



BSI Standards Publication

Intelligent transport systems — Management of electronic traffic regulations (METR)

Part 3: System of systems requirements and architecture (SoSR)

National foreword

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The UK participation in its preparation was entrusted to Technical Committee EPL/278, Intelligent transport systems.

A list of organizations represented on this committee can be obtained on request to its committee manager.

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Intelligent transport systems - Management of electronic traffic regulations (METR) - Part 3: System of systems requirements and architecture (SoSR) (ISO/TS 24315-3:2025)

Systèmes de transport intelligents - Gestion des règles de circulation sous forme électronique - Partie 3: Exigences et architecture pour le système des systèmes (ISO/TS 24315-3:2025)

Intelligente Verkehrssysteme - Management von elektronischen Verkehrsregularien (METR) - Teil 3: System von Systemanforderungen und Architektur (SoSR) (ISO/TS 24315-3:2025)

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European foreword

This document (CEN ISO/TS 24315-3:2025) has been prepared by Technical Committee ISO/TC 204 "Intelligent transport systems" in collaboration with Technical Committee CEN/TC 278 "Intelligent transport systems" the secretariat of which is held by NEN.

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Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

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This document was prepared by Technical Committee ISO/TC 204, *Intelligent transport systems*, in collaboration with the European Committee for Standardization (CEN) Technical Committee CEN/TC CEN/TC 278, *Intelligent Transport Systems*, in accordance with the Agreement on technical cooperation between ISO and CEN (Vienna Agreement).

A list of all parts in the ISO 24315 series can be found on the ISO website.

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

Introduction

0.1 System overview

The ISO 24315 series on the management of electronic traffic regulations (METR) is intended to provide users access to geo-specific, trustworthy, timely, authoritative, machine-interpretable, traffic and transport related rules enacted by jurisdictional entities, including those who define rules for campuses (i.e., private grounds). This is conceptually shown in Figure 0-1.

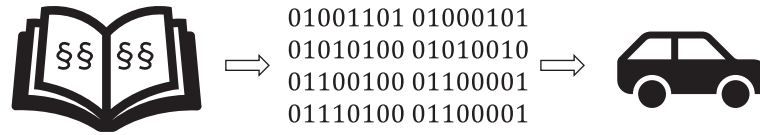


Figure 0-1 — Management of electronic traffic regulations (METR) concept

0.1.1 Purpose

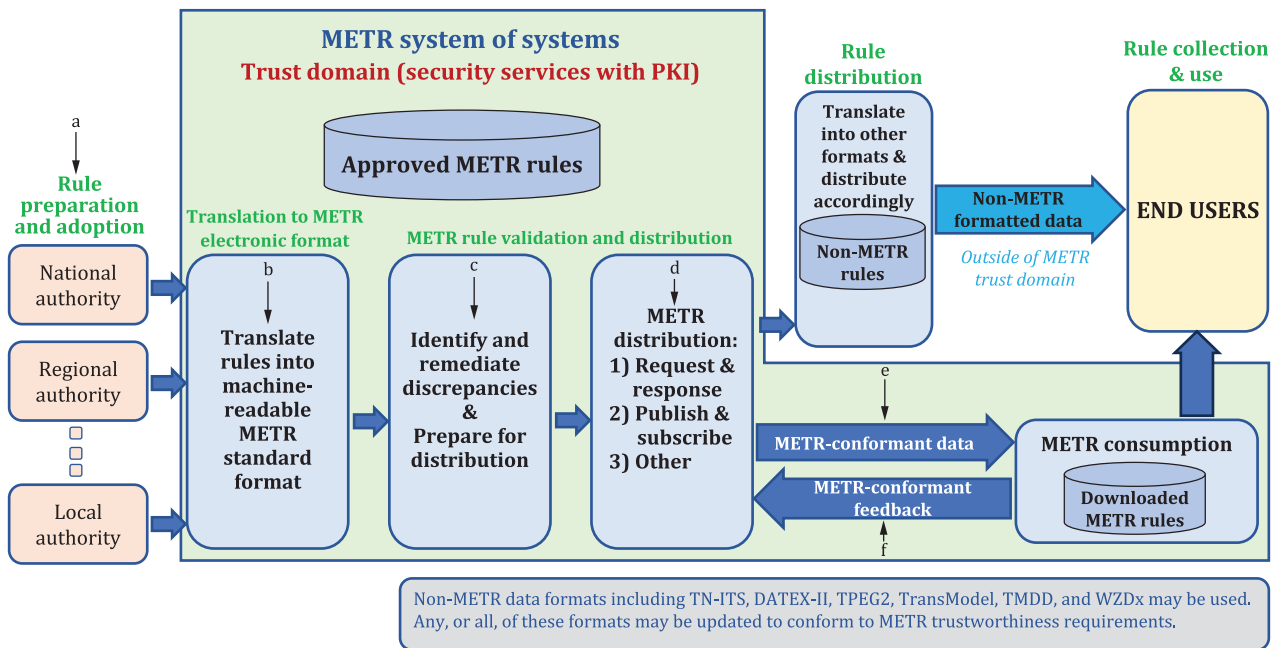
METR is designed to assist developers and manufacturers of driving automation systems (i.e., automation Levels 1 to 5) and driver information systems (including those at automation Level 0) to electronically obtain traffic rules to better enable:

- a) interacting safely with other road users;
- b) following instructions from law enforcement organizations, and those authorized to direct traffic;
- c) maintaining smooth and safe flow of traffic; and
- d) complying with other rules enacted to support legislative policies (such as environmental protection, noise, manage height and weight restrictions, and societal aspects such as market days, fiestas, pedestrian zones, etc.).^[1]

METR is designed to provide a reference framework for the trustworthy distribution of electronic versions of legal traffic rules, however content and application of the traffic rules is outside of the scope of the METR standards and specifications.

0.1.2 Flow of information

The general flow of METR information is illustrated in Figure 0-2 and subsequently described.



Key

- a METR starts with rule makers defining and enacting rules that are relevant to transport users.
- b Each legal rule is translated into a METR rule, which is a secure, standardized electronic representation that includes a digital signature of the rule signing organization.
- c METR rules are collected for a geographic area(s) and specific scope(s).
- d Rules are distributed to METR users based on their needs.
- e METR users become aware of the METR rules, verify their authenticity, and respond appropriately.
- f As needed, METR users can submit discrepancy reports to a discrepancy handler for investigation and correction.

Figure 0-2 — Management of electronic traffic regulations (METR) flow of information

0.1.3 Graphical overview

Figure 0-3 provides an overview of the data and devices included within the scope of the METR environment.

A	freight rules
B	kerbside usage rules
C	ride sharing rules
D	micromobility rules
E	VRU rules
F	public transport rules
G	rules for automated driving systems
H	driving rules
I	lane use rules
J	public-area mobile robot rules
K	road work rules
L	pre-announced rules with subset of either emergent rules or supporting data or both
M	either emergent rules or supporting data, or both
1	various communications and network infrastructure
2	roadside communication unit
3	METR user system

0.1.4 Rule distribution

- Electronic rules can be pre-announced (i.e., known and publicized well in advance of the user's need) or emergent (i.e., publicized and needed while previously obtained pre-announced rules are still considered fresh).
- Electronic rules can be distributed through a wide-area distribution mechanism or a local distribution mechanism.
- Electronic rules can be pulled by users well in advance of their need or pushed to users as special conditions necessitate.

It is expected that the characteristics of METR users and the limitations on data capacities for local distribution mechanisms mean that virtually all persistent rules will be pre-announced and distributed from a wide-area distribution source, likely using a pull mechanism. However, any emergent rule that is activated while previously distributed pre-announced rules are still considered fresh necessitates a push mechanism, often from a local distribution source. Those two combinations are only typical use cases and that METR supports every possible combination of these three characteristics and addresses how discrepancies can be reported and resolved.

In addition, supporting data can provide context to the rules and can be transmitted by wide-area communication systems, roadside units, other vehicles, or on-board devices.

The rules cover virtually any rule related to surface transport systems; the graphic depicts rules for freight vehicles, kerbside usage, ride sharing, micromobility operations, vulnerable road users (VRUs), public transport usage, driving (i.e., human-in-the-loop, including driver support systems, which represent Levels 1 and 2 of automation), Automated driving systems (ADS) (i.e., automation Levels 3 to 5), lane usage, public-area mobile robots (PMRs), and road works. This information must be available and conveyed to all transport users including nomadic devices, PMRs, and vehicles equipped with driving automation systems (i.e., Levels 1 to 5 of automation). Although not shown in the diagram, METR is also intended to be flexible enough to support rules relating to the use of ferries, passenger rail (e.g., trams, subways, and inter-city rail), and off-road environments.

0.2 Framework adaptation

METR is defined through the ISO 24315 series, which provides a comprehensive framework for the interoperable digitalization, distribution, and management of electronic traffic regulations. This framework will be defined at a relatively high-level and will support both regional adaptation and customization, as well as the use of non-METR protocols and data formats, as depicted in Figure 0-4.

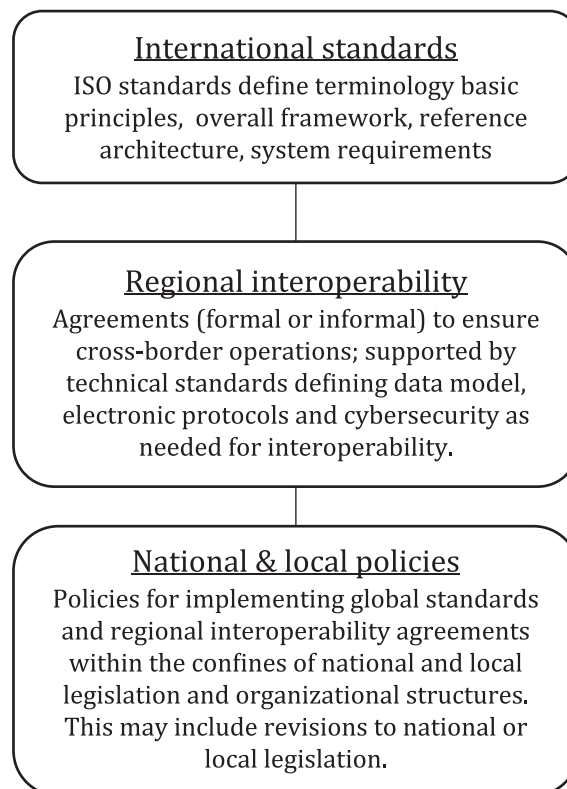


Figure 0-4 — Three-tier framework

The first set of ISO documents of the ISO 24315 series provide a framework based on the ISO-specified systems engineering methodology as defined by ISO/IEC/IEEE 29148,^[2] and consist of a vocabulary, a concept of operations, a reference architecture, and requirements for the METR system of systems (SoS). Subsequent documents in the ISO 24315 series define requirements for each component system within

the METR SoS and other requirements common to all component systems. The ISO 24315 series promotes semantic interoperability but necessitates interpretation and adaption for regional use to provide complete interoperability (i.e., including syntactic interoperability).

Each region (e.g. EU, Japan, Korea) customizes (e.g. extends and adapts) the ISO 24315 series based on their specific needs and environment, as necessary to provide cross-border interoperability within their region. The METR reference architecture is refined to provide regional implementation guidance. For example, in Europe, METR can eventually become part of the national access point (NAP). Furthermore, non-METR data formats including TN-ITS,^[3] DATEX-II,^[4] TPEG2,^[5] TransModel,^[6] TMDD,^[7] and WZDx^[8] can be refined to support METR requirements or used as-is to deliver METR information to the extent that the data can be supported (i.e., non-METR distribution). The preferred solution is to update these formats to conform to the full set of METR trustworthiness requirements.

Translating and adapting international standards and regional interoperability agreements is achieved at the national level and can even be done at local levels. Operations, funding and governance are determined nationally, locally, or both. Legal implications of electronic rules provided through METR are defined nationally or locally. Many places start this digitalization of the rules at an informative supplemental level, rather than as regulatory.

0.3 Document overview

The METR provides trustworthy, authoritative, machine-interpretable, transport-related rules for using the road network. The purpose of this document is to define formal requirements for the METR SoS and to introduce the reference architecture used by subsequent parts.

The requirements are provided in a format that is consistent with the guidance provided by ISO 29148^[2] for a system requirements document.

The operational concept for METR is provided in ISO/TR 24315-2.^[9]

This document has been developed in coordination with many experts from countries around the world. It is designed to be sufficiently generic to be applicable to any national or regional authority that wishes to adopt its processes.

System developers and system operators within authorities that adopt the METR model are advised to become familiar with this document and use it as their guide in operations.

Intelligent transport systems — Management of electronic traffic regulations (METR) —

Part 3: System of systems requirements and architecture (SoSR)

1 Scope

This document defines the end-to-end requirements for the entire management of electronic traffic regulations (METR) system of systems (SoS). This document introduces the reference architecture used by subsequent parts.

NOTE The operational concept for METR is provided in ISO/TR 24315-2.^[9]

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 21217, *Intelligent transport systems — Station and communication architecture*

ISO/TS 14812:2022, *Intelligent transport systems — Vocabulary*

ISO/TS 24315-1:2025, *Intelligent transport systems — Management of Electronic Transport Regulations (METR) — Part 1: Vocabulary*

ISO/IEC/IEEE 24765:2017, *Systems and software engineering — Vocabulary*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO/IEC/IEEE 24765, ISO/TS 14812, ISO 24315-1 apply.

ISO and IEC maintain terminology databases for use in standardization at the following addresses:

- ISO Online browsing platform: available at <https://www.iso.org/obp>
- IEC Electropedia: available at <https://www.electropedia.org>

4 Abbreviated terms

For the purposes of this document, the following abbreviated terms apply.

ADS	automated driving system
ARC-IT	architecture reference for cooperative and intelligent transportation
CCMS	cooperative ITS credentials management system
CV	connected vehicle
FM	frequency modulation
GNSS	global navigation satellite system
HTML	hypertext markup language
IEC	International Electrotechnical Commission
IEEE	Institute of Electrical and Electronics Engineers
ISO	International Organization for Standardization
ITS	intelligent transport systems
MCMC	maintenance and construction management centre
METR	management of electronic traffic regulations
OBE	on-board equipment
OEM	original equipment manufacturer
PID	personal information device
PMR	public mobile robot
RSE	roadside equipment
SoS	system of systems
SoSR	system of systems requirements
SRADS	service registration and discovery service
TCD	traffic control device
TS	technical specification
UN	user need
VRU	vulnerable road user
WAIDS	wide-area information disseminator system

5 Overview

5.1 METR purpose

The ISO 24315 series intends to provide trustworthy transport-related rules in a machine-interpretable format to transport users.

5.2 METR scope

The METR SoS is designed to provide electronic systems with the rules that travellers are required to follow. Provision of this rule information can be used directly by the receiving electronic system and can also be displayed to travellers to confirm which rules are currently relevant. To achieve this, the METR SoS provides a path and process to distribute the rules defined by rule makers to METR users (e.g. travellers), who are required to comply with the rules.

Some rules are dependent upon supporting data, which can provide parameters related to a rule (e.g., the current speed limit for a variable speed limit system) or parameters that activate rules (e.g. the presence of rain can result in a lower speed limit). The METR SoS is responsible for delivering rules entered by a translator to (typically mobile) METR user devices. The METR user device is responsible for merging these rules along with supporting data from other sources (e.g. visually observed rules, current traffic conditions, and other factors) and providing merged results to the user, as needed. The METR SoS also includes the ability to report observations from the field back to the central office to ensure that the electronic data store is consistent with the rules posted in the field.

5.3 Management of electronic traffic regulations (METR) overview

5.3.1 Functional view

[Figure 1](#) summarizes the functional view of METR. It summarizes the functions to be performed and the data flows associated with each function. The diagram conforms to the rules for Yourdon-Demarco data flow diagrams,^[10] as summarized in [Annex B](#). Depicting all processes and flows on a single diagram is overly complex. [Figure 1](#) focuses on the main METR processes and flows, while ISO/TR 24315-2:2025, 7.4.2 and 7.4.3 provide a more complete listing as well as a complete description of the diagram.

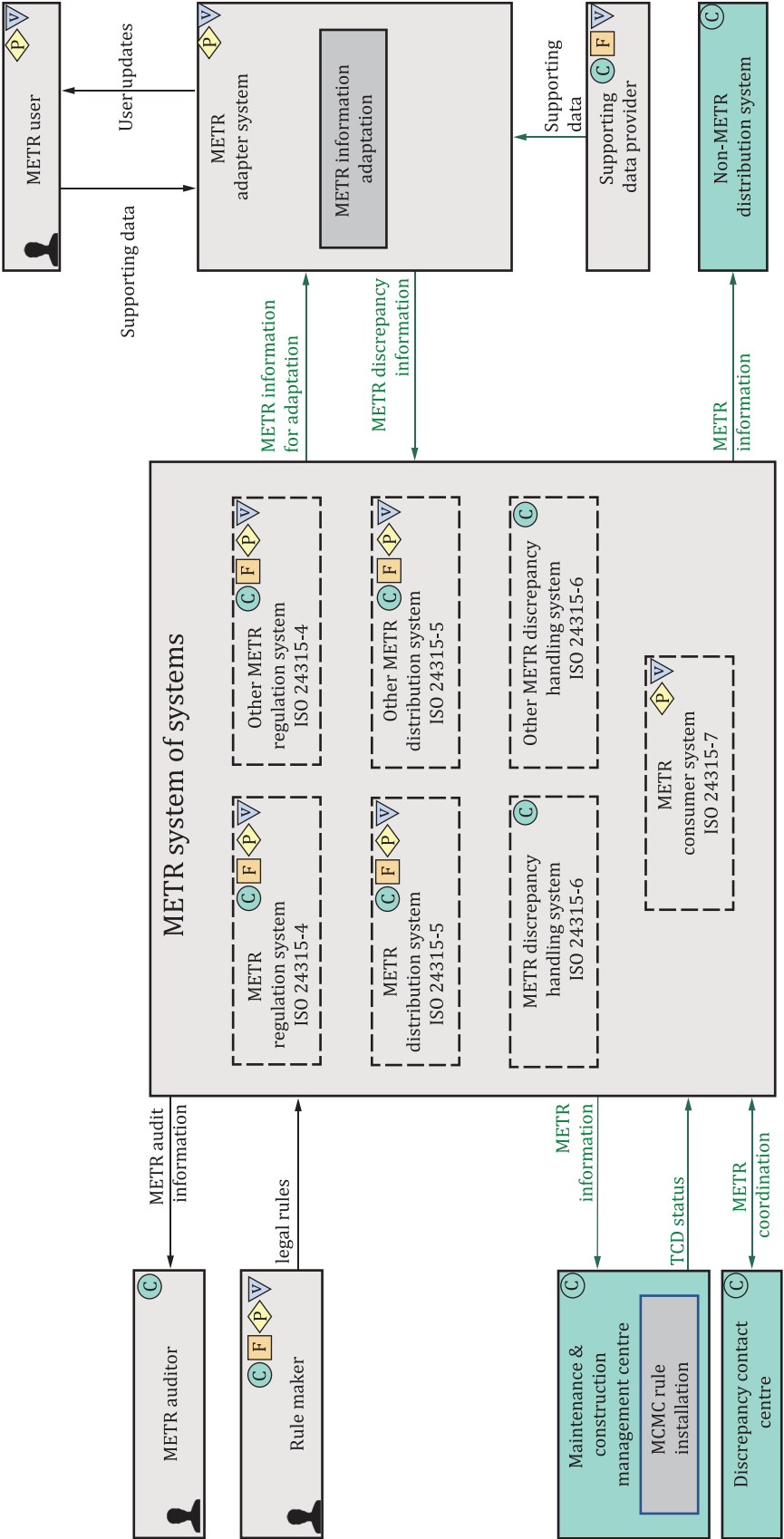


5.3.2.1 Overview

Full document details: PD CEN ISO/TS 24315-3:2025

Key

- centre
- field



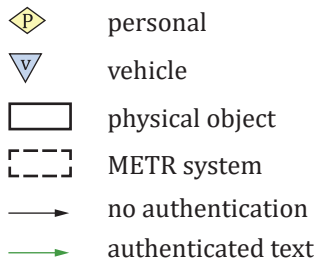


Figure 2 — Physical view

NOTE 1 The METR auditor can request METR audit information from METR system components when appropriate. For clarity, neither the actor nor the flow will be shown in most of the subsequent detailed diagrams.

NOTE 2 Example deployments for this architecture are discussed in [Annex C](#).

5.3.2.2 Information flows

Figure 2 includes the following information flows that are defined as a part of the METR SoS.

- a) Discrepancy Contact Centre <—> METR SoS: METR coordination (as defined in [6.2.2](#) and [6.3.2](#));
- b) MCMC —> METR SoS: TCD status (as defined in [6.2.4](#));
- c) METR adapter system —> METR SoS: METR discrepancy information (as defined in [6.2.3](#));
- d) METR SoS —> MCMC: METR information (as defined in [6.3.3](#));
- e) METR SoS —> METR auditor: METR audit information (as defined in [6.3.1](#));
- f) METR SoS —> METR adapter system: METR information for adaptation (as defined in [6.3.4](#));
- g) METR SoS —> Non-METR Distribution System: METR information (as defined in [6.3.3](#));
- h) Rule maker —> METR SoS: legal rules (as defined in [6.2.1](#)).

5.3.2.3 Other relevant information flows

In addition to the information flows identified in [5.3.2.2](#), there are several other information flows shown in [Figure 2](#) that provide additional insight into how METR is expected to work within its overall environment, which is as follows:

- a) METR adapter system —> METR user: user updates: This flow allows the METR adapter system to provide the METR user with rules as they become relevant.
- b) METR user —> METR adapter system: supporting data: This flow allows a METR user to provide supporting data to the METR adapter system through a human machine interface. This flow is particularly useful for supporting data that can be difficult for the METR adapter system to obtain through other means (e.g. notification that the user possesses a particular type of parking permit).
- c) Supporting data provider —> METR adapter system: supporting data: This flow allows the METR adapter system to obtain rules from supporting data providers, which are likely to include providers that are on-board the vehicle (e.g., sensors on-board the vehicle), at the roadside (e.g., RSUs), and at remote centres (e.g., via cellular connections).

5.3.2.4 Physical objects

[Table 1](#) defines the physical objects for METR contained in the top-level physical view.

Table 1 — Physical objects

Physical object	Description	Assigned processes
Discrepancy contact centre	The discrepancy contact centre is an optional component that represents any non-METR organization whose assistance can be needed to address reported discrepancies. For example, if METR adapter systems from a specific manufacturer consistently report discrepancies when none exists, the METR SoS can coordinate with that manufacturer's discrepancy contact centre to alert them to the problem.	Update external systems
Maintenance and construction management centre (MCMC)	The MCMC is a required component responsible for planning, installing, implementing, and maintaining all traffic control devices (TCD) that correspond to jurisdictional rules, as well as detectors and sensors that provide supporting data. It is used by the rule implementer to report the implementation status of a rule either through use of traffic control devices (TCDs) or through updates to the public record. While this physical object can be a simple implementation for the purpose of METR, it is envisioned to be fulfilled by the more general ARC-IT-defined physical object that monitors and manages roadway infrastructure construction and maintenance activities.	Implement rules
METR adapter system	The METR adapter system is a required component that represents the physical object used by a METR user to obtain relevant rules. It is expected to be either the on-board equipment (OBE) of a vehicle or a personal information device (PID). The METR adapter system obtains METR rules from the METR SoS and merges them with supporting data, which can include rules detected with on-board sensors, location information, environmental conditions, time-of-day information, variable speed limit information, etc. The METR adapter system presents relevant rules to other on-board components to fulfil specific user needs (e.g., displaying information to a human driver or providing information electronically to an ADS). Any inconsistencies detected during this process are reported as a discrepancy to the METR SoS.	— Obtain electronic supporting data — Identify relevant rules — Present relevant rules
METR auditor	The METR auditor is responsible for analysing the information received and sent by a METR component. For example, this task can be a part of forensic analysis. There are multiple types of auditors. Regional documents and future editions of this document can define additional requirements for these auditors.	Audit systems
METR SoS	The METR SoS is a required component that represents the set of METR systems detailed in ISO 24315-4 to ISO 24315-7. The METR SoS obtains electronic versions of rules and provides a trustworthy pipeline to METR adapter systems for the distribution of these rules. It also handles discrepancy reports submitted by METR adapter systems so that they can be investigated and addressed.	— Translate into electronic rules — Verify electronic rules — Approve electronic rules — Report system-generated discrepancies — Distribute rules to users — Identify current rules — Report unverified discrepancies — Consolidate discrepancies — Report discrepancies — Resolve discrepancies

Table 1 (continued)

Physical object	Description	Assigned processes
METR user	The METR user is a required component that represents the entity that must be aware of the transport rules. This is typically the transport user or automated driving system (Level 1 through 5). The METR user is responsible for receiving relevant rules as presented by the METR adapter system and fusing this information with their own observations (e.g. supporting data from posted rules) to make operational decisions.	
Non-METR distribution system	Non-METR distribution system is an optional component that represents any non-METR system that receives METR information, optionally combines this data with other information, and distributes to users in a manner that does not conform to minimum METR requirements. For example, a map provider can embed METR information into its map database distributed to its subscribers. If the embedded rules do not include the signature of the rule signer, the data is not conformant to METR and the system is classified as a non-METR distribution system. Since it is, by definition, a non-conforming system, the ISO 24315 series does not place any requirements on the performance of these processes.	— Distribute rules to users
Rule maker	The rule maker is a required component that represents any entity authorized to issue rules (i.e., including rules of the road, regulations, advisories, warnings, or guidance).	
Supporting data provider	The supporting data provider is a recommended component that obtains data from sensors, data stores, and other resources and provides this data to the METR adapter system to assist in determining whether rules are active (e.g. parking restriction is active in the evening), and parameters associated with rules (e.g. the current variable speed limit).	Monitor supporting data

5.3.2.5 Component systems

[Clause 8](#) further analyses the internals of the METR SoS and provides a more detailed physical view that identifies the component systems of the METR SoS and explains the information flows that occur internally within the METR SoS. Requirements for each component system is provided in subsequent parts of the ISO 24315 series.

5.4 Assumptions and dependencies

5.4.1 Assumptions

5.4.1.1 Internet-based communications

It is assumed that the METR SoS will likely use the internet and internet-enabled mobile telecommunication services to distribute pre-announced rules.

5.4.1.2 Leverage existing standards

METR is one ITS service among many existing services with existing standards. It is assumed that METR will adopt and adapt existing ITS standards to the extent possible.

5.4.1.3 Supporting data

It is assumed that supporting data providers will maintain evidence of the information that they transmit.

NOTE Being able to provide evidence that accurate information was provided can assist in limiting legal exposure.

5.4.1.4 Avoiding vehicle inoperability

It is assumed that vehicles will not become inoperable when they are unable to download rules for a prolonged period.

NOTE This can be achieved by allowing the vehicle to be operated by a human driver without the assistance of METR technologies or other means.

5.4.2 Dependencies

The requirements defined in this document depend on:

- publicly available communication technologies;
- inputs from supporting data providers as necessary to properly interpret the current meaning and applicability of rules;
- availability of both maps and map updates from a map update system in near-real time; and
- being able to align the map quickly and accurately and relevant METR rules to the real-world environment.

5.5 Traceability conventions

Within the systems engineering process, every managed item (e.g. user need, requirement, design element, etc.) should exist for a reason. At the genesis of the process, the reasons are documented through stakeholder consensus and are generally defined through a justification of a user need. All subsequent managed items are justified through traceability to managed items previously defined (e.g. design elements trace to requirement, which trace to user needs). Traces are therefore defined as being "from" the new managed item and "to" the previously defined managed item. [Figure 3](#) depicts the traceability rules that apply to managed items defined within METR documents.

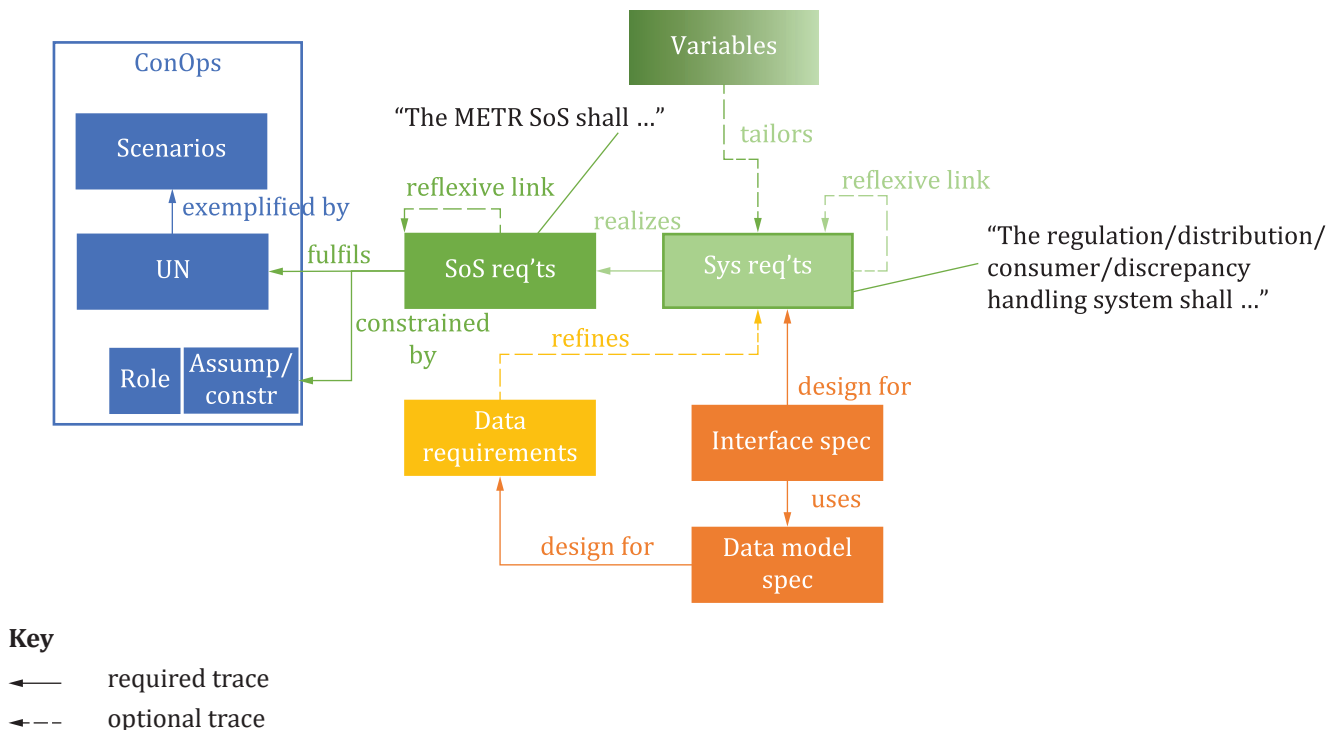


Figure 3 — Traceability among managed items

List of reflexive links:

- derives: an incoming flow derives an outgoing flow from another system;
- generates: a process generates a flow;
- calls: a flow uses a process;
- summarizes: a requirement summarizes a set of more detailed requirements.

From the perspective of the developers of the ISO 24315 series, the traceability is normative in that traceability rules are followed (e.g. each SoSR requirement is fulfilled by one or more user needs or constraints) while producing each document. However, from the perspective of a developer of a METR component, traceability is informative (i.e. non-normative) and only provides the justification as to why these requirements exist (e.g. system requirements fulfilling SoSR requirements) and what features are impacted by a failure to meet certain requirements.

[Table 2](#) indicates the rules for each trace type. The rows are ordered alphabetically in pairs based on the primary keyword. The first row in each pair represents the "to" trace while the second row in each pair represents the corresponding reverse, "from", trace. The name of the reverse trace is shown in parenthesis.

Table 2 — Traceability types

Source	Type	Destination
Each functional requirement is	called by	zero or more incoming information flows
Each incoming information flow	(calls)	zero or more functional requirement
Each SoSR requirement is	constrained by	zero or more constraints specified in the ConOps
Each constraint in the ConOps	(constrains)	one or more SoSR requirements
Each system-level information flow that does not realize an SoSR requirement and that is not generated by a functional requirement is	derived by	one or more system-level information flows of the same name in the opposite direction
Each system-level information flow that realizes a SoSR requirement and that exchanges data with another METR component	(derives)	one corresponding system-level information flow in the opposite direction for each associated METR component
Each interface specification element is an interoperable	design for	one or more detailed system-level requirements
Each detailed system-level requirement is a	(requirement for)	one or more interface specification elements
Each data model specification element is a	design for	one or more METR data requirements
Each METR data requirement is a	(requirement for)	one or more data model specification element
Each scenario	exemplifies	one or more user needs
Each user need is	(exemplified by)	zero or more scenarios
Each SoSR requirement that is not constrained by a constraint	fulfils	one or more user needs
Each user need is	(fulfilled by)	one or more SoSR requirements
Each information flow is	generated by	zero or more functional requirements
Each functional requirement	(generates)	zero or more information flows
Each system-level requirement	realizes	one or more SoSR requirements
Each SoSR requirement is	(realized by)	one or more system-level requirements
Each data requirement	refines	one or more content requirement for a system-level information flow
^a High-level requirements are used when a group of detailed requirements are referenced in multiple places within a document.		

Table 2 (continued)

Source	Type	Destination
Each content requirement for a system-level information flow is	(refined by)	one or more data requirements
Each high-level requirement ^a	summarizes	one or more detailed requirements
Each detailed content requirement is	(summarized by)	zero or more high-level requirements
Each variable	tailors	one or more requirements to the needs of a region
Each requirement is	(tailored by)	zero or more variables
Each interface specifications element	uses	one or more data model specification elements
Each data model specification element is	(used by)	one or more interface specification elements
^a High-level requirements are used when a group of detailed requirements are referenced in multiple places within a document.		

5.6 Naming conventions

The naming conventions for architectural elements (e.g., physical objects, information flows, processes) in this document follow the conventions defined by ARC-IT.^[11] When presented in text, information flow names are placed within double quotation marks and followed by the term "flow" when necessary to avoid ambiguity between the full name of the architectural element and intended wording of the surrounding sentence.

5.7 Traceability and conformance

Rules for conformance are defined in [Annex A](#).

6 System of systems requirements

6.1 General

The SoS requirements are presented in the order of input requirements, output requirements, functional requirements, (other) general requirements, and METR information requirements. The input and output requirements are organized by information flow, as identified in [Figure 2](#).

- Function: identifies the purpose of the information flow and the function that it is intended to provide.
- Content: identifies the data that is contained within the information flow.
- Source or destination: identifies the intended source of the input flow or the destination of the output flow.
- Causality: if the flow is initiated by the METR SoS, this clause identifies the event that initiates the flow.
- Constraints: identifies any constraints that apply to the flow; this can include filtering criteria, performance requirements, etc.
- Resulting action: identifies the action that is to occur upon the completion of the flow.

6.2 Input requirements

6.2.1 Information flow: legal rules

6.2.1.1 Function

The METR SoS accepts legal rules from the rule maker whereupon a METR translation agent will create draft electronic rules that capture the intent of legal rules.

6.2.1.2 Content

The "legal rules" flow shall include:

- a) METR information, as defined in [6.6.3](#);
- b) METR information content, as defined in [6.6.4](#);
- c) METR information meta-data, as defined in [6.6.5](#);
- d) observable transport rule attributes, as defined in [6.6.6](#); and
- e) additional transport rule attributes, as defined in [6.6.7](#).

6.2.1.3 Source

The METR SoS shall obtain the legal rule flow from one or more rule makers.

NOTE The legal rules are preferably obtained directly from the rule maker; however, the METR SoS can rely on indirect means, such as posted rules or announcements made by an implementer.

6.2.1.4 Causality

Ideally, the legal rule flow is initiated by the rule maker when creating a new rule. Alternatively, the legal rule flow occurs when the METR SoS makes an effort to discover existing legal rules.

6.2.1.5 Constraints

No constraints are defined for this information flow.

6.2.1.6 Resulting action

Upon receipt of the legal rule flow, the translation agent shall create an electronic version of the rule. Once complete, the rule can be verified by a rule verification agent, per local policies. Finally, the rule is signed by a rule signing agent, whereupon it can be provided to distributors for dissemination to METR users.

6.2.2 Information flow: coordination

6.2.2.1 Function

The METR SoS shall enable METR operational personnel (e.g. translation agents, rule verifiers, implementers) to coordinate their activities by receiving information about METR information and operations from other systems.

6.2.2.2 Content

The "METR coordination" flow can include:

- a) METR information, as defined in [6.6.3](#);

- b) METR information content, as defined in [6.6.4](#);
- c) METR information meta-data, as defined in [6.6.5](#);
- d) observable transport rule attributes, as defined in [6.6.6](#);
- e) additional transport rule attributes, as defined in [6.6.7](#); and
- f) free text that allows operational personnel to coordinate operations.

6.2.2.3 Source

The METR SoS shall obtain the "METR coordination" flow from one or more authorized centres.

6.2.2.4 Causality

The "METR coordination" flow is initiated by an authorized centre with a need to coordinate information.

6.2.2.5 Constraints

No constraints are defined for this input.

6.2.2.6 Resulting action

Upon initiation of the "METR coordination" flow, the METR SoS shall notify appropriate METR personnel (e.g. translation agent).

6.2.3 Information flow: discrepancy information

6.2.3.1 Function

The METR SoS may accept all "METR discrepancy information" flows so that discrepancies can be resolved, rules can be discovered, or both.

6.2.3.2 Content

The "METR discrepancy information" flow shall include:

- a) METR information identifier, if known, as defined in [6.6.4.2](#);
- b) location of the discrepancy;
- c) time at which the discrepancy was detected;
- d) type of discrepancy identified, such as:
 - i) electronic discrepancies; and
 - ii) physical discrepancies;
- e) meta-data about the METR adapter system reporting the discrepancy (e.g., make, model and year/version for the vehicle, driving automation system, mapping system, etc);
- f) image of the site;
- g) associated sensor readings; and
- h) free form notes.

6.2.3.3 Source

If the "METR discrepancy information" flow is supported, the METR SoS shall obtain the METR discrepancy information from a METR adapter system (i.e., via the METR information adaptation functional object).

6.2.3.4 Causality

If the "METR discrepancy information" flow is supported, it is initiated by the METR information adaptation functional object when it identifies a discrepancy between MER information and another item (e.g., another electronic rule, a detected sign).

6.2.3.5 Constraints

No constraints are defined for this input.

6.2.3.6 Resulting action

After receipt of sufficient "METR discrepancy information" flows, as defined by local policies, the METR SoS shall notify appropriate METR personnel (e.g., translation agent) to investigate the reported discrepancy.

6.2.4 Information flow: traffic control devices (TCD) status

6.2.4.1 Function

The METR SoS shall maintain its awareness of the implementation status of TCDs.

6.2.4.2 Content

The "TCD status" flow shall include the:

- a) type(s) of TCD implemented (or removed);
- b) associated METR information content, if known, as defined in [6.6.4](#);
- c) observable transport rule attributes, as defined in [6.6.6](#); and
- d) status of any requested discrepancy correction associated with the TCD; and
- e) free form notes.

6.2.4.3 Source

The METR SoS shall obtain the "TCD status" flow from the MCMC.

6.2.4.4 Causality

The "TCD status" flow is typically initiated by a MCMC when the status of a TCD changes. In addition, the METR SoS shall be able query the status of any TCD.

NOTE It is the responsibility of the MCMC to enter changes in TCD status in a timely manner.

6.2.4.5 Constraints

6.2.4.5.1 Change notifications

The MCMC is responsible for providing the "TCD status" flow for each TCD that meets the METR SoS specified criteria when its status changes.

6.2.4.5.2 Query

A request for the "TCD status" flow shall include:

- a) the identifier for the TCD of interest;
- b) any reported discrepancy associated with the TCD;
- c) the METR information identification for the associated rule, as defined in [6.6.4.2](#);
- d) free form notes.

6.2.4.5.3 Query response

The MCMC is responsible for providing the "TCD status" flow for a transport rule upon request from the METR SoS.

6.2.4.6 Resulting action

Upon receipt of the "TCD status" flow, the METR SoS shall perform appropriate actions per the policies established for the jurisdictional entity.

EXAMPLE In the case of implementing a stop sign, the local policy can require automatically updating the inception time of the rule or can require an alert to a translation agent to update and re-sign the associated rule.

EXAMPLE In the case of a resolved discrepancy, the local policy can update the associated METR rule to remove any discrepancy alert.

NOTE The resulting action can be different based on the type of TCD implemented.

6.3 Output requirements

6.3.1 Information flow: audit information

6.3.1.1 Function

The METR SoS shall enable METR auditors to obtain a record of the information that has been transmitted and received by the METR SoS from both user and system interfaces.

NOTE Audits are especially useful for establishing evidence as a part of legal proceedings.

6.3.1.2 Content

The "METR audit information" flow can include:

- a) information transmitted or received;
- b) date and time of transmission or reception;
- c) identification of the destination or origin of the information;
- d) authentication information identifying the source of the information; and
- e) auditing attributes as defined in [6.6.8](#).

6.3.1.3 Destination

The METR SoS shall provide the "METR audit information" flow to the METR auditor making the request.

6.3.1.4 Causality

The "METR audit information" flow is initiated by an authorized METR auditor based on their needs.

6.3.1.5 Constraints

The METR auditor can specify filtering criteria for the information, such as type of information, a date and time range, a specific destination or origin, or specified authentication data.

6.3.1.6 Resulting action

It is the responsibility of the auditor to process the flow and to respond appropriately.

6.3.2 Information flow: coordination

6.3.2.1 Function

The METR SoS shall enable METR operational personnel to coordinate their activities by sharing information about METR information.

6.3.2.2 Content

The "METR coordination" flow can include:

- a) METR information, as defined in [6.6.3](#);
- b) METR information content, as defined in [6.6.4](#);
- c) METR information meta-data, as defined in [6.6.5](#);
- d) observable transport rule attributes, as defined in [6.6.6](#);
- e) additional transport rule attributes, as defined in [6.6.7](#); and
- f) free text that allows operational personnel to coordinate operations.

6.3.2.3 Destination

The METR SoS shall provide the "METR coordination" flow to the authorized centre identified by the initiating METR operational personnel (e.g. translation agent).

6.3.2.4 Causality

The METR SoS shall enable METR operational personnel to initiate a "METR coordination" flow.

6.3.2.5 Constraints

No constraints are defined for this output.

6.3.2.6 Resulting action

It is the responsibility of the operational personnel of the destination system to process the "METR coordination" flow and to respond appropriately.

6.3.3 Information flow: information

6.3.3.1 Function

The METR SoS shall provide authorized requesting systems with METR information.

6.3.3.2 Content

The "METR information" flow shall include the following:

- a) feature catalogue, as defined in [6.6.2](#);
- b) METR information, as defined in [6.6.3](#);
- c) METR information content, as defined in [6.6.4](#);
- d) METR information meta-data, as defined in [6.6.5](#);
- e) observable transport rule attributes, as defined in [6.6.6](#); and
- f) additional transport rule attributes, as defined in [6.6.7](#).

6.3.3.3 Destination

The METR SoS shall provide METR information to any authorized system.

6.3.3.4 Causality

The METR SoS shall provide METR information to all subscribed systems as the information is updated.

6.3.3.5 Constraints**6.3.3.5.1 Location constraint**

The METR SoS may allow subscribed systems to constrain their request to a user-defined area as:

- a) proximity from a point location;
- b) proximity along a route; or
- c) user-defined area.

NOTE The mobile user can vary its location constraints as needed to accommodate its movement.

6.3.3.5.2 Content constraint

The METR SoS may allow subscribed systems to constrain their request by rule categories.

6.3.3.5.3 Response time

The METR SoS shall begin providing the "METR information" flow as requested within `metrResponseTime` from the time that the request was made.

6.3.3.5.4 Data quality

The METR SoS shall only distribute METR information that satisfies locally defined data quality policies, which may include independent verification.

6.3.3.5.5 Emerging rule availability

The METR SoS shall provide authorized systems with emergent rules, when available from a central location.

6.3.3.6 Resulting action

The requesting system is responsible for determining how the "METR information" flow is to be used.

6.3.4 Information flow: information for adaptation

6.3.4.1 Function

The METR SoS shall provide METR adapter systems with the requested METR information by using the "METR information for adaptation" flow so that it can be merged with other data as needed to determine current relevancy of rules.

6.3.4.2 Content

The "METR information for adaptation" flow shall include the following:

- a) feature catalogue, as defined in [6.6.2](#);
- b) METR information, as defined in [6.6.3](#);
- c) METR information content, as defined in [6.6.4](#);
- d) METR information meta-data, as defined in [6.6.5](#);
- e) observable transport rule attributes, as defined in [6.6.6](#); and
- f) additional transport rule attributes, as defined in [6.6.7](#).

6.3.4.3 Destination

The METR SoS shall provide the "METR information for adaptation" flow to any authorized system.

6.3.4.4 Causality

The METR SoS shall provide the "METR information for adaptation" flow based on the user request.

NOTE Within the context of this document, the request can represent a request for a single response or a standing request with updates.

6.3.4.5 Constraints

6.3.4.5.1 Location constraint

The METR SoS shall provide METR information constrained by the location criteria established by the user.

- a) The METR SoS shall support location criteria specified as proximity from a point location.
- b) The METR SoS may support location criteria specified as proximity along a route.
- c) The METR SoS may support location criteria specified as user-defined area.

NOTE The mobile user can vary its location constraints as needed to accommodate its movement.

6.3.4.5.2 Content constraint

The METR SoS shall provide the "METR information for adaptation" flow constrained by characteristics specified by the user, which may include any, or all, of the following:

- a) manually reported characteristics (i.e., self-asserted);
- b) authenticated permits (e.g., permissions issued by an authority);
- c) detectable characteristics;
- d) static characteristics; and

e) METR information type (e.g., rule catalogue, defined areas, etc.).

NOTE This division of characteristics is intended to cover the full scope of characteristics without being specific as to how the value for any individual characteristic is determined. For example, it is possible that one vehicle can automatically detect a characteristic (e.g., addition of a trailer) while another can require manual reporting of the changed characteristic.

6.3.4.5.3 Provide rules in priority order

The METR SoS shall deliver the "METR information for adaptation" flow based on the priority assigned by the translator and the current criteria defined by the user.

NOTE This requirement can assist in fulfilling the timeliness interface requirement.

6.3.4.5.4 Response time

The METR SoS shall begin providing the METR adaptation for integration flow as requested by the user within `metrResponseTime` from the time that the request was made.

6.3.4.5.5 Verified information

The METR distributor shall only distribute the "METR information for adaptation" flow that satisfies local policies, which can include independent verification.

6.3.4.5.6 Information delivery

The METR SoS shall ensure that each METR adapter system is confident that it is provided with each rule and each piece of supporting data prior to the rule becoming relevant at least to the level of confidence currently advertised by the METR SoS. When distributing emergent rules, this can require redundant systems due to the typical localized nature and short time horizon that exists to acquire the rule.

EXAMPLE A jurisdiction uses a wide-area information disseminator system (WAIDS, e.g., FM broadcast subcarrier, satellite) to distribute emergent rules to all travellers. In addition, for safety-critical rules, the jurisdiction deploys local beacons as a secondary communication path in case the WAIDS is unable to deliver the information.

NOTE The probability that a user system can access an emergent rule is impacted by the number of distribution points reachable, the availability of the rule through each distribution point (e.g., the number of times the rule is broadcast while the user system is in range), the transmission error rates involved, the resiliency of the distribution point, and other factors.

6.3.4.5.7 Information availability

The METR SoS shall ensure the continued availability of relevant pre-announced METR information even during periods of disruption to relevant communications networks for periods less than `metrUpdateCycle`.

NOTE Mobile users are responsible for determining what information from the "METR information for adaptation" flow is likely to become relevant to them within the `metrUpdateCycle`.

EXAMPLE 1 Users can refresh rules often enough to provide high confidence that the user will be notified of any impending change. For example, METR informs the user that a new rule of a known type (e.g., stop sign) will be implemented but with an estimated time rather than an exact time. The challenge is that this assumes relatively frequent updates especially near locations where rules are expected to change, which requires connectivity; the system, holistically, is brittle beyond the update time. Requires deployment agencies to update system prior to any change in field.

EXAMPLE 2 Use a guaranteed delivery, subscription-based system to deliver any updates. The challenge is that this does not accommodate zones with no connectivity.

EXAMPLE 3 Local beacons that notify approaching vehicles of the specific emergent rule. The challenge is that this requires extra effort to deploy the beacons; not practical for wide area issues such as evacuation orders.

EXAMPLE 4 Local signs that notify approaching vehicles of the presence of "an" emergent rule perhaps supported with data that allows vehicles with advanced sensors to detect the specific type of rule. The challenge is that additional rule-specific data requires extra effort; generic sign requires minimal extra effort; this is not practical for wide-area issues.

EXAMPLE 5 Obtain access to low frequency spectrum that allows for metropolitan-wide broadcasts of emergent rules. The challenge is obtaining access to spectrum; users will need an additional radio; requires electronic entry of rule

6.3.4.5.8 Emerging rule availability

The METR SoS shall provide users with relevant emergent rules, when needed.

6.3.4.5.9 Remote emergent rules

Upon direction from a rule maker, the METR SoS shall notify users of remote emergent rules.

6.3.4.6 Resulting action

The requesting user is responsible for determining how the "METR information for adaptation" flow is to be used.

6.4 Functional requirements

6.4.1 Verification of METR rules

6.4.1.1 Verify locations associated with rules

The METR SoS shall verify that the location(s) associated with each rule is entirely within the jurisdictional area for which the issuing rule maker is authorized.

6.4.1.2 Maintain awareness of rule makers

The METR SoS shall be cognizant of the authorized rule makers for each jurisdictional area and sub-area.

6.4.1.3 Verify rule consistency

The METR SoS shall identify inconsistencies among the electronic rules within its relevant scope.

6.4.1.4 Ensure data quality

All information shall be verified and approved prior to provisioning to users.

NOTE The extent of verification can be established by local policies.

6.4.1.5 Ensure data resiliency

The METR SoS shall provide a local data store of relevant pre-announced rules for each METR user to ensure that METR information remains available, even if connectivity is temporarily lost.

6.4.2 METR information storage requirements

6.4.2.1 Availability

The METR SoS shall maintain the availability of approved METR information.

6.4.2.2 Integrity

The METR SoS shall maintain the integrity of the approved METR information.