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Recommendations and best practices for scripts on connected sensing devices

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Introduction

This document, related to the TC53 Provenance sensor class pattern specification, describes a set of best practices for scripts running on connected sensing devices that propagate sensor readings beyond the connected sensing device and to some remote endpoint, such as a server, cloud application, or another (non-embedded) computing system (these best practices are not applicable to sensing devices with sensors that act exclusively locally on the sensed data).

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Recommendations and best practices for scripts on connected sensing devices

1 Scope

This document is non-normative and intended to provide TC53 practitioners with guidance related to designing and implementing connected systems capable of capturing and transmitting useful and integrous data.

2 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.

ECMA-419, *ECMAScript® embedded systems API specification*

ECMA-262, *ECMAScript® language specification*

3 Terms and definitions

For the purposes of this document, the terms and definitions from ECMA-419 apply.

4 Abbreviations

TC53 Ecma International Technical Committee 53

5 Best practices for scripts on connected sensing devices

To ensure the integrity and usefulness of reported sensing data, a connected sensing device must reflect provenance as accurately as possible when reporting to a remote endpoint. The following best practices should be incorporated into script design to ensure that sensor configuration, connected sensing device identification, and data processing techniques are properly propagated to endpoints.

A connected sensing device must have a queryable instance identifier. The instance identifier must be meaningful upon receipt at a connected endpoint; this identifier may be globally-unique.

6 Best practices for propagating static device metadata

These static properties of the connected sensing device must be derivable by the endpoint from the connected sensing device identifier or queryable directly from the connected sensing device:

- The `identification` of all connected peripheral sensors.
- The physical variant of the connected sensing device, if relevant.
- The device's clock accuracy and precision, if known.
- Geospatial data associated with the location of the connected sensing device, if static and known.

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7 Best practices for propagating dynamic device state metadata

These dynamic properties of the connected sensing device must queryable directly from the connected sensing device, if known and applicable:

- The active `configuration` of peripheral sensors reported as an identifier unique to the connected sensing device, developer, platform, or globally. The information encoded should by itself or in conjunction with connected sensing device identification information enable an endpoint to determine the hardware, software, and sampling configuration used to capture each sample or sample sequence, if non-default configuration parameters are used. Information may be encoded in the configuration identifier, transmitted for resolution at a remote endpoint, or combine approaches.

- Peripheral sensors' data encoding and/or parsing approach, if applicable.

8 Best practices for propagating sensor samples

An implementation must make every effort to associate a sample with the most-precise available time or tick before propagating it to an endpoint. The most-precise available `time` or `tick` is defined as being derived from the lowest-level clock associated with the start of a sampling event. The `time` associated with the sample capture is the most precise, followed by the `time` associated with the request for capture, followed by the `time` associated with the transmission of that sample. `time` must be represented as a time value as defined in ECMA-262 Section 20.4.1.1, “Time Values and Time Range.” Should `time` not be available at a particular level of precision, `ticks` may instead be reported. In this case, the lowest-level `time` should also be reported, if available.

If a connected sensing device generates a synthetic measurement, that measurement must be noted as such and may optionally include details about the operations conducted on the raw data.

If data stemming from a connected sensing device transits through intermediate data handlers, then that chain of stewardship may be queryable.

If a connected sensing device makes efforts to ensure trust and integrity of its derivative provenance data, then associated meta-provenance data related to trust and integrity in the provenance chain may be queryable.

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