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DESIGN STUDY

Substation switch end-of-sale under NERC CIP-013: last-time buy, migration and supplier-risk plan for 60 substations

Complete design on current platforms

CAPABILITY	INDUSTRY	SETTING
Strategic Resourcing	Utilities	Transmission owner
DOCUMENT	**VERSION**	**DATE**
RES-006	1.1	Oct 10, 2026

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Document control

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Sign-off	"An engagement under this design is signed by the practice lead before any build proceeds."		

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CONVENTIONS

Source tags. [S] figure or clause read from the standards body's or vendor's own current page on Sep 24, 2026, or on Sep 27, 2026 where §1c says so · [S*] figure from the page summary where the page itself could not be opened · [A] assumption about the typical buyer, to be confirmed by the signing engineer · [T] design target taken from the design's stated outcome or derived from it. Every figure carries at least one tag. No figure comes from any prior engagement, file or asset. A row with more than one tag is counted once: as a published figure if any tag is [S] or [S*], otherwise as an assumption if any tag is [A], otherwise as a design target.

Table 1. Revision history

Date	Version	Change
Sep 27, 2026	1.0	First issue.
Oct 10, 2026	1.1	Approval line now reads: approved by the Founder, issued by Symbeeo. Avinash Dhinakaran remains the author.

1 · Scope

Who it is for. The supply-chain security lead at an electric utility whose substation Ethernet switch has an end-of-sale date, who must decide what to buy before that date, what to migrate to after it, and show an auditor that both decisions went through the utility's CIP-013 plan.

Typical buyer [A]. A US transmission owner with 60 substations holding medium-impact BES Cyber Systems. Each substation's protection and control LAN runs on 2 SEL-2730M switches — 120 installed. The comparison for the replacement named the SEL-2731 as the conforming successor for this protection network [A].

What is in. The last-time buy before end-of-sale; the migration schedule; the CIP-013 risk assessment of the vendor transition; the procurement controls CIP-013 R1.2 lists, applied to this purchase; provenance and software integrity at receipt; the plan review cycle. **What is out.** The substation network design and its protection-signaling tests; CIP-005 and CIP-010 controls after installation; field installation, which runs under SRA-RES-001 §4.8.

Assumptions. The utility's CIP-013 plan exists and is in force; this document is one application of it [A]. The switches are bought direct from the manufacturer [A]. Migration runs 20 substations a year for three years, one substation at a time inside a planned outage [A].

Related documents, read Sep 24, 2026. SRA-RES-001 · SDD-RES-001 · STP-RES-001 · NERC CIP-013-3 (https://www.nerc.com/globalassets/standards/reliability-standards/cip/cip-013-3.pdf) · NERC CIP-013-2 (https://www.nerc.com/globalassets/standards/reliability-standards/cip/cip-013-2.pdf) · SEL-2730M product page (https://selinc.com/products/2730m/) · SEL-2731 product page (https://selinc.com/products/2731/) · CycloneDX 1.7 release (https://cyclonedx.org/news/cyclonedx-v1.7-released/).

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1c · Public implementations this design follows

Table 2. Public implementations this design follows

Implementation	Who published it · date	What it settles for this design	URL
CIP-013-3, Cyber Security – Supply Chain Risk Management	NERC · adopted by the NERC Board May 9, 2024; approved by FERC Order No. 919, issued Mar 19, 2026; effective in the US Jul 1, 2028 · published standard, used to build our own design	R1.1 requires a process to assess risk from procuring and installing vendor equipment and from transitions from one vendor to another; R1.2.1–1.2.6 list the procurement controls; R3 requires the plan reviewed at least once every 15 calendar months; evidence kept three calendar years. Effective in the US on Jul 1, 2028, CIP-013-2 inactive after Jun 30, 2028 [S] NERC standard page and US Effective Date Status workbook, read Sep 27, 2026; until then CIP-013-2, which carries the same review interval, is in force	https://www.nerc.com/globalassets/standards/reliability-standards/cip/cip-013-3.pdf · https://www.nerc.com/standards/reliability-standards/cip/cip-013-3 · https://www.nerc.com/globalassets/align-reports/us-effective-date-status---functional-applicability.xlsx
SEL-2730M availability notice	Schweitzer Engineering Laboratories · product page last updated Sep 25, 2026 (page data, read Sep 27, 2026); the notice itself carries no date · vendor documentation, used to build our own design	"No longer available for purchase after January 7, 2027"; SEL-2731 and SEL-2741 named in its place. The date fixes R2	https://selinc.com/products/2730m/
SEL-2731 Ethernet Switch	Schweitzer Engineering Laboratories · product page last updated Sep 25, 2026 (page data, read Sep 27, 2026) · vendor documentation, used to build our own design	The successor's published figures: 24 ports, IEEE 1613 Class 1 and IEC 61850-3, RSTP or OT SDN by firmware, ten-year warranty	https://selinc.com/products/2731/
CIP-013 Supply Chain Cyber Security Risk Management Plan, Version 7.0	A US municipal utility, the plan's owner · effective May 1, 2025 (read Sep 27, 2026) · public deployment	A US utility's own published CIP-013-2 plan: procurements subject to CIP-013 are made only from vendors on its prequalified list, admitted after a vendor risk assessment, with vendor risk monitored afterwards and the plan approved by a CIP Senior Manager delegate. The purchases here run inside a plan of that kind (§1, assumptions)	https://www.ladwp.com/sites/default/files/2025-08/CIP-013%20Supply%20Chain%20Cyber%20Security%20Risk%20Management%20Plan%207.0.pdf

CIP-013-3's effective date, Jul 1, 2028 in the US, was read on Sep 27, 2026 from NERC and matches SRA-RES-001 §9.1; it follows the Project 2016-02 implementation plan (24 months after the approving order took effect on May 26, 2026, rounded to the next calendar quarter). The SEL notice has no date of its own; its row is dated by the product page's last update.

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2 · Requirements register

Table 3. Requirements register

#	Requirement	Value	Source
R1	Installed switches reaching end-of-sale	120 × SEL-2730M in 60 substations	[A]
R2	Last date to order the installed model	Jan 7, 2027 — 15 weeks after Sep 24, 2026	[S] SEL; [T] derived
R3	Successor model	SEL-2731: 24 ports (8 × 1000/100 Mbps, 16 × 100 Mbps); IEEE 1613 Class 1, IEC 61850-3; IEEE C37.238-2017; RSTP or OT SDN, field-convertible by firmware; –40 to +85 °C, fanless; ten-year warranty	[S] SEL
R4	Migration rate	20 substations, 40 switches a year, for 3 years	[A]
R5	Last-time-buy spares of the installed model	12 units, 10 % of installed, to cover sites not yet migrated	[A]
R6	Successor spares	5 % of units installed each year, minimum 2	[A]
R7	Vendor-transition risk assessment	written and approved before the first successor order	[T]; [S] CIP-013 R1.1
R8	Procurement controls addressed in the purchase	incident notification; coordinated incident response; notice when vendor access should end; disclosure of known vulnerabilities; verification of software integrity and authenticity; coordination of vendor-initiated remote access	[S] CIP-013 R1.2.1–1.2.6
R9	Plan review and CIP Senior Manager approval	at least once every 15 calendar months	[S] CIP-013 R3
R10	Evidence retention	3 calendar years	[S] CIP-013-3
R11	Firmware integrity checked before installation	100 % of units	[T]; [S] CIP-013 R1.2.5
R12	Provenance record at receipt	100 % of units: serial, ship notice, seal, firmware version and integrity result	[T]
R13	Single-manufacturer waiver	signed by the buyer; compensated by early order and the spares of R5 and R6	[A]; SRA-RES-001 §4.4
R14	Vendor-initiated remote access during migration	none; manufacturer's engineers on site under escort	[A]

Fourteen rows; seven carry a standards body's or vendor's text (three of them beside a design target), six are design assumptions, one is a design target.

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3 · Architecture overview

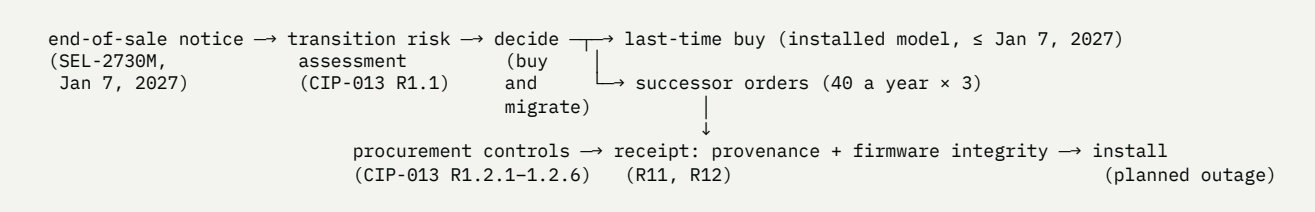


Figure 1. End-of-sale purchase and migration flow

The end-of-sale notice is the trigger the utility's plan names; the two purchases that follow — a last-time buy and a three-year successor program — each carry the same procurement controls and the same receipt checks.

Table 4. Architecture overview

CIP-013 item	How this purchase meets it	Evidence kept
R1.1 transition risk	written assessment of moving from SEL-2730M to SEL-2731: configuration conversion, protection-signaling retest, mixed-model period	signed assessment
R1.2.1 incident notification	clause in the purchase terms; named contacts both sides	contract reference
R1.2.2 coordinated response	the manufacturer's contact is in the utility's incident plan for these assets	plan extract
R1.2.3 end of vendor access	no standing access; on-site escort ends with the visit (R14)	visitor log
R1.2.4 vulnerability disclosure	subscription to the manufacturer's security notices, mapped to serials	subscription record; serial map
R1.2.5 software integrity	firmware verified before install (R11)	per-unit integrity record
R1.2.6 remote access	none initiated by the vendor (R14)	access-control record

4 · Design by subsystem

4.1 Decision.

Two purchases, not one [A]. A last-time buy of 12 SEL-2730M (R5) keeps every not-yet-migrated substation supported until its turn; a successor program of SEL-2731 at 40 a year (R4) replaces the fleet. Rejected: buying 120 SEL-2730M before Jan 7, 2027 to defer migration — it only moves the same transition decision later, onto a model that can no longer be bought. Rejected: migrating all 60 substations before end-of-sale — 15 weeks (R2) cannot hold 60 planned outages [A].

4.2 Last-time buy.

Ordered at once; the order date must fall before Jan 7, 2027 [S], and the promised date is recorded against it like any class-A line (SRA-RES-001 R5). Spares are received, inspected under R12, firmware-checked under R11 and held sealed [A].

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4.3 Transition risk.

CIP-013 R1.1 names transitions from one vendor to another [S]; here the manufacturer is unchanged but the model, its port groups and its firmware change, so the utility's plan treats it as a transition [A]. The assessment covers configuration conversion from the installed model, the protection-signaling retest after each cutover, and the mixed-model period while both run (§5) [A]. The SEL-2731's OT SDN mode is not used in this migration; switches are ordered and kept in RSTP mode, which the firmware allows either way [S].

4.4 Source depth.

One manufacturer, bought direct; no second independent source exists for the model the comparison fixed [A]. Under SRA-RES-001 §4.4 that is a class-A line with a buyer-signed waiver (R13), compensated by ordering each year's quantity at the start of the year and by the spares of R5 and R6 [A].

4.5 Receipt, integrity and provenance.

Per unit: serial scanned against the ship notice; seal inspected; firmware version read; firmware integrity and authenticity verified against the manufacturer's published hash or signature where the manufacturer provides one, before the unit is configured (R11) [A] method. Where the manufacturer publishes a bill of materials it is attached in CycloneDX 1.7 form [S] (released Oct 21, 2025). A unit that fails any check is quarantined and returned.

4.6 Plan review.

The utility's CIP-013 plan is reviewed and approved by its CIP Senior Manager at least once every 15 calendar months [S]; this purchase's evidence is filed so that the next review can read it, and kept three calendar years [S]. SRA-RES-001's quarterly supplier review (R10 there) runs inside that cycle [A].

5 · Failure behavior

Table 5. Failure behavior

Failure	Behavior	Source
Last-time-buy order not accepted before Jan 7, 2027	spares cover only what is on hand; migration of the sites with the oldest units brought forward	[A]
Firmware fails integrity check at receipt	unit quarantined; manufacturer's security contact told; replacement ordered	[T]
Protection-signaling retest fails after cutover	substation rolled back to the installed model from last-time-buy spares inside the outage	[A]
Successor quoted beyond the start-of-year order date	that year's migration shortened; the remaining substations run on SEL-2730M with spares	[A]
Manufacturer security notice for a deployed model	notice mapped to serials; patch planned under the utility's CIP-007 process	[A]
Plan review overdue beyond 15 calendar months	compliance finding risk; escalated to the CIP Senior Manager	[S] R3; [A] handling

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6 · Limits

- CIP-013-3 takes effect in the US on Jul 1, 2028 (NERC, read Sep 27, 2026); until then CIP-013-2 is the standard in force and carries the same 15-month review. The three-year migration (R4) runs past that date, so the plan review before Jul 1, 2028 moves the utility's plan to CIP-013-3 [A].
- 12 spares at 10 % is an assumption; the utility's own failure history for the installed model replaces it.
- Whether a same-manufacturer model change is a "transition" under R1.1 is the utility's plan's call; this design treats it as one.
- The firmware-integrity method depends on what the manufacturer publishes per release; it is stated as a method, not as a claim about that manufacturer.
- No figure here has been measured.

7 · Lessons learned

None yet — this is a design study; populated after the first build against it.

8 · The author

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Signed off by Edwin Ozer, Founder.

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SYMBEEO

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Figures are as published by their sources on the dates given in this document; figures marked [A] are assumptions.

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