Nest Weave
Battery Power Source Capabilities and Battery Power Source Trait

Design Specification

Revision 5
2016-05-02

Status: **Approved / Active**

Revision History

Revision	Date	Modified By	Description
1	2016-02-16	Grant Erickson	Initial revision.
2	2016-02-18	Grant Erickson	Changed Battery Type to Rechargeable. Changed Replaceability from a Boolean to an enumeration.
3	2016-04-13	Grant Erickson	Bifurcated the Battery Power Source trait into a static, read-only trait and another dynamic, read-only trait. Added Replacement Indicator enumeration.
4	2016-04-14	Grant Erickson	Added clarifying language regarding optionality and nullability of the Capacity, Designations, Designation Description, Common Designation Identifier, ANSI Designation Identifier, IEC Designation Identifier, Replacement Indicator, Remaining, Remaining Percent, and Remaining Time properties.
5	2016-05-02	Grant Erickson	Resolved trait identifier conflict by reassigning new, non-conflicting trait identifiers.

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Typographic and Syntactic Conventions

The following syntactic conventions are used throughout this document:

shall
: is used to indicate a mandatory rule or guideline that must be adhered to without exception to claim compliance with this specification.

should
: is used to indicate a rule or guideline that serves as a strong preference to suggested practice and is to be followed in the absence of a compelling reason to do otherwise.

may
: is used to indicate a rule or guideline that serves as a reference to suggested practice.

Summary

Weave is the Nest communications home area network (HAN) application protocol stack designed to enable asynchronous, symmetric, device-to-device, device-to-service and service-to-device networking among Nest and Nest-enabled ecosystem devices for the purposes of both control- and data-path messaging. For specific network media in the HAN, Weave enables wireless, low-power, battery-friendly communication by leveraging appropriate, standards-based technologies such as Wi-Fi, 802.15.4, 6LoWPAN, IP, TCP and UDP.

This document introduces the specification for a derived Weave Common trait that generalizes how any Weave device resource presents battery power source information common to any such device.

1. Introduction

This document introduces the specification for a derived Weave Common trait that generalizes how any Weave device resource presents battery power source information common to any such device.

2. Goals

The broad goals of the Nest Weave Power Source and Power Sources traits are to standardize across all device resources the means by which such resources publish and encode power source and power sources information for view or subscription by other resources in the system.

3. Trait Identifiers

3.1. Trait Names

The Battery Power Source Capabilities trait shall be named the *BatteryPowerSourceCapabilitiesTrait*.

The Battery Power Source trait shall be named the *BatteryPowerSourceTrait*.

3.2. Weave Profile Identifiers

The Battery Power Source Capabilities trait Weave profile identifier shall be 0x0000 001B.

The Battery Power Source trait Weave profile identifier shall be 0x0000 001C.

4. Byte Ordering

As with all trait data, the byte ordering shall be little endian unless otherwise specified.

5. Schemas

This section describes in detail the data schema supported by these profiles. Figure 1 and Figure 2 below provide an abstract, graphical representation of the schemas for the Battery Power Source Capabilities and Battery Power Source traits.

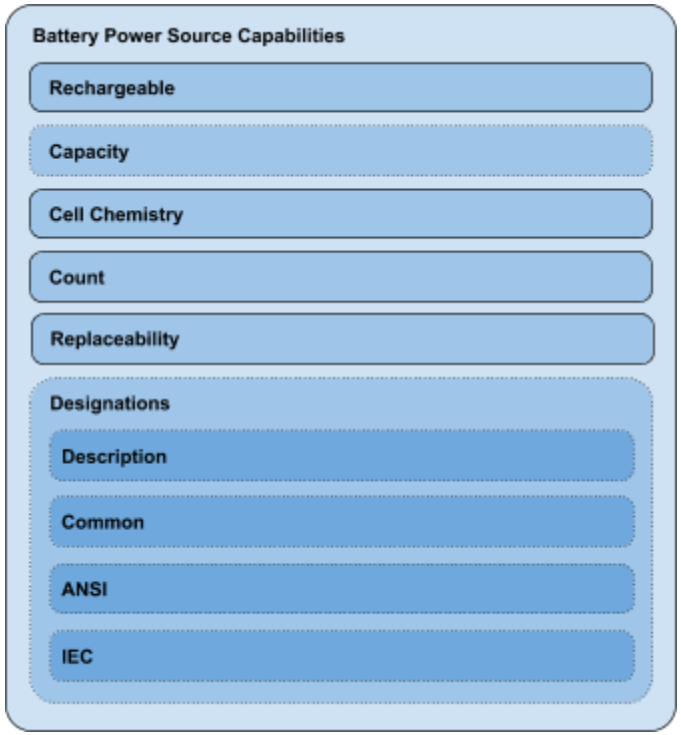

Figure 1. Graphical illustration of the Battery Power Source Capabilities trait data schema.

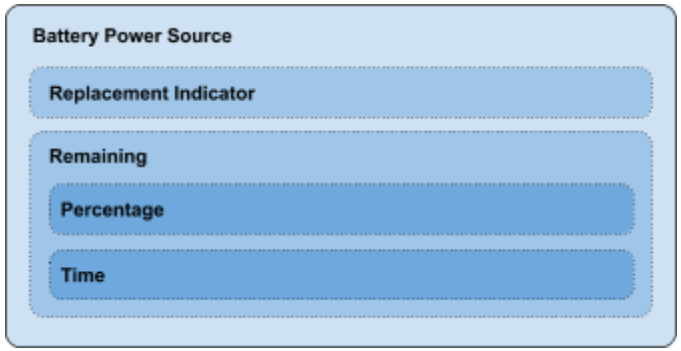

Figure 2. Graphical illustration of the Battery Power Source trait data schema.

5.1. Battery Power Source Capabilities

5.1.1. Summary

Name	Trait Applicability	Weave Tag Profile	Weave Tag Category	Weave Tag Number	Element Type	Constraints	Disposition	Mutability
Type	Power Source Capabilities	Power Source Capabilities	Context-specific	0x0001	Unsigned Fixed Point	32-bits	Required	Read-only
Rechargeable	Battery Power Source Capabilities	Battery Power Source Capabilities	Context-specific	0x0020	Boolean	-	Required	Read-only
Capacity	Battery Power Source Capabilities	Battery Power Source Capabilities	Context-specific	0x0021	Unsigned	32-bits 0 to at least 4000 Ampere-Hours 0.001 Ampere-Hour Precision	Optional	Read-only

Cell Chemistry	Battery Power Source Capabilities	Battery Power Source Capabilities	Context-specific	0x0022			Required	Read-only
Count	Battery Power Source Capabilities	Battery Power Source Capabilities	Context-specific	0x0023	Unsigned Fixed Point	-	Required	Read-only
Replaceability	Battery Power Source Capabilities	Battery Power Source Capabilities	Context-specific	0x0024	Unsigned Fixed Point	Not Replaceable, Factory Replaceable, User Replaceable	Required	Read-only
Designations	Battery Power Source Capabilities	Battery Power Source Capabilities	Context-specific	0x0025	Structure	-	Optional	Read-only

Table 1. Summary of the *Battery Power Source Capabilities* trait data schema.

5.1.2. Detail

5.1.2.1. Type

The *Type* property is a required property representing an indication of the type or class of power source for the trait instance published by the resource. The value may be one of those enumerations listed in Table 2 below.

- **Trait Applicability:** Power Source
- **Weave Tag Profile:** Power Source
- **Weave Tag Category:** Context-specific
- **Weave Tag Number:** 0x0001
- **Element Type:** Unsigned Fixed Point
- **Constraints:** 32-bits
- **Disposition:** Required
- **Mutability:** Read-only

Type	Description
Unspecified	The power source type is unspecified or unknown.
Battery	The power source type is a battery or batteries.

Table 2. Supported enumerations for the power source capabilities Type property.

5.1.2.1.1. Extending the Type

The type power source property enumeration should be extended by entities outside of Nest Labs by adding the vendor identifier to the high order 16-bits of the enumeration and then using the low order 16-bits as the extended power source type.

Let us assume that Acme Company (with a presumed Weave vendor identifier 0xAC3E) is making a new product with a squirrel-based power source in which they need a property for acorn capacity. To do so, they'll need to extend the base power source trait, adding the acorn capacity property and extend the type enumeration to do this. Listing 1 below shows how this might be done both with and without this requirement.

```
enum PowerSourceType {
    POWER_SOURCE_TYPE_UNSPECIFIED = 0;
    POWER_SOURCE_TYPE_BATTERY = 1;
    POWER_SOURCE_TYPE_SQUIRREL = 0xAC3E0001;
};
```

Listing 1. Extending the power source capabilities type property with a Weave vendor identifier.

5.1.2.2. Rechargeable

The *Rechargeable* property is a required property representing whether the battery power source for the trait instance published by the resource is rechargeable.

- **Trait Applicability:** Battery Power Source Capabilities
- **Weave Tag Profile:** Battery Power Source Capabilities
- **Weave Tag Category:** Context-specific
- **Weave Tag Number:** 0x0020
- **Element Type:** Boolean

- **Constraints:** -
- **Disposition:** Required
- **Mutability:** Read-only

5.1.2.3. Capacity

The *Capacity* property is an optional property representing the total electric charge capacity in Ampere-Hours, constrained from 0 to at least 4000 Ampere-Hours in 0.001 Ampere-Hour precision, of the battery power source for the trait instance published by the resource.

- **Trait Applicability:** Battery Power Source Capabilities
- **Weave Tag Profile:** Battery Power Source Capabilities
- **Weave Tag Category:** Context-specific
- **Weave Tag Number:** 0x0021
- **Element Type:** Unsigned
- **Constraints:** 32-bits, 0 to at least 4000 Ampere-Hours, 0.001 Ampere-Hour Precision
- **Disposition:** Optional
- **Mutability:** Read-only

Absence of this property implies a NULL value and a NULL value implies that the device resource has no known or published battery capacity.

5.1.2.4. Cell Chemistry

The *Cell Chemistry* property is a required property representing an indication of the battery cell chemistry type of the battery power source for the trait instance published by the resource. The value may be one of those enumerations listed in Table 3 below.

- **Trait Applicability:** Battery Power Source Capabilities
- **Weave Tag Profile:** Battery Power Source Capabilities
- **Weave Tag Category:** Context-specific
- **Weave Tag Number:** 0x0022
- **Element Type:** Unsigned Fixed Point
- **Constraints:** -
- **Disposition:** Required
- **Mutability:** Read-only

Cell Chemistry	Description
Unspecified	The cell chemistry is unspecified or unknown.
Alkaline	The cell chemistry is alkaline (zinc manganese dioxide).
Lithium Carbon Fluoride	The cell chemistry is lithium carbon fluoride.
Lithium Chromium Oxide	The cell chemistry is lithium chromium oxide.
Lithium Copper Oxide	The cell chemistry is lithium copper oxide.
Lithium Iron Disulfide	The cell chemistry is lithium iron disulfide.
Lithium Manganese Dioxide	The cell chemistry is lithium manganese dioxide.
Lithium Thionyl Chloride	The cell chemistry is lithium thionyl chloride.
Magnesium	The cell chemistry is magnesium.
Mercury Oxide	The cell chemistry is mercury oxide.
Nickel Oxyhydride	The cell chemistry is nickel oxyhydride.
Silver Oxide	The cell chemistry is silver oxide.
Zinc Air	The cell chemistry is zinc air.
Zinc Carbon	The cell chemistry is zinc carbon.
Zinc Chloride	The cell chemistry is zinc chloride.
Zinc Manganese Dioxide	The cell chemistry is zinc manganese dioxide.
Lead Acid	The cell chemistry is lead acid.
Lithium Cobalt Oxide	The cell chemistry is lithium cobalt oxide.
Lithium Ion	The cell chemistry is lithium ion.

Lithium Ion Polymer	The cell chemistry is lithium ion polymer.
Lithium Iron Phosphate	The cell chemistry is lithium iron phosphate.
Lithium Sulfur	The cell chemistry is lithium sulfur.
Lithium Titanate	The cell chemistry is lithium titanate.
Nickel Cadmium	The cell chemistry is nickel cadmium.
Nickel Hydrogen	The cell chemistry is nickel hydrogen.
Nickel Iron	The cell chemistry is nickel iron.
Nickel Metal Hydride	The cell chemistry is nickel metal hydride.
Nickel Zinc	The cell chemistry is nickel zinc.
Silver Oxide	The cell chemistry is silver oxide.
Silver Zinc	The cell chemistry is silver zinc.
Sodium Ion	The cell chemistry is sodium ion.
Sodium Sulfur	The cell chemistry is sodium sulfur.
Zinc Bromide	The cell chemistry is zinc bromide.
Zinc Cerium	The cell chemistry is zinc cerium.

Table 3. Supported enumerations for the battery power source capabilities Cell Chemistry property.

5.1.2.5. Count

The *Count* property is a required property representing the count of individual, user- or factory-serviceable battery cells or packs in the battery power source for the trait instance published by the resource.

- **Trait Applicability:** Battery Power Source Capabilities
- **Weave Tag Profile:** Battery Power Source Capabilities

- **Weave Tag Category:** Context-specific
- **Weave Tag Number:** 0x0023
- **Element Type:** Unsigned Fixed Point
- **Constraints:** -
- **Disposition:** Required
- **Mutability:** Read-only

5.1.2.6. Replaceability

The *Replaceability* property is a required property representing replaceability of the battery or batteries in the battery power source for the trait instance published by the resource. The value may be one of those enumerations listed in Table 4 below.

- **Trait Applicability:** Battery Power Source
- **Weave Tag Profile:** Battery Power Source
- **Weave Tag Category:** Context-specific
- **Weave Tag Number:** 0x0024
- **Element Type:** Unsigned Fixed Point
- **Constraints:** Not Replaceable, Factory Replaceable, User Replaceable
- **Disposition:** Required
- **Mutability:** Read-only

Replaceability	Description
Unspecified	The replaceability is unspecified or unknown.
Not Replaceable	The battery power source is not replaceable.
User Replaceable	The battery power source is replaceable by the user or customer.
Factory Replaceable	The battery power source is replaceable by an authorized factory technician.

Table 4. Supported enumerations for the battery power source capabilities Replaceability property.

Frequently, battery power sources are replaceable. In some cases, the battery/ies can be replaced by the user. In other cases, the battery/ies should be replaced by an authorized factory technician. Finally, in rare occasions, the battery/ies is/are fixed and the

entire product must be disposed of when the batteries reach the end of their life. This trait property informs the customer of these replaceability conditions.

This trait property value should almost always track and mirror the *Removable* property in the base power source trait where a value of *true* for *Removable* would map to *User Replaceable* for *Replaceability* and *false* would map to *Not Replaceable* . However, there are cases where *Removable* would be *false* but *Replaceable* would be *Factory Replaceable*, such as those products for which the battery or batteries are not user-removable but are serviceable (i.e. factory- but not user-replaceable).

5.1.2.7. Designations

The *Designations* property is an optional property that may contain a structured representation intended to provide a customer or maintenance personnel with precise information that they can use to order or source the exact or equivalent battery/ies necessary for the battery power source this trait has been instantiated for.

- **Trait Applicability:** Battery Power Source Capabilities
- **Weave Tag Profile:** Battery Power Source Capabilities
- **Weave Tag Category:** Context-specific
- **Weave Tag Number:** 0x0025
- **Element Type:** Structure
- **Constraints:** -
- **Disposition:** Optional
- **Mutability:** Read-only

For the Battery Power Source Capabilities *Replaceability* property of *User Replaceable*, vendors should include, at minimum, a Common designation identifier and, ideally, Common, ANSI, and IEC designation identifiers as appropriate for the geographies they will be marketing and selling a product into.

Clients consuming this information may choose how to present this information. For example, space in a user interface could be allocated to present all three designations, when available, as shown in Figure 3 below.

Figure 3. Displaying more than one battery designation in a graphically-rich user interface.

Each designation in the array of designations may be provided in common or colloquial form or in ANSI or IEC standard forms. Additionally, a simple designation identifier may be used alone or it may be augmented with a descriptive string.

Table 5 below summarizes the sub-properties of the *Designation* property.

Absence of this property or a NULL value imply that the device resource has provided no common designations and equivalent to providing an empty structure with no containing properties or providing all properties with all values set to NULL.

5.1.2.7.1. Summary

Name	Trait Applicability	Weave Tag Profile	Weave Tag Category	Weave Tag Number	Element Type	Constraints	Disposition	Mutability
Designation Description	Battery Power Source Capabilities	Battery Power Source Capabilities	Context-specific	0x0001	UTF-8 String or Unsigned Fixed Point	1-32 characters or 1-128 bytes	Optional	Read-only
Common Designation Identifier	Battery Power Source Capabilities	Battery Power Source Capabilities	Context-specific	0x0002	Unsigned Fixed Point	-	Optional	Read-only
ANSI Designation Identifier	Battery Power Source Capabilities	Battery Power Source Capabilities	Context-specific	0x0003	Unsigned Fixed Point	-	Optional	Read-only
IEC Designation Identifier	Battery Power Source Capabilities	Battery Power Source Capabilities	Context-specific	0x0004	Unsigned Fixed Point	-	Optional	Read-only

Table 5. Summary of the *Battery Power Source* trait *Designation* property data schema.

5.1.2.7.2. Detail

5.1.2.7.2.1. Designation Description

The *Designation Description* property is an optional property encoded as a UTF-8 String or unsigned fixed point number (string reference) that describes the designation in a human-readable format in the vendor's preferred language localization. This value is assigned and administered by the vendor.

The UTF-8 String is used when the description is a non-localized string literal. The string reference is used when the string, localized or not, is located in a string table associated with the device resource containing this trait instance.

- **Trait Applicability:** Battery Power Source Capabilities
- **Weave Tag Profile:** Battery Power Source Capabilities
- **Weave Tag Category:** Context-specific
- **Weave Tag Number:** 0x0001
- **Element Type:** UTF-8 String or Unsigned Fixed Point
- **Constraints:** 1-32 characters or 1-128 bytes
- **Disposition:** Optional
- **Mutability:** Read-only

Absence of this property implies a NULL value and a NULL value implies that the device resource has provided no cell designation description.

5.1.2.7.2.2. Common Designation Identifier

The *Common Designation Identifier* property is an optional *Designation* property representing the common or colloquial designation of the battery or batteries in the battery power source for the trait instance published by the resource. The value may be one of those enumerations listed in Table 6.

- **Trait Applicability:** Battery Power Source Capabilities
- **Weave Tag Profile:** Battery Power Source Capabilities
- **Weave Tag Category:** Context-specific
- **Weave Tag Number:** 0x0002
- **Element Type:** Unsigned Fixed Point
- **Constraints:** -
- **Disposition:** Optional
- **Mutability:** Read-only

Absence of this property and a NULL value implies that the device resource has provided no common or colloquial designation identifier and that the value is implicitly COMMON_BATTERY_DESIGNATION_IDENTIFIER_UNSPECIFIED.

Common Designation Identifier	Description
Unspecified	The common designation identifier is unspecified or unknown.

AAA AA C D 4v5 6v0 9v0 1_2AA AAAA A B F N No6 SubC A23 A27 BA5800 Duplex 4SR44 523 531 15v0 22v5 30v0 45v0 67v5 J CR123A CR2 2CR5 CR_P2 CR_V3 SR41 SR43 SR44 SR45 SR48	The common designation identifier is as specified.

SR54 SR55 SR57 SR58 SR59 SR60 SR63 SR64 SR65 SR66 SR67 SR68 SR69 SR516 SR731 SR712 LR932 A5 A10 A13 A312 A675 AC41E 10180 10280 10440 14250 14430 14500 14650 15270 16340 RCR123A 17500 17670 18350 18500 18650	

19670 25500 26650 32600	

Table 6. Supported common or colloquial enumerations for the *Common Designation Identifier* property.

5.1.2.7.2.3. ANSI Designation Identifier

The *ANSI Designation Identifier* property is an optional *Designation* property representing the ANSI standard designation of the battery or batteries in the battery power source for the trait instance published by the resource. The value may be one of those enumerations listed in Table 7.

- **Trait Applicability:** Battery Power Source Capabilities
- **Weave Tag Profile:** Battery Power Source Capabilities
- **Weave Tag Category:** Context-specific
- **Weave Tag Number:** 0x0003
- **Element Type:** Unsigned Fixed Point
- **Constraints:** -
- **Disposition:** Optional
- **Mutability:** Read-only

Absence of this property and a NULL value implies that the device resource has provided no ANSI designation identifier and that the value is implicitly ANSI_BATTERY_DESIGNATION_IDENTIFIER_UNSPECIFIED.

ANSI Designation Identifier	Description
Unspecified	The ANSI designation identifier is unspecified or unknown.
24A 24D 24LF 15A 15D 15LF 1.2H2	The ANSI designation identifier is as specified.

1.2K2 14A 14D 13A 13D 3LR12 3R12 1604A 1604D 1604LC 7.2H5 11604 908A 908D 25A 60 910A 910D 905 1811A 1306A 1307AP 220 215 210 213 217 1412A 915 915A 918A 5018LC 5046LC 5032LC 5024LC 5047LC 5047LF 5033LC	

5034LC 5012LC 5020LC 5009LC 5000LC 5003LC 5004LC 5011LC 5029LC 1135SO 1134SO 1133SO 1132SO 1166A 1107SO 1131SOP 1136SO 1138SO 1160SO 1165SO 1158SO 1163SO 1175SO 1176SO 7012ZD 7005ZD 7000ZD 7002ZD 7003ZD 7001Z	

Table 7. Supported ANSI standard enumerations for the *ANSI Designation Identifier* property.

5.1.2.7.2.4. IEC Designation Identifier

The *IEC Designation Identifier* property is an optional *Designation* property representing the IEC standard designation of the battery or batteries in the battery power source for the trait instance published by the resource. The value may be one of those enumerations listed in Table 8.

- **Trait Applicability:** Battery Power Source Capabilities
- **Weave Tag Profile:** Battery Power Source Capabilities
- **Weave Tag Category:** Context-specific
- **Weave Tag Number:** 0x0004
- **Element Type:** Unsigned Fixed Point
- **Constraints:** -
- **Disposition:** Optional
- **Mutability:** Read-only

Absence of this property and a NULL value implies that the device resource has provided no IEC designation identifier and that the value is implicitly IEC_BATTERY_DESIGNATION_IDENTIFIER_UNSPECIFIED.

IEC Designation Identifier	Description
Unspecified	The IEC designation identifier is unspecified or unknown.
LR03 R03 FR03 HR03 KR03 ZR03 LR6 R6 FR6 HR6 KR6 ZR6 LR14 R14	The IEC designation identifier is as specified.

HR14 KR14 ZR14 LR20 R20 HR20 KR20 ZR20 3LR12 3R12 6LR61 6F22 6KR61 6HR61 4LR25Y 4R25 CR14250 ER14250 LR8D425 R23 LR23 R12 LR12 R25 LR25 LR1 R1 HR1 KR1 R40 KR22C429 HR22C429 8LR932 8LR732 2R10 4LR44 3LR50 10F15	

15F20 20F20 30F20 4LR61 4R25X 4LR25X 4R25-2 4LR25-2 CR17345 CR15H270 2CR5 CR-P2 CR927 CR1025 CR1130 CR1216 CR1220 CR1225 CR1616 CR1620 CR1632 CR2012 CR2016 CR2020 CR2025 CR2032 CR2320 CR2325 CR2330 CR2354 CR2412 CR2430 CR2450 CR2477 CR3032 CR11108 LR736 SR736	

LR1142 SR1142 LR1154 SR1154 LR936 SR936 LR754 SR754 LR1131 SR1131 LR1121 SR1121 SR1116SW LR926 SR926 LR721 SR721 LR726 SR726 LR621 SR621 LR521 SR521 LR527 SR527 LR65 LR626 SR626 SR716 LR916 SR916 LR921 SR921 LR516 SR516 LR416 SR416 LR731	

SR731 SR712 LR932 PR63 PR70 PR48 PR41 PR44 PR43	

Table 8. Supported IEC standard enumerations for the *IEC Designation Identifier* property.

5.1.3. Status Codes

There are no status codes defined by the *Battery Power Source Capabilities* trait.

5.1.4. Commands

There are no commands defined by the *Battery Power Source Capabilities* trait.

5.1.5. Extendability

This trait reserves those unused tags in the range 32-47 for future trait extendability. Derived traits may used tags outside that range for extending this trait.

5.2. Battery Power Source

5.2.1. Summary

Name	Trait Applicability	Weave Tag Profile	Weave Tag Category	Weave Tag Number	Element Type	Constraints	Disposition	Mutability
Type	Power Source	Power Source	Context-specific	0x0001	Unsigned Fixed Point	32-bits	Required	Read-only

Replacement Indicator	Battery Power Source	Battery Power Source	Context-specific	0x0020	Unsigned Fixed Point	Not At All, Soon, Immediately	Optional	Read-only
Remaining	Battery Power Source	Battery Power Source	Context-specific	0x0021	Structure	-	Optional	Read-only

Table 9. Summary of the *Battery Power Source* trait data schema.

5.2.2. Detail

5.2.2.1. Type

See *5.1.2.1. Battery Power Source Capabilities: Detail: Type* above.

5.2.2.2. Replacement Indicator

The *Replacement Indicator* property is an optional property that supports introspection of the device resource-internal assessment of when its battery/ies should be replaced. The value may be one of those enumerations listed in Table 10 below.

- **Trait Applicability:** Battery Power Source
- **Weave Tag Profile:** Battery Power Source
- **Weave Tag Category:** Context-specific
- **Weave Tag Number:** 0x0020
- **Element Type:** Unsigned Fixed Point
- **Constraints:** Not At All, Soon, Immediately
- **Disposition:** Optional
- **Mutability:** Read-only

Absence of this property and a NULL value implies that the device resource has provided no battery replacement indicator and that the value is implicitly BATTERY_REPLACEMENT_INDICATOR_UNSPECIFIED.

Replaceability	Description
Unspecified	The replacement indicator is unspecified or unknown.

Not At All	The battery/ies are fine and do not require replacement.
Soon	The device resource using the battery/ies is apt to be fine for a little while longer. Battery/ies should be purchased now. Replace the battery/ies when the new battery/ies are received.
Immediately	The device resource using the battery/ies is about to shut off. The battery/ies should be replaced immediately.

Table 10. Supported enumerations for the battery power source Replacement Indicator property.

5.2.2.3. Remaining

The *Remaining* property is an optional structured property supporting one or two representations of the amount of electric charge or energy remaining in a battery power source.

- **Trait Applicability:** Battery Power Source
- **Weave Tag Profile:** Battery Power Source
- **Weave Tag Category:** Context-specific
- **Weave Tag Number:** 0x0021
- **Element Type:** Structure
- **Constraints:** -
- **Disposition:** Optional
- **Mutability:** Read-only

Table 11 below summarizes the sub-properties of the *Remaining* property.

Absence of this property or a NULL value imply that the device resource has provided assessment of energy remaining in a battery power source and is equivalent to providing an empty structure with no containing properties or providing all properties with all values set to NULL.

5.2.2.3.1. Summary

Name	Trait Applicability	Weave Tag Profile	Weave Tag Category	Weave Tag Number	Element Type	Constraints	Disposition	Mutability
Remaining Percentage	Battery Power Source	Battery Power Source	Context-specific	0x0001	Unsigned Fixed Point	0 to 100%	Optional	Read-only
Remaining Time	Battery Power Source	Battery Power Source	Context-specific	0x0002	Unsigned Fixed Point	Seconds	Optional	Read-only

Table 11. Summary of the *Battery Power Source* trait *Remaining* property data schema.

5.2.2.3.2. Detail

5.2.2.3.2.1. Remaining Percentage

The *Remaining Percentage* property is an optional property representing the amount of electric charge or energy remaining in a battery power source as a percentage between 0% and 100%, inclusive.

- **Trait Applicability:** Battery Power Source
- **Weave Tag Profile:** Battery Power Source
- **Weave Tag Category:** Context-specific
- **Weave Tag Number:** 0x0001
- **Element Type:** Unsigned Fixed Point
- **Constraints:** -
- **Disposition:** Optional
- **Mutability:** Read-only

Absence of this property implies that this device resource does not make any assessment of the percentage of energy remaining in a battery source and the value is unknown. A NULL value implies that the device may make an assessment of the percentage of energy remaining in a battery source; however, is unable to transiently provide one and the value is presently unknown.

5.2.2.3.2.2. Remaining Time

The *Remaining Time* property is an optional property representing the amount of electric charge or energy remaining in a battery power source as time in seconds.

- **Trait Applicability:** Battery Power Source
- **Weave Tag Profile:** Battery Power Source
- **Weave Tag Category:** Context-specific
- **Weave Tag Number:** 0x0002
- **Element Type:** Unsigned Fixed Point
- **Constraints:** -
- **Disposition:** Optional
- **Mutability:** Read-only

Absence of this property implies that this device resource does not make any assessment of the time remaining for a battery source and the value is unknown. A NULL value implies that the device may make an assessment of the time remaining for a battery source; however, is unable to transiently provide one and the value is presently unknown.

5.1.3. Status Codes

There are no status codes defined by the *Battery Power Source* trait.

5.1.4. Commands

There are no commands defined by the *Battery Power Source* trait.

5.1.5. Extendability

This trait reserves those unused tags in the range 32-47 for future trait extendability. Derived traits may used tags outside that range for extending this trait.

6. References

1. Google LLC. *Nest Weave: Power Source and Power Sources Traits: Design Specification*. Revision 3. 2016-02-11.
2. Google LLC. *Weave TLV Format*. Revision 4. May 20, 2013.

Appendix A. Weave TLV Examples

In this example, we consider the Nest Protect (Second Generation), Wired.

A.1. Nest Protect (Second Generation)

Table 12 and Table 13 below illustrate an example encoding of a Battery Power Source Capabilities and Battery Power Source instance for the Nest Protect (Second Generation), Wired using context tags[1].

Element	Notes	Tag	Length	Value
Type	**Battery**	0x24 01	-	**0x01**
Description	**“Back-up Battery”**	0x2c 02	15	**0x42 61 63 6b 2d 75 70 20 42 61 74 74 65 72 79**
Nominal Voltage	**4.5**	0x26 03	-	**0x00 00 12 00**
Maximum Current	**3**	0x26 04	-	**0x00 00 0c 00**
Current Type	**DC**	0x24 05	-	**0x01**
Order	**1**	0x24 06	-	**0x01**
Removable	**True**	0x29 07	-	**-**
Rechargeable	**False**	0x28 20	-	**-**
Capacity	**9**	0x26 21	-	**0x00 00 24 00**
Chemistry	**LithiumIronDisulfide**	0x24 22	-	**0x0F**

[1] While Weave TLV data is encoded in little endian byte order, values in the tag column are shown in big endian byte order to aid human readability.

Count	**3**	0x24 23	-	**0x03**
Replaceability	**User Replaceable**	0x24 24	-	**0x02**

Designations	{
	“*description*” : “**Energizer Ultimate Lithium L91**”,
	“*common_identifier*” : **AA**,
	“*ansi_identifier*” : **15LF,**
	“*iec_identifier*” : **FR6**
	}
		0x35 25	-	**0x2c 01 1f 45 6e 65 72 67 69 7a 65 72 20 55 6c 74 69 6d 61 74 65 20 4c 69 74 68 69 75 6d 20 4c 39 31 24 02 04 24 03 1d 24 04 26 18**

Table 12. A Battery Power Source Capabilities trait data schema example for the Nest Protect (Second Generation), Wired for its back-up battery power source encoded in Weave TLV with context-specific tags.

Element	**Notes**	**Tag**	**Length**	**Value**
Type	**Battery**	0x24 01	-	**0x01**
Assessed Voltage	**4.1**	0x24 02	-	**0x00 00 10 66**
Condition	**Nominal**	0x24 05	-	**0x01**
Status	**Active**	0x24 06	-	**0x02**
Present	**True**	0x29 07	-	**-**
Replacement Indicator	**Not At All**	0x24 20	-	**0x01**
Remaining	**NULL**	0x34 21	-	**-**

Table 13. A Battery Power Source trait data schema example for the Nest Protect (Second Generation), Wired for its back-up battery power source encoded in Weave TLV with context-specific tags.