

How Arista's UPSK Overcomes the Challenges of WPA3

UPSK Overview

Unique Pre Shared Keys (UPSK) provide a simplified and secure client authentication process. UPSK allows users to connect to the same SSID using a unique / user specific PSK. Arista's UPSK solution provides added security over single PSK deployments because single PSKs use the same PSK for all connected devices. PSKs are more easily compromised, and the fallout is greater if a single PSK is compromised than if a UPSK is compromised.

UPSK can be implemented with Arista Guardian Network Identity (AGNI) or a third party NAC. Using AGNI with UPSK also provides an option for UPSK-to-UPSK based segmentation where wireless Macro Segmentation Service - Groups UPSK (MSS-G UPSK) are created. Third party NACs do NOT support MSS-G UPSK segmentation.

UPSK - An Innovative Approach

Arista has designed a solution where client MAC addresses are not the primary key for device registration. Rather, AGNI uses a user's SSO identity as the primary key. This approach eliminates the need for users to keep track of the MAC addresses of their devices.

Segmentation with MSS-G UPSK

As mentioned above, AGNI is required for MSS-G UPSK. MSS-G UPSK effectively creates private networks for each user (using their own UPSK) that share a single SSID and a single VLAN. When MSS-G UPSK is enabled, clients connecting with the same UPSK can talk to each other regardless of which APs the clients are associated to, while clients that do not share a UPSK cannot talk to each other. All user devices can access clients that are in the Shared Client Group (e.g. shared printers), as depicted in the Fig. 1 on page 2.

PSK implementation challenges with WPA3

Alphabet Pre Shared Key (PSK) implementations (e.g. MPSK / DPSK / IPSK / PPSK) typically require that a per user PSK be tied to a MAC address when the end user registers a new client. These implementations use a technique called 'WPA2 PSK Cracking' where the server can deduce the PSK based on MAC and few other parameters sent by the AP, and the per user PSKs is tied to a MAC address. With WPA3, it is no longer possible to tie the PSK to a MAC address hence breaking existing implementations.

UPSK with WPA2

There has been a solution for registering new clients using WPA2 for some time. Various vendors have been using a well known cracking method that occurs during the 4-way handshake to derive the user's PSK. When a user connects a new client the new MAC address can be automatically registered to the user's UPSK Group and the new client will be automatically authenticated

using the user's UPSK. AGNI supports this methodology for on-boarding clients using WPA2.

UPSK with WPA3 Challenges

The cracking solution used for WPA2 outlined above will not work for WPA3 as WPA3 relies on Simultaneous Authentication of Equals (SAE). SAE is not susceptible to the WPA2 cracking method. One work around to this challenge might be to register MAC addresses manually but that method is too laborious, prone to errors, and does not scale.

Arista's UPSK with WPA3 Solution

The Arista solution automatically ties a user's client MAC addresses to a user's UPSK Group by keying on the user's SSO identity. There are a number of methods for adding client devices to a user's UPSK Group.

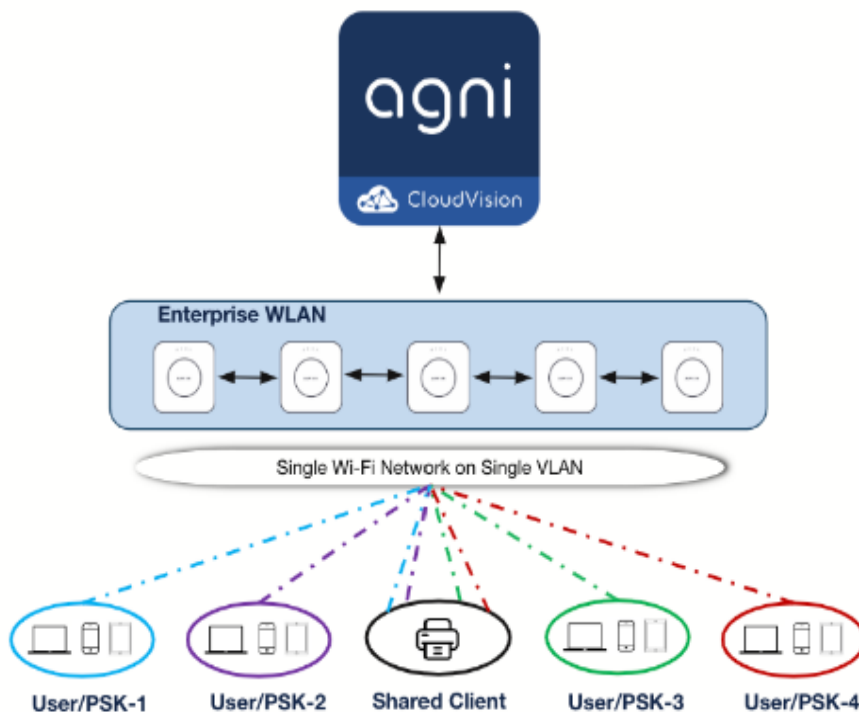


Figure 1.

Option 1: Self Service Portal via Onboarding PSK

1. A user's new device connects to the UPSK SSID with the onboarding PSK.
2. The user then gets redirected to the AGNI Self Service Portal where the user enters their SSO credentials. After the user gets validated by an IDP, the user will be presented with their UPSK.
3. User registers its MAC address by following prompts and now the new device automatically gets added to the user's UPSK Group.
4. The user then copies their UPSK and uses that to reconnect to the network.

Option 2: Self Service Portal via QR Code Scan

1. A new device scans QR code (which contains the UPSK SSID name and onboarding passphrase) and automatically connects to the UPSK SSID.
2. The user then gets redirected to the AGNI Self Service Portal where the user enters their SSO credentials. After the user gets validated by an IDP the user will be presented with their UPSK.
3. User registers its MAC address by following prompts and now the new device automatically gets added to the user's UPSK Group.
4. The user then copies their UPSK and uses that to reconnect to the network.

Option 3: Client Groups for Headless / IoT Devices

1. The admin logs into AGNI to create a Client Group and enables Group UPSK and a UPSK for the Group will be auto generated for that Client Group.
2. Admin can directly import or add client MAC addresses to the Client Group manually. Admin can also enable delegated management, to allow end users (such as technicians) to import / manage MAC addresses in the Client Group via AGNI Self Service Portal without requiring AGNI admin involvement.
3. The admin or technician then configures the headless / IoT devices to use the UPSK created for the Client Group.
4. The user connects the headless device (printers, IoT device) to the network using their Client Group UPSK.
5. Devices using the UPSK for the Client Group will now be tied to the Client Group.

Conclusion

SSO identity is the primary key in the UPSK solution, rather than relying on client MAC addresses. Therefore there is no need for users to keep track of the MAC addresses used by their devices. In addition to increased security over PSK, Arista's UPSK solution works for both WPA2 and WPA3.

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