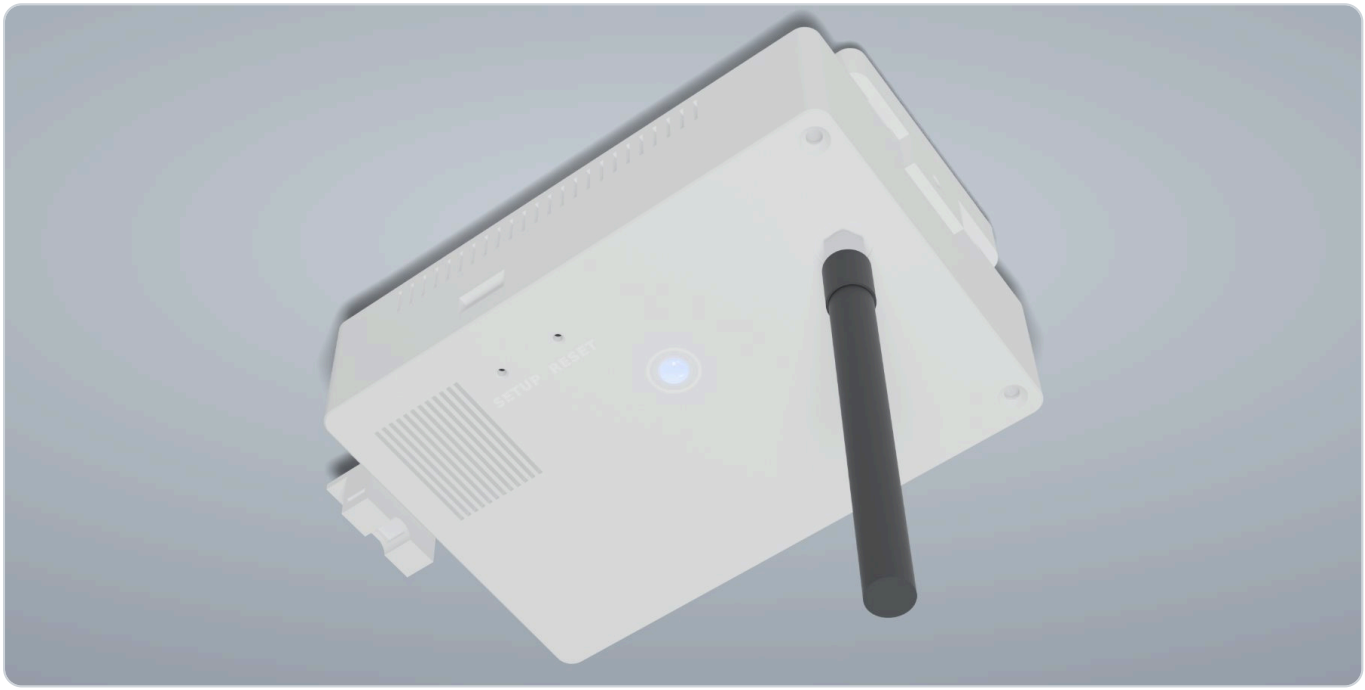
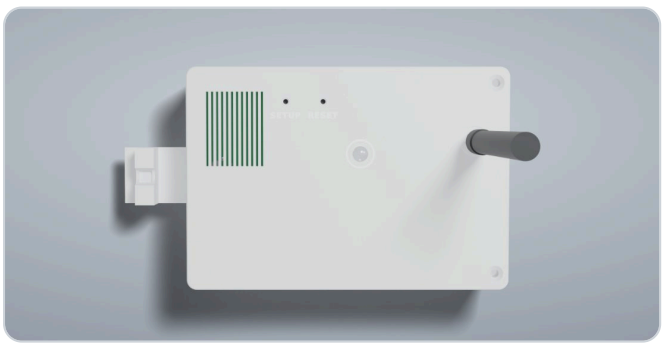
Access point

Ceiling radio for Merkora labels, powered over Ethernet

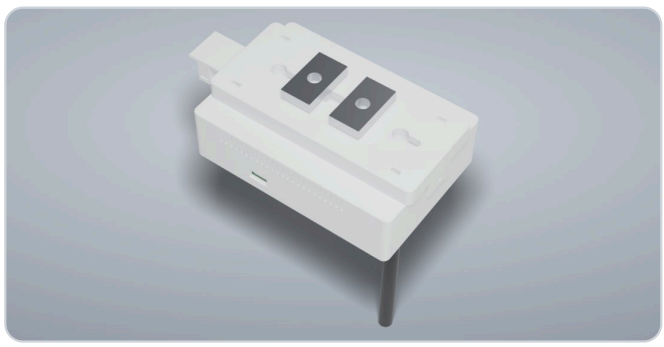
Hangs above the aisle and reaches every label in range over Bluetooth. One Ethernet cable brings power and the connection to the site's bridge.



Render from the design model. Nothing has been fabricated yet.



The floor-facing side: dipole, status LED and recessed button.



From above, on its mounting plate with two channel nuts.

One cable
Power over Ethernet (802.3af) brings power and data. No mains socket on the ceiling.

Planned by floor area
Three or four access points cover about 1,500 m² with racks, with overlap so one can fail.

Made for metal racks
A front-end amplifier hears the labels' coin-cell replies, and the dipole hangs below the steel.

No ladder for updates
Both processors take firmware updates over the network; sending them from the bridge is planned.

In development. The design is captured in KiCad and build123d (revision A). No board has been fabricated and nothing has been tested on hardware; every value here is a design target or an estimate until it is measured on prototypes.

Specifications

Design in the design files · Target to be verified on prototypes · Estimate calculated, not measured · Planned not built yet

Radio

Radio	Bluetooth 5.4 Electronic Shelf Label access point (PAwR), sync every 1–2 s	Design
Module	nRF54LM20A with an nRF21540 front end: +13 dB receive gain for the labels' weak replies	Design
Antenna	2 dBi swivel dipole on RP-SMA, pointing down	Design
Transmit power	+10 dBm EIRP cap in every region, set by the radio firmware; not yet verified on hardware	Design
Coverage	Planning radius 15–20 m in rack aisles, 25–30 m in an open hall, 10–12 m in dense metal	Estimate
Site plan	3–4 access points for about 1,500 m² with racks; every label heard by two of them	Target
Labels per AP	About 500 before adding access points for capacity; the ESL standard addresses 32,640	Estimate

Network

Ethernet	10/100 Mbit/s, DHCP	Design
Protocol	MQTT to the bridge in your local network; TLS optional	Design
Processor	ESP32-S3 with a W5500 Ethernet controller; Wi-Fi off by default	Design
Updates	Both processors take firmware updates over the network; sending them from the bridge is planned	Design
Identity	Access point id is its Ethernet MAC, printed as a QR code	Design

Power

Supply	Power over Ethernet, IEEE 802.3af (presents Class 0)	Design
Consumption	About 1.1 W typical, 3.2 W at most	Estimate
Service port	USB-C under a cover: console, flashing and 5 V bench power	Design

Light and button

Status LED	RGB behind a light pipe, seen from the floor at 5 m; firmware not yet verified on hardware	Design
Patterns	Green breathing: running. Blue blink: no bridge. Amber: no radio. Red: no network. White: identify	Design
Button	Recessed. Press: identify; 5 s: setup page; 10 s: factory reset. Not yet verified on hardware	Design

Mechanical

Size	About 130 × 90 × 35 mm, plus the dipole	Design
Weight	About 230 g printed, with mount plate (target 180 g)	Estimate
Mounting	Mount plate for 41 mm strut channel (M8), two keyholes 80 mm apart, cable ties or a drop rod; the access point slides on and is held by a detent and one screw	Design
Height	3–5 m above the floor, dipole below any steel within 1 m	Design
Housing	First units printed in flame-retardant PC; PC/ABS, UL 94 V-0, light grey (RAL 7035) in volume	Target

Environment

Temperature	0 to 45 °C, 10–90 % relative humidity, no condensation	Target
Ingress	IP20; IP42 as an option	Target
Drop	1 m onto concrete, three times	Target

Compliance

- **Not certified, not CE marked yet.** Before sale the access point gets its own assessment under the Radio Equipment Directive: EN 300 328, EN 301 489-1/-17, EN 62368-1 and EN 55032 / EN 55035.
- The radio module's test reports apply only with the same antenna type and gain.
- RoHS and REACH are design requirements. WEEE marking and take-back are arranged before the first sale.

Availability

- **Not for sale yet.** Pilot sets go to a few manufacturers first. Ask at service@newmatik.com.
- Needs a PoE switch or injector (802.3af or 802.3at) and one Merkora bridge per site.
- Before installation, a site survey decides how many access points go where.