# Wi-SUN Product Manual

# Model: ELAP1000

# ELAP1000

# Wi-SUN Access Point

## Product Overview

ELAP1000 Access Point is ruggedized, modular platforms on which utilities and other industrial customers can build a highly secure, reliable, and scalable communication infrastructure. The product is certified to meet harsh environmental standards. They support a variety of communications interfaces, such as Ethernet, cellular, Wi-Fi, radio-frequency (RF) mesh.

Figure 1: ELAP1000 which is designed for extreme-environment outdoor installations (With aluminum housing)



Figure 1. ELAP1000

## Product Features

Utilities all over the world are transitioning their grids from transmission to consumption. Regulatory mandates are driving initiatives around smart metering, grid reliability, and the integration of solar and wind farms into the distribution grid. The situation imposes a unique set of challenges for utilities to build a bidirectional communications field area network (FAN) that enables these diverse applications and also scales across millions of endpoints.

The FAN provides network connectivity to endpoints such as smart meters, street lights, and other environmental sensors. These endpoints form a mesh network based on radio-frequency (RF) technologies.

ELAP1000 is a modular platform that supports various wired and wireless interfaces. It supports IPv6 RF mesh

## Converged Multiservice Network Architecture

ELAP1000 Series is a modular platform that supports IPv6 RF mesh. The gateway has integrated Ethernet and LTE module to connect to backhaul network.

Network tunnel design can integrate IPv6 network equipment into IPv4 network. An integrated Wi-Fi port can enable remote workforce automation and secure wireless console access while an integrated global positioning system (GPS) enables location mapping of the router. The modular design provides an easy upgrade path to future communication interfaces without platform replacement.

ELAP1000 Series portfolio offers platforms for outdoor deployments without cabinet. These platforms come with flexible mounting kits that allow utilities to deploy the gateway on a broad array of existing assets such as distribution poles, walls. In addition, the ELAP1000 Series offers a wide range of external antenna choices to meet coverage, throughput, and range requirements.

## Security(Optional)

ELAP1000 Series security adheres to Smart Grid security principles and widely adopted cryptography and security standards:
  - ➢ Mutual authentication and authorization of all nodes connected to the network
  - ➢ 802.1x/EAP-TLS Authentication
  - ➢ X.509 certificate-based identity Authentication used for FAN devices implementing AES-GCM-128 and SHA-256 based frame Security to encrypt and verify the transmission data
  - ➢ Support ECDSA algorithm (based on ECC-256) for digital signature
  - ➢ Support ECDH algorithm to dynamic authentication key
  - ➢ Link-layer encryption in the FAN mesh (AES-128)
  - ➢ Network-layer encryption in the WAN (OpenVPN or IPSec VPN)

## Network Reliability and High Availability

ELAP1000 Series Access Gateway contain both device-level and network-level reliability to meet harsh physical environments. ELAP1000 Series is built to meet stringent compliance standards such as IEC 61000-4, IEC 61709 and IEC 62262(IK10).

Additionally, the routers offer mechanisms for backup power to ensure the device can work normally for more than 8 hours in the event of power outages.

## Easy Maintenance

Support operation and maintenance (O&M) with Wi-Fi or Ethernet by browser on site.

Based on the characteristics of Wi-SUN network, a data aggregation scheme of minimum transmission cost is designed. In this scheme, the AP acts as the aggregation point. All other nodes in sensing region send their data to this aggregation node, then

AP will send the aggregation information to the sink along he shortest path. AP will Consolidate and compress the data to reduce the resource occupation of the backhaul network and improve the success rate of data push.

## Main Functionalities

➢ Support UDP/CoAP protocol for IBAP and SNMPv2/v3 for integrating with the third-party network management system
➢ Topology information of MESH network can be managed on NMS
➢ Support time synchronization from NTP server
➢ Support remote upgrade AP and Wi-SUN firmware through NMS system
➢ Support Self-Adaptive Mesh Network, Auto-registration to join the network
➢ Support IPv6 Routing Header for Source Routes with RPL
➢ Support IPv6 over IPv4 to send the IPv6 message of the Wi-SUN network back to the master station through IPv4 Cellular network
➢ Support last gasp alarm to NMS after power failure

## Product Specifications

| ELAP1000 | |
|---|---|
| **Physical Specifications** | |
| Cabinet material | Aluminum with silver paint |
| Power Supply | 1P2W, 90~350 VAC |
| Frequency | 50/60Hz |
| RAM | 1GB |
| Flash | 8GB |
| Protection Degree | IP67 |
| Dimension | 290mm x 274mm x 126 mm |
| Pole Mount | Yes |
| Wall Mount | Yes |
| Weight | 7.5KG with embedded battery |
| Operation Temperature | -25℃ to 70℃ |
| Storage Temperature | -40℃ to 70℃ |
| Humidity | ≤ 95% (no condensation) |
| Battery Backup Options | Integrated modular battery Operation Temperature Range: -10℃ to 50℃ |
| Typical Power Consumption | 15 Watts |
| **Communication Modules** | |
| IEEE 802.15.4g Wi-SUN | Yes |
| 2G/3G/4G LTE for Global | Yes, Using 4G module can be compatible with 2G/3G LTE FDD: B1/B2/B3/B4/B5/B7/B8/B28    LTE TDD: B40 WCDMA: B1/B2/B4/B5/B8    GSM: B2/B3/B5/B8 |
| Fast Ethernet | 10/100 Mbps |
| **Wi-SUN Module Specifications** | |
| | ELAP.R139 |

| Wi-SUN chipset | Wi-SUN FAN 1.0 Certificated |
|---|---|
| ISM frequency band | 902~928 MHz |
| Spread spectrum | FHSS |
| Transmit Power | FSK:     29.5±0.5dBm |
| Sensitivity | -110dBm@50kbps<br>-97dBm@100kbps |
| Antenna Gain | 2.0+/-0.5 dBi<br>External FRP antenna |
| **Onboard Interfaces** | |
| Wi-Fi (IEEE 802.11) | Yes, 16dBm@11b, 14dBm@11g, 13dBm@11n |
| Wi-Fi Antenna Gain | 2.0+/-0.5 dBi<br>External FRP antenna |
| GPS for Location | Yes |
| GPS Antenna Gain | 2.0+/-0.5 dBi<br>External FRP antenna |
| **Regulatory Compliance** | |
| Electrostatic Discharge | Contact discharge: 8 kV, Air discharge:15 kV |
| Fast transient burst | 4 kV |
| Surge immunity | 4 kV |
| Impulse voltage | 1.2/50µs, main connections 6kV |
| AC voltage | 2.5 kV during 1 min |
| Other | IEC 62262(IK10) |

## Caution in use

- ➢ Do not put this product completely enclosed in the metal box; if it must be installed in the metal shell, the antenna of the module must be led out of the metal shell.
- ➢ If it is used in the outdoor high position, and the surrounding is quite open, then it is needed to install lightning rod, in order to prevent lightning strike.
- ➢ N-type antenna connector, please make sure it is waterproof.