VusionGroup Electronic Shelf Labels (ESL) Integration with MRs

Overview

Electronic shelf labels (ESL) are digital displays of various sizes and shapes used by retailers to display product pricing (among other uses). Unlike traditional paper price tags, the product pricing on electronic shelf labels can be automatically and remotely updated whenever a price is changed from a central control server. Below is an example of the electronic shelf label from a Meraki partner, VusionGroup.

Learn more with these free online training courses on the Meraki Learning Hub:

- Implementing ESL Technology with Meraki-Managed Wireless

Sign in with your Cisco SSO or create a free account to start training.

ESL and MQTT (BLE based) cannot be enabled in the same network since these features utilize the same IoT radio available on the AP.

Note: Ensure that your V:Cloud stores use the token-based (JWT) connection. Direct connection type is no longer supported for new ESL deployments.
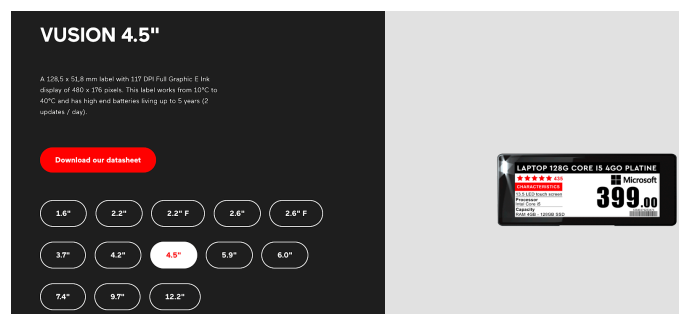
Electronic shelf labels have the following advantages over traditional paper price tags:

- Instant pricing integrity (accurate prices on all products, including promotions)

- Improved operating efficiency (eliminate paper label waste and free employees for higher-value activities)

- The enhanced customer experience (save time to find products and help both staff and shoppers make informed decisions)

Traditionally, retail customers had to deploy two parallel infrastructures: ESL "gateways: to serve ESL tags and regular
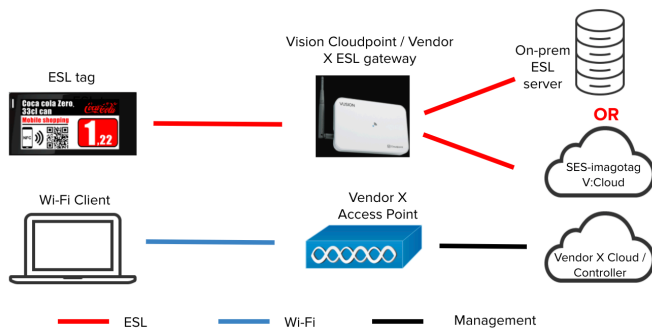
Wi-Fi access points to serve wireless clients.

Sometimes an on-prem price update server needs to be set up as well. In addition, installing ESL gateways has associated costs that involve cable runs, additional PoE switch ports, IT security provisioning and monitoring, and labor.

Meraki partnered with VusionGroup to deliver a simple integrated solution to our customers in such scenarios. Supported MR access points can act as ESL "gateways" for ESL labels and serve regular wireless clients.
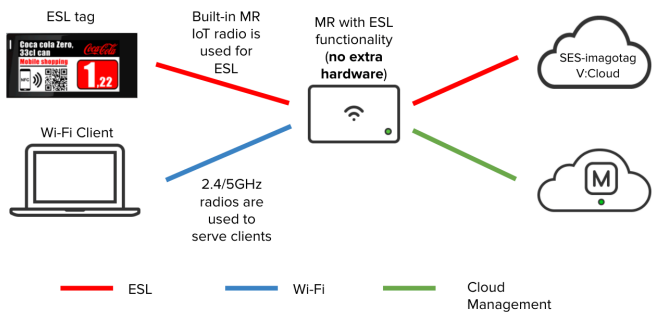
VusionGroup/Meraki ESL Architecture

Traditional ESL deployment looks like this:

ESL tag

Vision Cloudpoint / Vendor X ESL gateway

On-prem ESL server

OR

SES-imagotag V:Cloud

Wi-Fi Client

Vendor X Access Point

Vendor X Cloud / Controller

ESL — Wi-Fi — Management

Customers must run ESL and wireless infrastructures in parallel and maintain hardware and software for both, increasing operational overhead.

Meraki provides a unified ESL + Wireless infrastructure with no additional hardware (e.g., USB dongles or PCI-e add-on cards):

ESL tag

Built-in MR IoT radio is used for ESL

MR with ESL functionality (**no extra hardware**)

SES-imagotag V:Cloud

Wi-Fi Client

2.4/5GHz radios are used to serve clients

ESL — Wi-Fi — Cloud Management

How ESL VusionGroup Integration Works

Terminology

- **V:Cloud / V:Cloud instance**

  ◦ VusionGroup dashboard used to manage ESLs, view the status of MRs used as ESL gateways, and push price

updates.

- **Meraki dashboard**

  ◦ Refers to the Meraki management web UI interface accessible via Meraki Cloud

When configured for the ESL MR access points will establish a TLS tunnel to V:Cloud to provide connectivity between ESL tags and VusionGroup V:Cloud.

Note: MR access points communicate with V:Cloud directly and not through the Meraki Dashboard. Therefore, data transmitted between V:Cloud and ESL tags do not go through the Meraki Cloud.

Note: MRs do not use Bluetooth for communication with VusionGroup ESLs but instead use a proprietary protocol developed by VusionGroup that allows extended battery life for ESLs and scalable updates to tens of thousands of price tags. This protocol operates in the same 2.4GHz band as 2.4GHz Wi-Fi; however, the channels are narrower and differ from Wi-Fi channels. See the "Recommended ESL Channels" section for more information.

Supported Models and Specifications

Note: Only MR models explicitly listed in the table below are supported (ex. MR46 is listed as supported but we do not see MR46E, which means MR46E is not supported).

"Support pending" means that ESL support will be added shortly.

Electronic Shelf Labels (ESL) integration with VusionGroup is supported on the following AP models:

MR Model Name	MR Family	VusionGroup Integration Status
MR30H	WiFi-5 Wave 2 Indoor	Supported
MR33	WiFi-5 Wave 2 Indoor	Supported
MR74	WiFi-5 Wave 2 Outdoor	Supported
MR45	WiFi-6 (Compatible) Indoor	Supported
MR55	WiFi-6 (Compatible) Indoor	Supported
MR36	Wi-Fi 6 Indoor	Supported
MR36H	Wi-Fi 6 Indoor	Supported

MR44	Wi-Fi 6 Indoor	Supported
MR46	Wi-Fi 6 Indoor	Supported
MR46E	Wi-Fi 6 Indoor	Not Supported
MR56	Wi-Fi 6 Indoor	Supported
MR76	Wi-Fi 6 Outdoor	Supported
MR86	WiFi-6 Outdoor	Supported
MR28	WiFi-6 Indoor	Supported
MR78	WiFi-6 Outdoor	Supported
MR57	Wi-Fi 6E Indoor	Supported
CW9162-MR	Wi-Fi 6E Indoor	Supported
CW9164-MR	Wi-Fi 6E Indoor	Supported
CW9166-MR	Wi-Fi 6E Indoor	Supported
CW9166D1-MR	Wi-Fi 6E Indoor	Planned
CW9163E-MR	Wi-Fi 6E Indoor	Planned

Prerequisites

- Access to VusionGroup V:Cloud. Please work with the VusionGroup Sales team to get access. **Direct connection type is not supported for new ESL deployments.** Please refer to Meraki Dashboard Configuration and V:Cloud Connection Types for more details about token-based vs. direct connection types**.**

- Access to Electronic Shelf Labels from VusionGroup. Please work with the VusionGroup Sales team to get the tags.

- Enabling ESL on a Meraki network precludes other MR IoT functionality, most notably BLE. That is, when using ESL, MR access points will not transmit a BLE beacon or scan for nearby BLE devices.

ESL Firmware Upgrades

ESL firmware upgrades are automatic and do not require any intervention from Meraki dashboard admins. Once a new

firmware version from VusionGroup becomes available, Meraki MRs will automatically download this latest firmware on the IoT radio. Therefore, there is no need to upgrade MR access points' firmware.

Requirements

- MRs listed in the "Supported Models and Specifications" section

- The Network firmware version should be set to MR 28.1 or higher

- MRs should be allowed to communicate with V:Cloud using the following destinations and ports:

FROM	ENDPOINT	PORT	GOAL
Cisco-Meraki Access Points	Authentication Service ap-auth.vusion.io	TCP: 7354 TLS 1.2 & AES 128 encrypted data	Security and authentication
Cisco-Meraki Access Points	Traffic Manager ap-${env}.vusion.io	TCP: 64000-65000 TLS 1.2 & AES 128 encrypted data	Transmission and updates

Predictive Site Survey (Optional)

Ekahau Pro software can be used to show ESL coverage using the BLE option below. Note that it only shows how many MRs hear BLE beacons from each other.
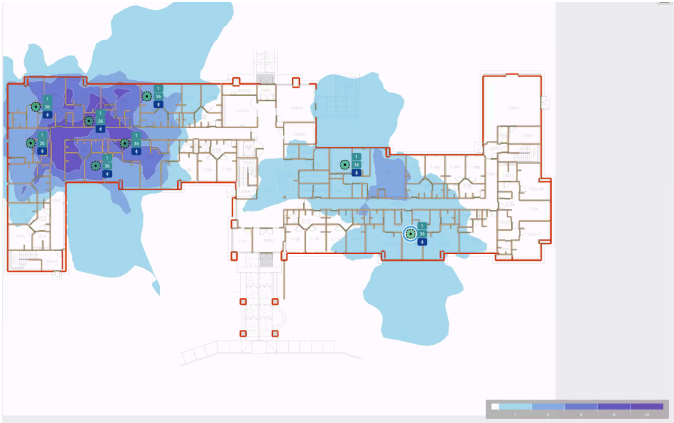
Manual ESL channel planning using custom tags is possible as well:
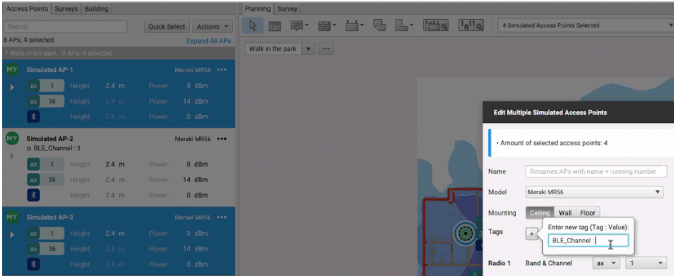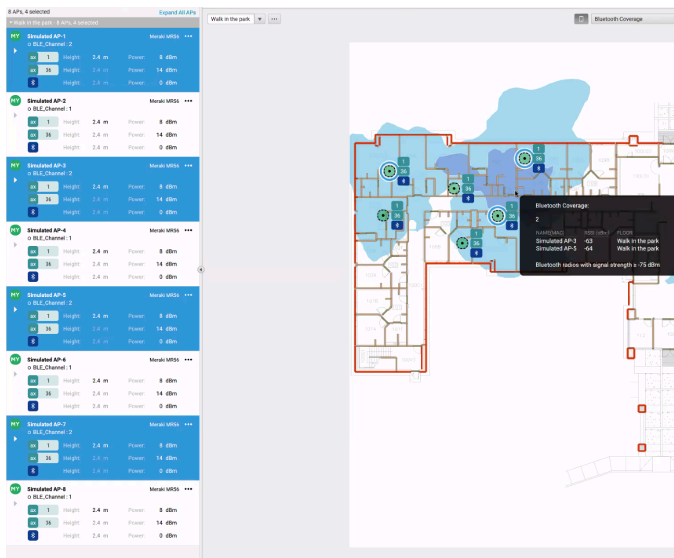
Note: Currently a heat map for BLE that shows RSSI values and automatic ESL channel planning is not available.

- Coverage planning - possible

- ESL channel planning - not possible (automatic)

Some rudimentary channel planning can be done with the custom tag functionality. For example, you could set "esl-channel : 1" tag for the ESLradio and you could then display the ESLcoverage for all ESLradios that have "esl-channel : 1" tag.

Meraki Dashboard Configuration and V:Cloud Connection Types

VusionGroup V:Cloud might use one of two VusionGroup backends: 1) direct legacy connection and 2) new token-based connection (also known as JWT).

Note: Only token-based (JWT) V:Cloud connection is supported for new deployments.

If you would like to enable the ESL in your Meraki network(s), please follow these steps to determine which backend your V:Cloud store is using:

1. Log into V:Manager

2. Navigate to your Retail Chain

3. Navigate to your Retail Store

4. Click on the **Infrastructure** tab and scroll all the way down

5. Check the URL listed under **"Network Information."**

6. **XXXXXXX.cloudapp.azure.com** means that your V:Cloud store is using the direct connection

7. **ap-auth.vusion.io** means that your V:Cloud store is using the token-based connection

8. If your store uses the direct connection, please contact VusionGroup Support to schedule your V:Cloud store migration to the token-based connection.

9. Enable the ESL functionality in the Dashboard.

1. VUSION
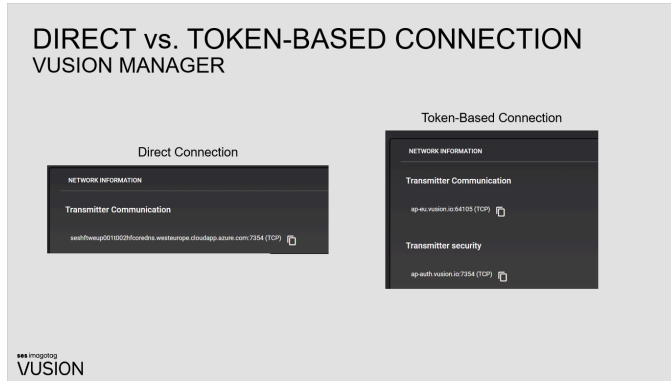
To enable ESL integration on supported MR models navigate to **Wireless > Configure > IoT radio settings**, select the "Electronic shelf labels" tab, and toggle "SES-imagotag integration" from "Disable" to "Enable".

Note: The V:Cloud URL field is no longer required if your V:Cloud stores use the token-based connection. In this case, this field will not be present in the Meraki Dashboard. However, if you need to use the direct connection instead, please let the Meraki Support team know, and we will enable the V:Cloud URL field in the Dashboard.

Select desired APs from the dropdown and assign an ESL channel for that AP (more on the ESL channels below). The "AP ID" field will be automatically generated. Repeat this step to enable ESL integration on additional MRs by using the "Add an AP" button.

Note: AP ID is a 32-bit value generated by the Meraki dashboard once ESL is enabled on the MR for the first time. AP ID is permanently assigned to an MR and will never change.

Use "Download CSV of ESL-enabled APs" to download a CSV list of all ESL-enabled APs along with ESL channels and AP IDs. MRs can be added via API call (please refer to the VusionGroup API documentation on the https://api-portal-us.vusion.io/ portal) or manually as shown below. Leave all settings at defaults.
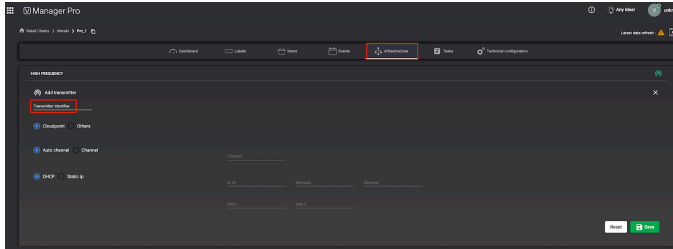
Basic and Smart ESL and Wi-Fi Coexistence

Wi-Fi 5 Wave 2 APs support basic co-existence with 2.4 Wi-Fi. Therefore, we recommend using 5GHz for Wi-Fi and 2.4GHz for ESL for these APs. However, if this is impossible, manually configure ESL channels on Wi-Fi 5 Wave to prevent interference with the Wi-Fi 2.4GHz channels (see "Recommended ESL Channels" section for details).

In addition, SSID(s) broadcasted on 2.4GHz channel(s) can be bandwidth-limited to reduce consumed air time.

Wi-Fi 6 and newer APs support smart co-existence and automatically manage 2.4GHz Wi-Fi and ESL transmissions on the same AP to minimize interference.

**Note:** 2.4GHz Wi-Fi Co-existence requires MR 28.6+ firmware.

Recommended ESL Channels

VusionGroup proprietary protocol that allows communication between MRs and ESL tags operates in the same 2.4GHz range as 2.4GHz Wi-Fi and has similar channel numbers, however, ESL channels have different central frequencies as shown below.

Note: This section is primarily meant for Wi-Fi 5 Wave 2 APs that support basic co-existence.

See "Supported Models and Specifications" for more information.

Note: All ESL channels are 1 MHz wide while 2.4GHz WiFi channels are 22 MHz wide.
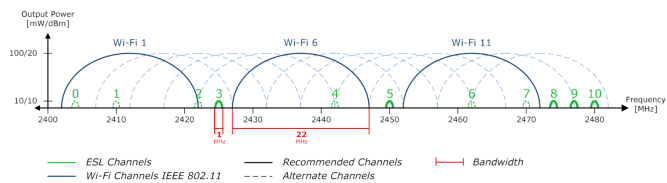
ESL Channel Number	Central Frequency (MHz)	Recommended?
0	2404	No
1	2410	No
2	2422	No
3	2425	Yes
4	2442	No
5	2445	Yes
6	2462	No
7	2470	No
8	2474	Yes
9	2477	Yes
10	2480	Yes

Note: Due to the overlap between ESL and WIFi channels in 2.4GHz it's recommended to only use ESL channels 3, 5, 8, 9, and 10. Never use a recommended ESL channel twice before all 11 available ESL channels are used. If an ESL

channel needs to be reused, please contact VusionGroup support for guidance.

Warning: While in ESL mode, this AP will no longer be able to collect data for Scanning API, track Bluetooth clients, broadcast Bluetooth beacons, or serve as an MT gateway. ESL integration is mutually exclusive with BLE, MT gateway functionality, and any future uses of the IoT radio.

When ESL is disabled on the MR the AP will resume collecting data for Scanning API, tracking Bluetooth clients, broadcasting Bluetooth beacons, or serving as an MT gateway

ESL Status

AP details page can be used to determine the ESL status. A green dot indicates that the AP is successfully connected to V:Cloud and a grey dot indicates a connectivity issue.

Note: This feature is available on MR 28.6 and newer firmware

RADIO SETTINGS
2.4 GHz: 1 (20 MHz; 26 dBm)
5 GHz: 157 (80 MHz; 26 dBm)
RF profile: Basic Indoor Profile
IoT radio assignment: ESL
ESL status: ●

RADIO SETTINGS
2.4 GHz: 11 (20 MHz; 23 dBm)
5 GHz: 48 (80 MHz; 24 dBm)
RF profile: Basic Indoor Profile
IoT radio assignment: ESL
ESL status: ●

Please use the **ESL status** column on the **Wireless > Access points page** to view the ESL status of all ESL-enabled MRs in the network.

ESL and Templates

If you would like to enable ESL integration on a network bound to a template, you can do so using the **Wireless > Configure > IoT radio settings** page within the template.

Once the ESL functionality is enabled, you can click on the link to the network(s) bound to this template and enable ESL on specific APs in that network. Save changes once you are done.

ESL and MT Coexistence in the Same Dashboard Network

MR access points can support both ESL functionality in the same dashboard network with the following caveats:

- If an MR access point has ESL enabled, it cannot serve as an MT gateway and vice versa. ESL is mutually exclusive with any other feature that uses IoT radio, including Bluetooth, MT gateway, and future uses.

API Support

Please refer to the "Help > API docs" page in your dashboard to see all supported ESL API endpoints.

- ESL network settings

- ESL node settings

Troubleshooting Steps
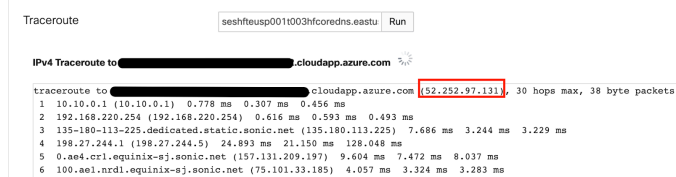
Problem: MR access points do not come online in the V:Cloud

Troubleshooting Steps:

- Ensure that the MR is online in the Meraki dashboard and its configuration is up to date. If everything looks good, proceed to the next step.
    - If the MR is not online, please follow the steps in this KB. If you cannot bring the MR online, please contact Meraki Support.

- Get the public IP of the V:Cloud instance your MR should be connected to by using the Traceroute tool on the MR's Tools tab and inputting the V:Cloud URL. Note that the traceroute will likely not complete if ICMP is blocked on the V:Cloud side for security reasons, however, the traceroute will resolve the URL to the public IP of V:Cloud.

Note: For token-based (JWT) connection, V:Cloud URL can be found in the V:Manager.
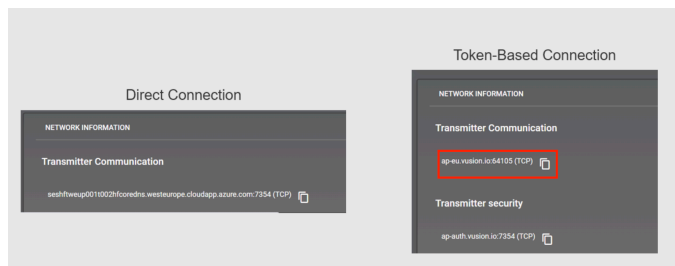
- If the MR cannot resolve the V:Cloud URL to a public IP address. Please check the DNS settings on your MR, and ensure that they are correct and DNS servers are reachable.

- ◦ Possible solutions:

    - ▪ Check the DNS server configuration on the MR. Change the DNS servers to Google public DNS servers to rule out any issues with currently used DNS servers

    - ▪ Ensure that DNS traffic from the MR to the DNS server is allowed by the upstream firewall / another access control device

- • Take a packet capture (Network-wide > Packet capture) on the wired interface of the MR and filter by the LAN IP of the MR and the public IP of the V:Cloud instance you collected earlier. You should see a bi-directional communication similar to the below. This is a standard SSL/TLS tunnel.:

- • If you do not see a bi-directional communication, make sure that the traffic from the MR to the V:Cloud instance is allowed upstream and that the return traffic from the V:Cloud instance to the MR is allowed as well.

- • If none of the above steps resolve the issue, please contact Meraki Support.

Problem: *Some* of the VusionGroup ESLs are not coming online in the V:Cloud

Troubleshooting: Please try switching an ESL channel from the current one to a higher channel. For example, if the MR is set to ESL channel 7, set to channel 9. If tags don't come online, please contact SES support.

Problem: *All* of the VusionGroup ESLs in the vicinity of a specific AP are not coming online in the V:Cloud and that AP is online in the V:Cloud.

Troubleshooting: There is a potential problem on the MR. Please contact Meraki support for assistance.

Problem: Both MR(s) acting as ESL gateway and labels are online in the V:Cloud, however, price updates are not going through

Troubleshooting: Ensure that MRs are online in the V:Cloud. If they are not, please follow the steps above.

Check the ESL status indicator on the Wireless > Access points page (add XXXX column). If the status is OK, please reach out to the VusionGroup support as there is likely a problem on the V:Cloud side.

If the status is not OK, please contact Meraki support as there is likely a problem with the ESL functionality on your MR.