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DESIGN STUDY

Store network rollout: 320 stores in 16 weeks, switches and Wi-Fi 7 claimed to the cloud, planned for overnight installs

Complete design on current platforms

CAPABILITY	INDUSTRY	SETTING
Implementation Services	Retail	Retailer
DOCUMENT	**VERSION**	**DATE**
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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 read from the vendor's or publisher's own current page on Sep 24, 2026 · [S*] figure from the publisher's summary or a secondary report, where the publisher's full text could not be read on that date · [A] design assumption, to be confirmed by the signing engineer · [T] design target: the record's outcome figure and anything derived from it. No figure comes from any 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. Steve Phillips remains the author.

1 · Scope

Who it is for. The head of store IT at a retailer that has chosen its new store switching and Wi-Fi and now has to put it into 320 stores that trade every day, with no IT staff in any store, without a till going dark during opening hours.

Typical buyer [A]. A retailer with 320 stores of similar size. Per store: two access switches and eight access points replace the current kit; the store firewall and WAN stay as they are. Stores trade 08:00–22:00; the install crew has 23:00–06:00. Point-of-sale terminals, payment terminals, handhelds and cameras are the devices that must work at 08:00.

What is in. Store survey (remote for all, on site for a sample); claiming and templating in the cloud controller; kit preparation and labeling at a central integrator area; the install night; per-store acceptance; rollback; the store record; handover. **What is out.** Choosing the platform (the Networking capability's comparison); the store firewall and WAN; the retailer's own point-of-sale software; cabling beyond the comms cabinet patch field.

Assumptions. HPE Juniper Networking is the chosen vendor: EX4100 switches and AP47 access points managed by Juniper Mist [A]. Every store's comms cabinet has two free 1U positions, a dedicated circuit and existing horizontal cabling that tests clean on the sample [A]. The store's management VLAN can reach the internet outbound [A]. Four install crews, one store a night each, five nights a week [A].

Related documents, read Sep 24, 2026.

- SRA-IMP-001, SDD-IMP-001, STP-IMP-001 — this capability's reference architecture, design and test plan
- EX4100 models and specifications — https://www.juniper.net/documentation/us/en/hardware/ex4100/topics/concept/ex4100-models.html
- AP47 access point datasheet — https://www.juniper.net/gb/en/products/access-points/ap47-access-point-datasheet.html
- Onboard switches to the Mist cloud — https://www.juniper.net/documentation/us/en/software/mist/mist-wired/topics/topic-map/onboard-switch-mist-wired.html
- Cloud-ready EX and QFX switches with Mist, quick start — https://www.juniper.net/documentation/us/en/quick-start/hardware/cloud-ready-switches/topics/topic-map/step-1-begin.html
- Midsize branch solution with Juniper Mist cloud (NCE-214), part 2 — https://www.juniper.net/documentation/us/en/software/nce/nce-214-midsize-branch-mist-pwp/topics/topic-map/nce-214-midsize-branch-mist-example_part2.html

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- NetBox v4.6 release notes — https://netboxlabs.com/docs/netbox/release-notes/version-4.6
- EX4100 Power System, PoE Budget Planning, topic dated Jun 29, 2025, read Sep 27, 2026 — https://www.juniper.net/documentation/us/en/hardware/ex4100/topics/topic-map/ex4100-power-system.html
- Understanding PoE on EX Series Switches, PoE class table, topic dated Feb 14, 2025, read Sep 27, 2026 — https://www.juniper.net/documentation/us/en/software/junos/poe/topics/concept/poe-overview.html
- AP47 datasheet, Power Options, read Sep 27, 2026 — https://www.juniper.net/gb/en/products/access-points/ap47-access-point-datasheet.html

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
A multinational apparel retailer moved its North American stores to a Juniper Mist cloud-managed WLAN after a proof of concept, automated provisioning through the Mist APIs, and reports 85 % fewer visits to stores by technical staff	Juniper Networks customer story, document 3520676-001-EN · 2019-11 · public deployment	That a store estate can be run from one Mist cloud organization with provisioning automated rather than done per store, the model of R5 and R7; it covers Wi-Fi only, not switches, so R2–R3 do not rest on it	https://www.juniper.net/content/dam/www/assets/case-studies/us/en/2020/gap-case-study.pdf
Branch built from an EX switch, Mist access points and a gateway, all claimed into the Mist cloud and configured from site, switch and wireless templates with device and port profiles	Juniper TechLibrary, NCE-214 · Jun 29, 2021 · vendor documentation, used to build our own design	The claim-then-template sequence in §4.2; the store is a template instance, not a hand configuration	https://www.juniper.net/documentation/us/en/software/nce/nce-214-midsize-branch-mist-pwp/topics/topic-map/nce-214-midsize-branch-mist-example_part2.html
Greenfield onboarding: cloud-ready switches claimed by QR or claim code; brownfield switches adopted by CLI; outbound TCP 443, with TCP 2200 during initial adoption	Juniper Mist documentation · Sep 25, 2026 · vendor documentation, used to build our own design	R5 and R6; the store firewall rule is written before the first install night	https://www.juniper.net/documentation/us/en/software/mist/mist-wired/topics/topic-map/onboard-switch-mist-wired.html

Dates are the topic dates Juniper prints on each documentation page, and the document date on the apparel retailer's customer story, all read Sep 27, 2026. The retailer's story was read in full.

2 · Requirements register

Table 3. Requirements register

#	Requirement	Value	Source
R1	Stores	320	[A]
R2	Per-store kit	2 × EX4100-48MP, 8 × AP47	[A]

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#	Requirement	Value	Source
R3	Switch	EX4100-48MP: 32 × 1GbE and 16 × 1/2.5GbE access ports, PoE++ at 90 W per port, 4 × 1/10GbE SFP+ uplinks, 4 × 10/25GbE SFP28 Virtual Chassis ports, 920 W AC power supply	[S] Juniper EX4100 models page
R4	Access point	AP47: four-radio 802.11be Wi-Fi 7, dedicated fourth tri-band scanning radio, two 10 Gbps Ethernet ports	[S] AP47 datasheet
R5	Onboarding	every unit claimed to the retailer's Mist organization and assigned to its store before it ships	[S] claim by QR or claim code; [T] before shipping
R6	Store firewall	management VLAN outbound to the Mist cloud on TCP 443, and TCP 2200 for initial adoption	[S] Mist onboarding page
R7	Configuration	every store's configuration from Mist templates; zero per-store CLI changes at handover	[T]; SRA-IMP-001 R8
R8	Install window	23:00–06:00; store trading unaffected	[T]
R9	Rate	20 stores a week; 320 stores in 16 weeks	[T] from the crew assumption
R10	Rollback	old switches left racked and powered until acceptance; rollback trigger 04:30; re-patch to them in ≤ 60 min, complete by 05:30, inside the 06:00 window end	[A]
R11	Per-store acceptance	both switches in one Virtual Chassis; 8 of 8 access points connected; every point-of-sale and payment terminal transacts once	[T]
R12	Labels	cabinet, switch, patch panel and access point labeled in the TIA-606-D scheme	[S*] TIA-606-D (from SRA-IMP-001)
R13	Store record	serial, store, cabinet position and claim state per unit in one source of truth	[S] NetBox 4.6; [A] tool choice
R14	PoE budget	AP47 full function is 802.3bt Class 6, allocated 60.0 W at the switch port (51 W at the access point). Four per switch: 4 × 60 W = 240 W, inside the 740 W PoE budget of one EX4100-48MP on one power supply. All eight re-patched to one switch if the other fails: 8 × 60 W = 480 W, still inside 740 W	[S] AP47 datasheet; [S] EX4100 Power System, Jun 29, 2025; [S] Understanding PoE on EX Series, Feb 14, 2025; [A] four per switch, one cable per access point

Fourteen rows; six carry a vendor figure, one a summary figure, three are design assumptions, four are design targets.

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3 · Architecture overview

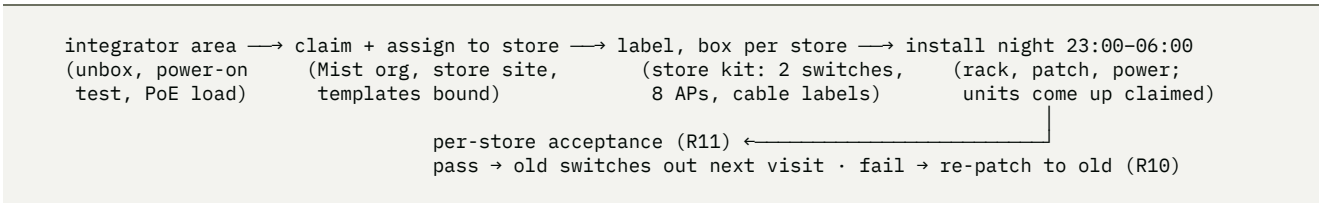


Figure 1. Store switch and access point rollout

The configuration is written once, as templates in the controller; each store is a site that inherits them. Nothing is configured on the install night; the crew only racks, patches and powers, and the units fetch their configuration when they reach the cloud. This is SRA-IMP-001 D3's controller path.

Table 4. Architecture overview

Role	Product (exact model)	Qty	Capacity used	Why this unit
Access switch	HPE Juniper Networking EX4100-48MP	640	48 access ports per unit, 96 per store [A]	PoE++ 90 W per port; 2.5GbE ports for the access points; Virtual Chassis ports for the pair [S]
Access point	HPE Juniper Networking AP47	2,560	8 per store [A]	Wi-Fi 7, scanning radio, two 10 Gbps ports [S]
Controller	Juniper Mist cloud	1 organization, 320 sites	all units [A]	claim codes, templates, onboarding [S]
Source of truth	NetBox 4.6	1	3,200 units by serial [T]	v4.6.0 released May 5, 2026 [S]

4 · Design by subsystem

4.1 Survey.

Every store answers a remote survey: cabinet photograph, free rack units, circuit, access point positions on the floor plan [A]. One store in ten is surveyed on site and its horizontal cabling tested; if the sample finds faults above 2 % of runs, every store in that region is surveyed on site [T]. The survey is signed by the store operations manager (SRA-IMP-001 R1, adapted to a store) [A].

4.2 Claim and template.

Cloud-ready switches carry a QR code and a claim code; claiming via the portal sets Mist to manage the configuration and sets the root password on each claimed switch [S]. Templates: one switch template with port profiles for point-of-sale, payment, access point, camera and handheld chargers; one wireless template with the store SSIDs and VLANs [A], the structure NCE-214 builds [S]. Each unit is assigned to its store's site at the integrator area, so it arrives already belonging to one store (R5).

4.3 Kit preparation.

Staging at an integrator area (SRA-IMP-001 D1) [A]. Per switch: power-on, PoE load on every port for 4 h, serial and claim confirmed [A]. SRA-IMP-001 R5 asks for 72 h of sustained load before a production room; for an access switch going

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into a store cabinet this plan records a waiver at 4 h, with the reason and the approver, rather than silently shortening it [A]. Kits are boxed per store with printed labels and the store's port map [A].

4.4 Install night.

23:00 crew arrives; photographs the cabinet; racks the new pair beside the old; moves patches port by port from the old to the new using the port map; powers on [A]. The switches reach the cloud outbound on TCP 443, with TCP 2200 during initial adoption [S], and take their template configuration [S]. Access points are swapped one for one at the surveyed positions, four cabled to each switch (R14) [A]. 03:30 acceptance starts, which leaves the crew 4 h 30 min to rack, patch, power and swap [A].

4.5 Acceptance and rollback.

R11 checked by the crew with a remote engineer watching the controller: Virtual Chassis formed, eight access points connected, one transaction per till and payment terminal [T]. If a check fails and cannot be fixed by 04:30, the rollback trigger, patches go back to the old switches, which were left racked and powered (R10) [A]. The re-patch takes up to 60 min, so it is complete by 05:30, and the crew has 30 min to check one transaction per till on the old switches and leave by 06:00: 04:30 + 60 min = 05:30 ≤ 06:00 (R8, R10) [A]. Old switches leave the store on the next visit, after acceptance [A].

4.6 Record and handover.

The store record in NetBox holds every unit's serial, store and cabinet position; the configuration record is the Mist templates at their final version (R7, R13). The retailer's network team receives both, plus the acceptance sheet per store, within 10 working days of the last store [T].

5 · Failure behavior

Table 5. Failure behavior

Failure	Behavior	Source
Switch does not appear in the controller	firewall rule for TCP 443 and 2200 checked first; unit re-patched to old kit if unresolved by 04:30	[S] ports; [A] rule
Unit fails the PoE load at the integrator area	swapped from staging stock; store kit ships complete	[A]
Store cabling fails on the night	affected ports stay on the old switch; store listed for a cabling visit	[A]
Acceptance not passed by 04:30	re-patch to the old switches, complete by 05:30; store re-booked	[A] R10
Template change breaks a port profile	change reverted in the controller for all stores at once; no store is touched by hand	[T] R7
Crew misses a night	the store moves to the reserve night at the end of that week	[A]

6 · Limits

- The PoE arithmetic in R14 counts the access points only, at their Class 6 allocation; cameras and any other powered device share the remaining 500 W per switch (740 W − 240 W), and the signing engineer adds them from the store survey. The 740 W budget assumes the single 920 W power supply of R3; a second supply raises it to 1,620 W [S].

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- The 04:30 trigger leaves 4 h 30 min for the install itself; a store that is not racked and patched by 03:30 starts acceptance late, and its trigger does not move.
- Twenty stores a week assumes four crews and no failed nights; the reserve night per week is the only buffer.
- The 4 h switch load test is a recorded waiver of SRA-IMP-001 R5, not a conformance.
- Stores with non-standard cabinets fall outside the port-map method and are planned one by one.
- The Mist cloud is a service outside the store; a store that cannot reach it on the night cannot complete.

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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