

# SP4 Gateway Layout Instructions

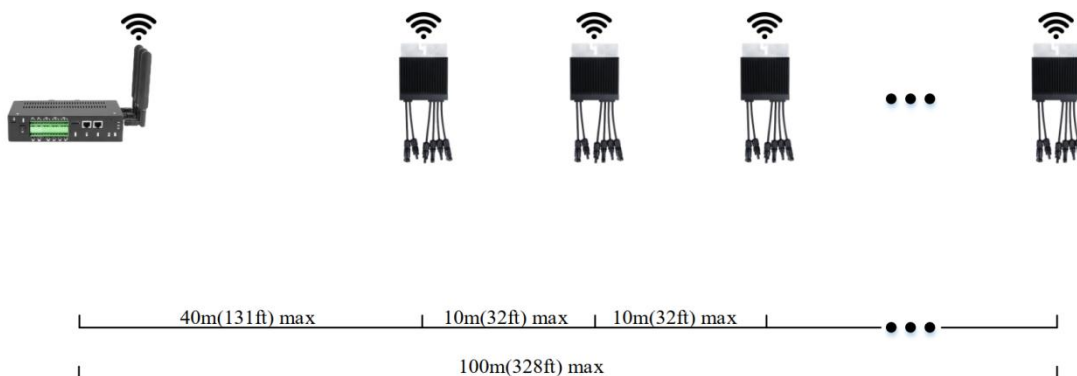
## Distance Requirements between Gateway and PV optimizer

The SP4 gateway and the SP4 PV optimizer use the Wi-SUN protocol for data communication and support mesh topology (MESH). The PV optimizers automatically select the optimal path to connect to the SP4 gateway based on signal strength, offering the advantages of self-organization and self-healing.

To ensure reliable communication of Wi-SUN, the placement of devices should follow these guidelines:

In the absence of obstructions:

- The maximum distance between the SP4 gateway and the nearest PV optimizer should not exceed **40m (131ft)**.
- The maximum distance to the farthest PV optimizer should not exceed **100m(328ft)**.
- The maximum distance between PV optimizers should not exceed **10m (32ft)**, as shown below.



## Recommended Layout of Gateway and PV Optimizer

Based on the above distance requirements, according to the maximum ratio of 1:300 between SP4 gateway and SP4 PV optimizer, the optimal installation layout is shown in Fig.1:

All PV panels should be installed with SP4 PV optimizers, the SP4 gateway should be placed at the center of the PV array, and the PV array radius does not exceed **100m (328ft)**, ensuring that each SP4 PV optimizer is within the communication coverage of the SP4 gateway.

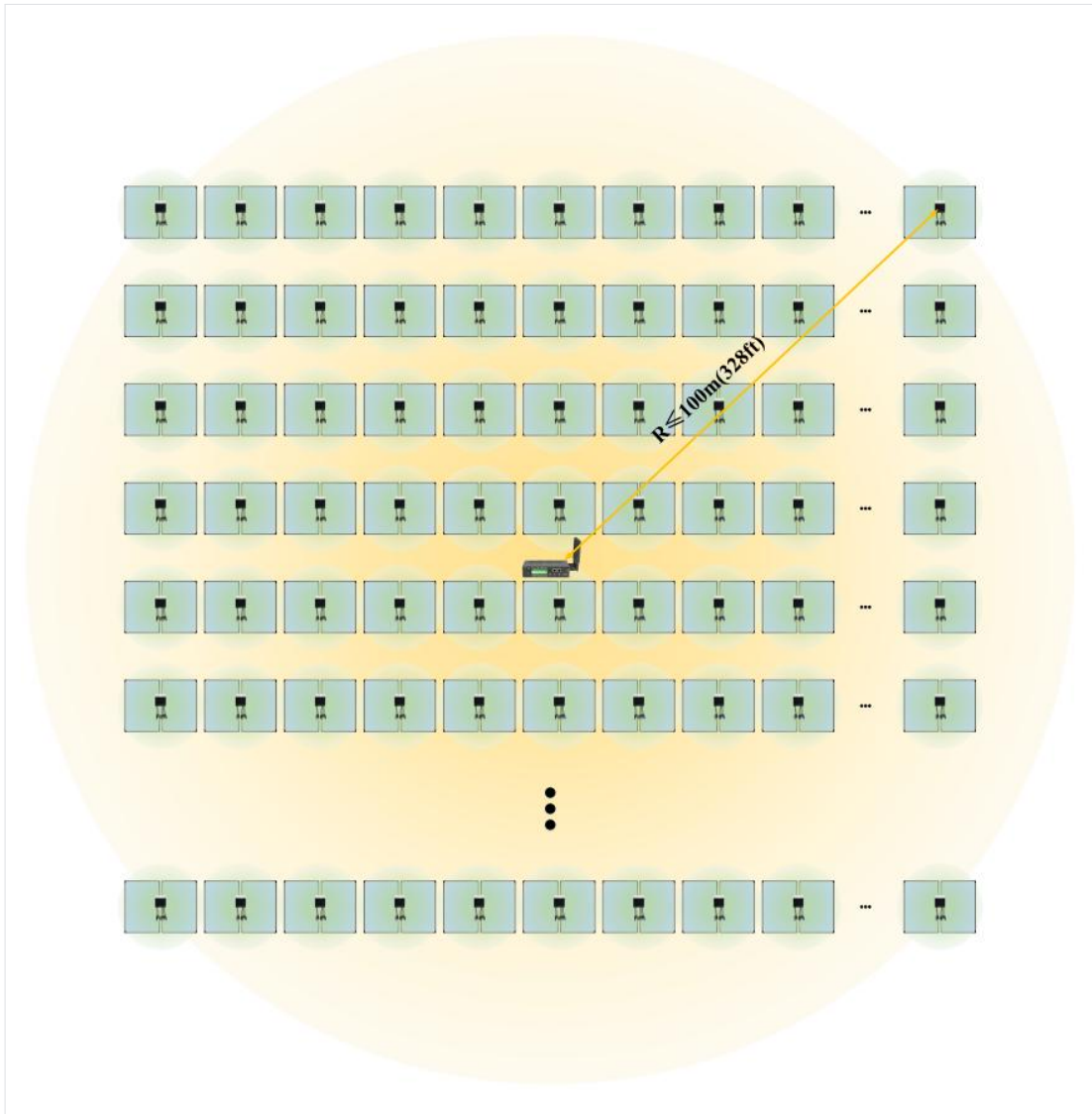


Fig.1 Recommended Layout of Gateway and PV optimizer(1:300)

If the on-site environment does not support the ideal layout, for example - such as when the PV array is not a complete rectangular array, or only the shaded components in the PV arrays are equipped with PV optimizers - the installation of the SP4 gateway and the SP4 PV optimizer should follow these general principles, as shown in Fig.2:

The maximum distance between the SP4 gateway and the nearest PV optimizer should not exceed **40m (131ft)**, and the maximum distance to the farthest PV optimizer should not exceed **100m(328ft)**, the maximum distance between PV optimizers should not exceed **10m (32ft)**.

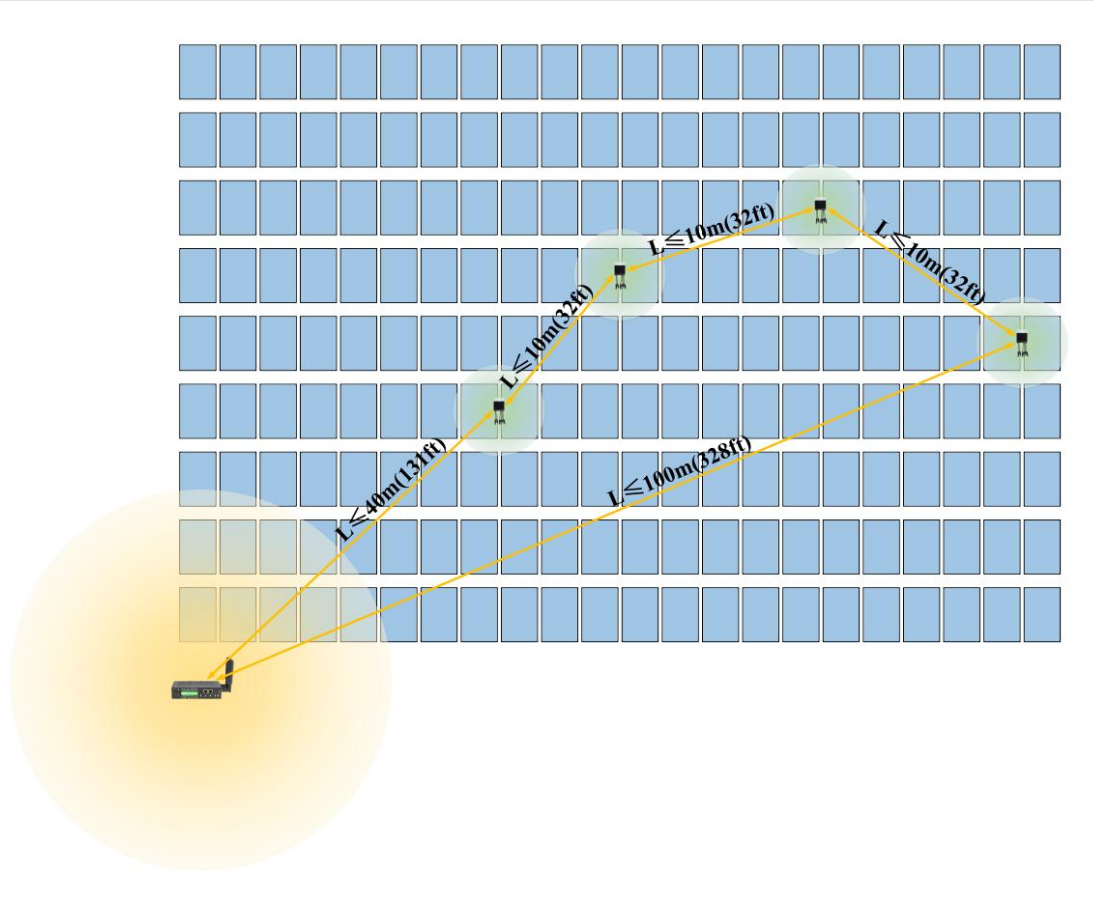


Fig.2 General layout requirements of SP4 gateway and SP4 PV optimizer

**Factors that affect reliable communication between gateway and PV optimizer**

Wi-SUN, as a wireless signal, offers flexibility and convenience. However, in certain environments, wireless signals can be interfered by other electronic devices or physical obstacles, affecting the stability of data transmission. The following factors can influence Wi-SUN communication quality:

**The gap between PV arrays**

If the gap between PV array A and PV array B exceeds **10m(32ft)**, and the distance between the PV optimizer in array B and the SP4 gateway exceeds **100m(328ft)**, the transmission quality may be compromised, it is recommended to use different gateways for communication between the arrays.

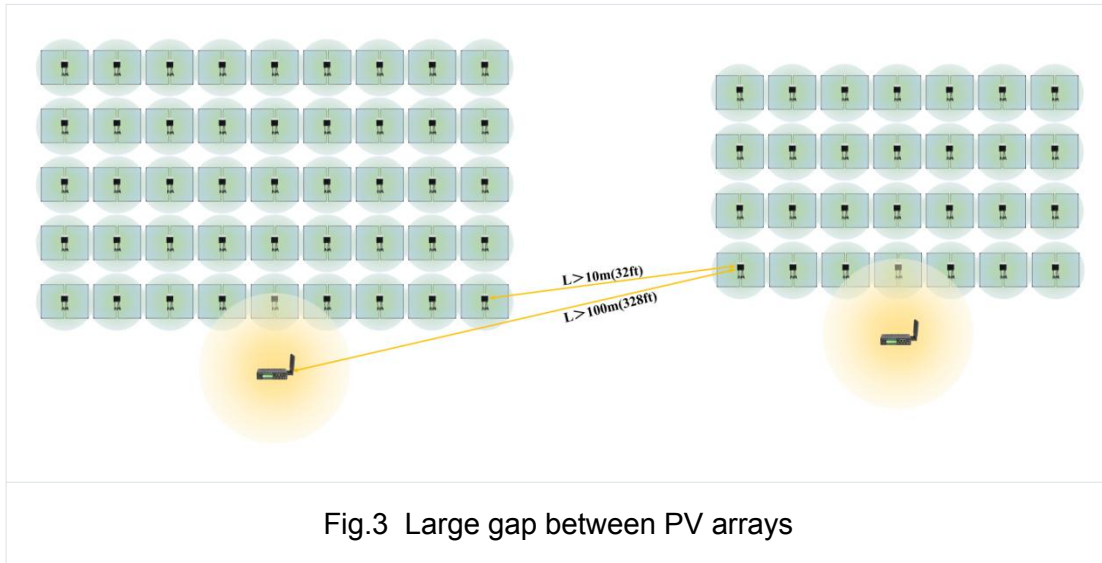


Fig.3 Large gap between PV arrays

### Obstructions

If there are obstructions, such as solid walls, floor-to-ceiling windows, or fully enclosed metal guardrails, etc. between PV arrays A and B, they may degrade the wireless signal transmission. In such cases, use different gateways for communication between the arrays.

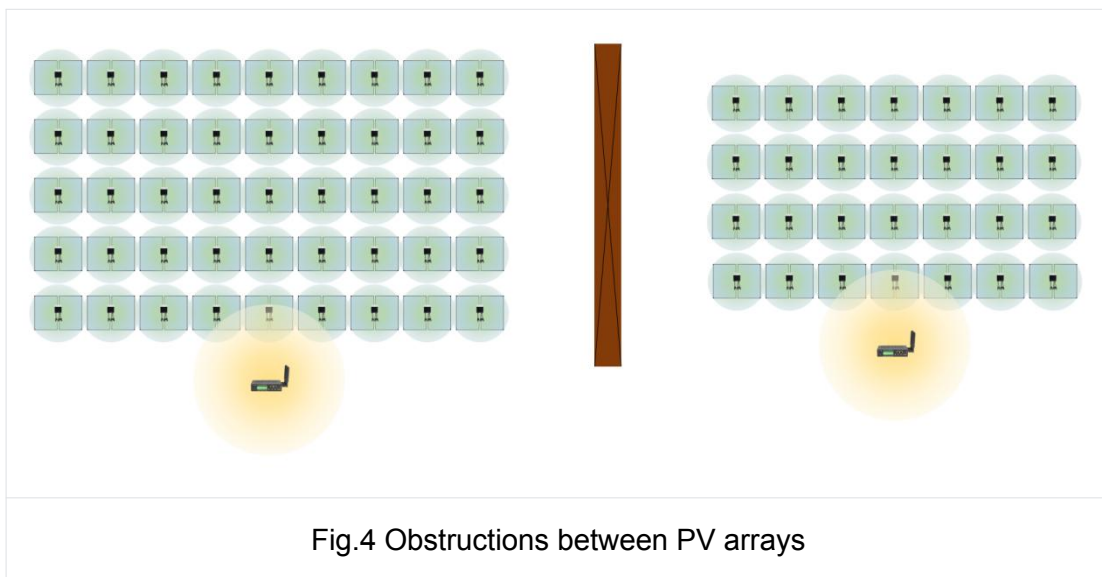


Fig.4 Obstructions between PV arrays

### Roof material

If the roof is made of metal (such as aluminum alloy) and the distance to the PV optimizer does not exceed **0.2m (0.65ft)**, the transmission quality of the wireless signal will be affected. In this case, the distance in the above general principle needs to be halved, that is:

The maximum distance between the SP4 gateway and the nearest PV optimizer should not exceed **20m (65ft)**, and the maximum distance to the farthest PV

optimizer should not exceed **50m(164ft)**, the maximum distance between PV optimizers should not exceed **5m (16ft)**.



Fig.5 The roof is made of aluminum alloy