OBDI can, however, make a narrowly tailored rule administrable. It allows a ranger to confirm that the bicycle presented is associated with an eligible manufacturer configuration or approved attestation, whether that status is current, and whether the visible bicycle plausibly matches the record. It also provides a pathway to suspend or revoke a credential when inspection shows that a bicycle no longer conforms.

That changes the policy conversation from “**we cannot tell the difference**” to “**we have a practical method for identifying participating bicycles and addressing noncompliance.**”

Municipalities agencies and land managers

Public agencies do not need another vehicle-registration bureaucracy, nor is one suitable for the bicycle industry or consumer. Municipal systems need a low-friction way to implement the policy they have chosen.

Under OBDI, an agency could publish a ruleset stating, for example, that only Class 1 bicycles without selectable out-of-class operation are eligible on designated natural-surface trails. A participating resolver would compare structured bicycle facts and current attestations against that

ruleset. The field page would display the agency, policy version, eligibility state, verification basis, and enough visible bicycle characteristics to discourage transferring a tag to another bicycle.

The agency would retain discretion over access, enforcement, evidence, appeals, and revocation. OBDI would supply the shared identity and data plumbing.

What OBDI does not claim

The standard should be adopted with disciplined expectations.

- An NFC tag does not electronically test motor output or prove that a bicycle has never been modified.
- Manufacturer data establishes original configuration, not permanent compliance after sale.
- Owner attestation is meaningful only when supported by clear terms, audit authority, and consequences for false statements.
- A static pilot tag can be copied; tamper-evident construction, visual bicycle matching, server-side status, and revocation reduce that risk but do not eliminate it.
- An eligibility result applies to the identified agency and ruleset. It is not a universal declaration of legality or access.
- Public verification should expose no owner identity, payment information, or location history.

These limitations are reasons to design the system carefully, not reasons to abandon the information standard. Existing class labels have the same limitations with fewer safeguards and no live status.

A practical path forward

The proposal does not require a national mandate or immediate integration by every manufacturer. A credible pilot can be intentionally small.

Phase 1 pilot

- Recruit one or two willing land managers and a limited group of riders.
- Use inexpensive, tamper-evident NFC stickers with matching QR codes.
- Establish canonical bicycle records using make, model, serial number, color, size, photograph, and available manufacturer specifications.
- Require a clear owner attestation to current configuration.
- Publish a privacy-preserving verification page optimized for a ranger's phone.

- Test issuance, field scanning, replacement, transfer, expiration, suspension, revocation, and appeal.
- Measure scan reliability, field comprehension, administrative workload, misuse, and participant acceptance.

Industry development

- Convene manufacturers, drive-system suppliers, Advocacy nonprofits, land managers, enforcement practitioners, privacy experts, and NFC specialists.
- Establish an independent nonprofit standards consortium with balanced representation and transparent governance.
- Agree on the minimum bicycle identity and configuration fields.
- Define how manufacturers can publish model- and bicycle-level provenance without exposing proprietary data.
- Define the compact signed attribute set that authorized handheld readers can verify without network connectivity.
- Test interoperability between manufacturer-controlled identity records and independent agency credentials.
- Develop the higher-assurance profile for factory-installed authenticated NFC tags.

Recommended industry action

Industry and advocacy leaders should authorize a limited working group to review the [Open OBDI Specification](#), establish the basis for an independent nonprofit standards consortium, and shape a neutral pilot. The immediate request is not endorsement of a finished standard. It is agreement that the underlying problem is real, manufacturer-originated specifications are essential to trust, and a shared open information architecture is preferable to fragmented local registration systems or broad restrictions created by enforceability concerns.

The working group should answer five threshold questions:

1. What minimum factory facts are necessary to establish a bicycle's original class and operating capabilities?
2. How should selectable modes, software configuration, throttles, and post-sale modification be represented?
3. What information can manufacturers provide through a common API, resolver, or signed data feed?
4. Which public attributes should be readable offline from NFC, and how should their integrity and freshness be verified?

5. What evidence and due process should support current attestation, suspension, and revocation?
6. What independent governance structure can hold the standard and conformance process in trust?
7. Which land manager, drivetrain supplier, and manufacturer partners are prepared to test the Minimum Viable Profile?

The bicycle industry has already made classification the foundation of bicycle policy. The next step is to make classification legible at the bicycle itself. An open OBDI standard can give manufacturers, advocates, land managers, and enforcement officials a common answer to the question that determines whether class-specific access works in practice:

What is this bicycle, and is this type of electric bicycle allowed here?

Interested parties should reach out directly for inclusion in the working group:
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