

LANCOM White Paper

Wi-Fi operation models

Different types of Wi-Fi operation models have evolved over time. First of all was the stand-alone operation of the access points without any central management instance. Then came the conventional WLAN controller. More recently, further enhancements came with cloud-based management based on software-defined wireless networking (SD-WLAN). This paper considers the advantages and disadvantages of each of these solutions.

Stand-alone operation

The access points (APs) have to be configured individually. Communication between the APs is usually limited to the hand-over of clients to the next AP. Any change to the configuration has to be carried out on each AP individually. Although the amount of effort required for this configuration is comparatively high, this model is still suitable for small networks. As soon as your network grows any bigger than this, you need to consider one of the other models.

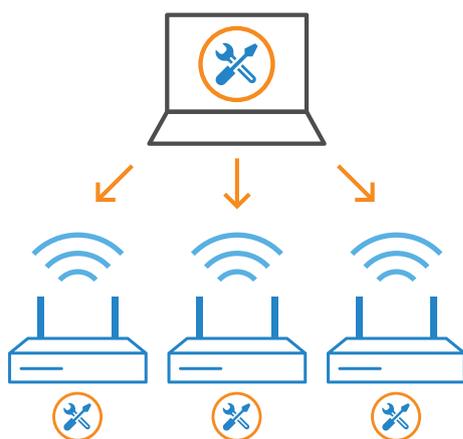


Fig. 1: Stand-alone operation

WLAN controller

A WLAN controller (WLC) is used for the central configuration and control of the access points. The protocol Control And Provisioning of Wireless Access Points (CAPWAP, RFC 5415) was created especially for this purpose. In particular, this protocol separates the payload and control data.

Centralization minimizes the work involved in setting up and maintaining the wireless network. As with stand-alone operation, highly trained personnel are required. With more than a certain number of access points, the extra money you spend on the hardware is regained as savings in time and expenditure because fewer personnel are required. This solution has demonstrated its value in small and large networks and it is still a good choice today. Another advantage is that all of the components including the management instance are located in your own network, so you have full control over your resources.

The hardware costs are direct capital expenditure (CAPEX). The initial investment is high, and this is written off over the equipment's lifetime.

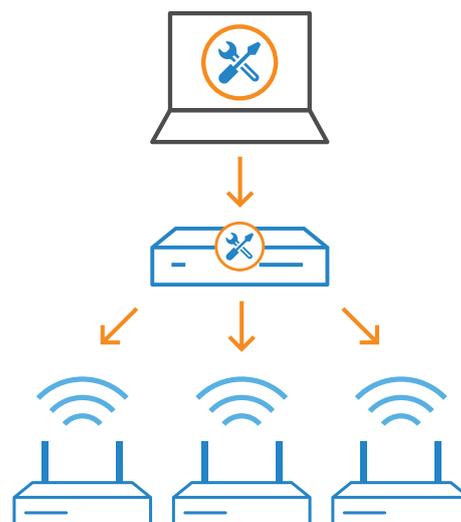


Fig. 2: WLC operation

Cloud-managed Wi-Fi (SD-WLAN)

In this case the "controller" is located in a data center resp. in the cloud, which is accessible via the Internet. Software-defined networking relieves the administrator of large portions of the work required for a configuration.

Depending on the type of "controller", the importance of having a permanent connection requires the use of multiple Internet connections. Similarly, the cloud provider must also be able to deliver comparable service levels. State-of-the-art cloud solutions, on the other hand, offer general stand-alone capability so that autonomous operation is guaranteed even if the connection to the cloud is lost.

A managed-service provider can use the centralized user interface of a cloud-based management system to manage and monitor projects of any size. This model is thus suitable for managing anything from a small company's network to the global networks of international corporations.

The costs of a public cloud are incurred as expenses for the operative business (OPEX). These costs are distributed over the operating lifetime, and in the long term they are comparable to the investment in a WLAN controller.

As an alternative to the public cloud mentioned above, large installations can optionally be operated in a private

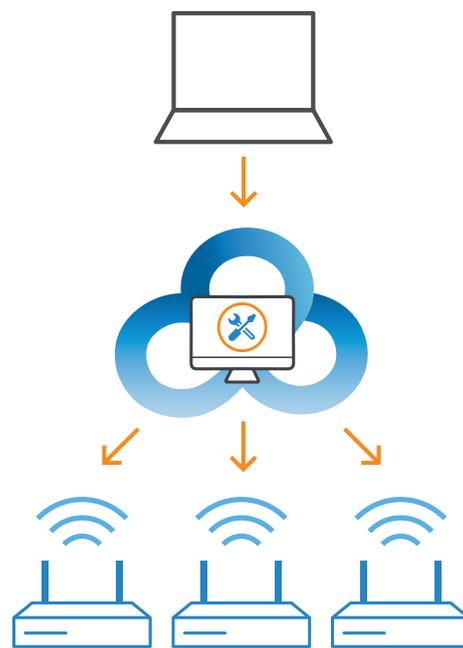


Fig. 3: Cloud-managed Wi-Fi (SD-WLAN)

cloud, meaning that cloud servers are operated at a company's own data center. Although operators gain full control over their resources, the running costs are higher due to the operation and maintenance of the servers.

The private cloud model incurs the additional costs of the initial investment in the in-house servers (CAPEX).

	Stand-alone operation	WLAN controller	Cloud-managed Wi-Fi (SD-WLAN)
Suitable for	Suitable for small Wi-Fi infrastructures at individual locations	Suitable for medium to large Wi-Fi infrastructures, also across multiple locations	Suitable for small to very large Wi-Fi infrastructures, across multiple locations and for multiple projects
Configuration effort	The configuration of individual devices results in high time and personnel expenditure	Central Wi-Fi configuration demands lower time and personnel expenditure	Automated central Wi-Fi configuration results in very low time and personnel expenditure
CAPEX	No additional hardware or operating costs, so lower investment expenditure	Additional WLC required, so higher investment expenditure	Public Cloud: No additional hardware required, so no investment expenditure Private Cloud: Own servers required, therefore additional investment expenditure
OPEX	No operating expenditure	No operating expenditure	Cloud licenses required, i.e. regular operating expenditure
Monitoring	Of individual devices	Central	Web-based
Firmware management	Of individual devices	Central	Central

Summary

These Wi-Fi operation models involve different levels of investment in terms of installation, configuration and maintenance. Once installed and configured, however, the performance characteristics available from each of these solutions actually converge over time.

If the added value of controllers or cloud-managed Wi-Fi such as central monitoring can be dispensed with, the stand-alone solution is the solution of choice for very small networks. Here you have the high configuration effort at the beginning and afterwards there are practically no more costs. If no new features are required, you can limit yourself here to importing security updates.

WLAN controllers and cloud-managed Wi-Fi, on the other hand, are both very well suited for medium to large networks.

The main distinguishing feature of these solutions is the distribution of the costs incurred. With the WLAN controller, these must be applied at the beginning, while with the Cloud-managed Wi-Fi they are distributed over the entire operating time.

If a service provider has to manage several projects of different sizes, the advantages of Cloud-managed Wi-Fi outweigh the disadvantages.

The decision for one or the other of the solutions is therefore intrinsically dependent on the individual technical requirements.