

What is the Lora Alliance

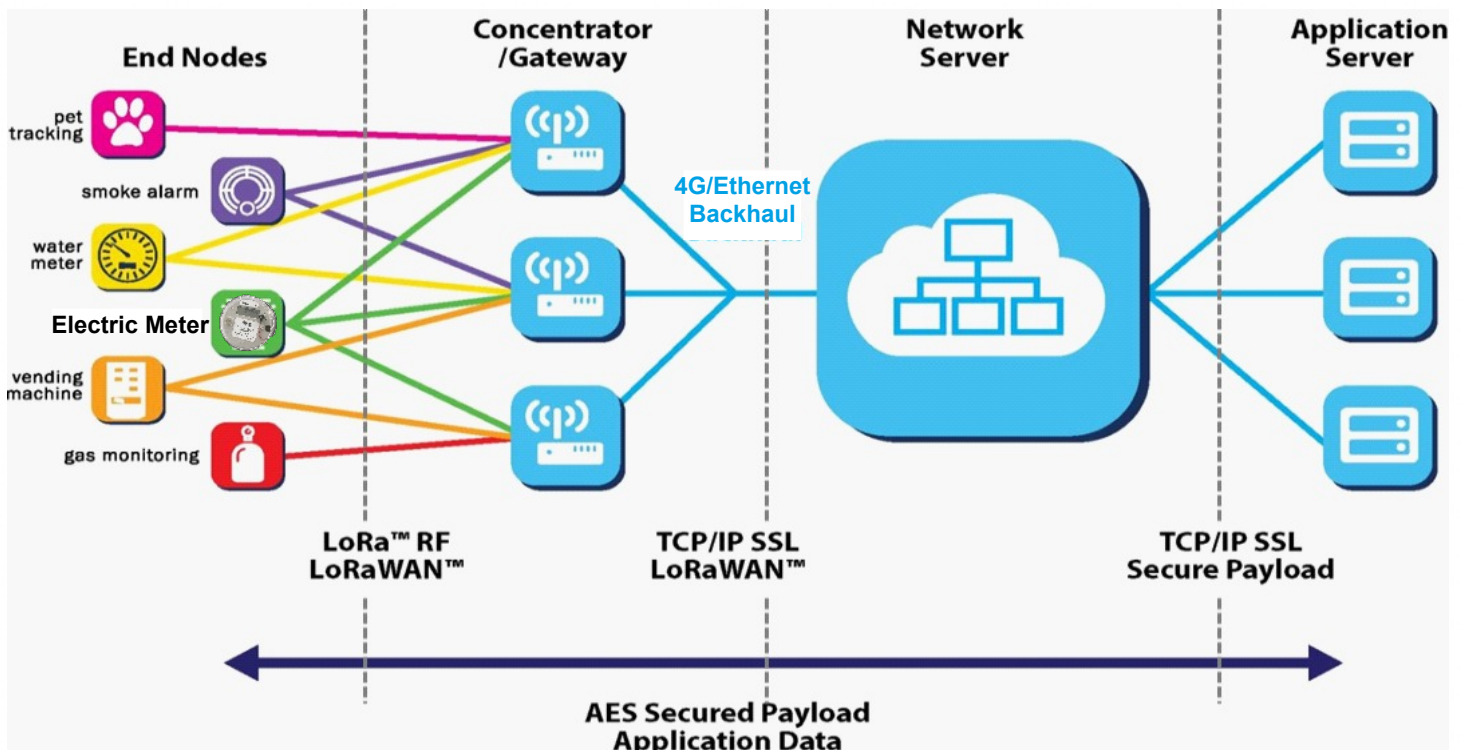
The LoRa Alliance is an open, non-profit association of members that believes the Internet of Things (IoT) era is now. It was initiated by industry leaders with a mission to standardize Low Power Wide Area Networks (LPWAN) being deployed around the world to enable Internet of Things (IoT), machine-to-machine (M2M), smart city, and industrial applications. The Alliance members will collaborate to drive the global success of the LoRa protocol (LoRaWAN), by sharing knowledge and experience to guarantee interoperability between operators in one open global standard.

In the US, LORA operates in the 900 MHz ISM bands. It's a proven technology with AES 128 encrypted security from end to end. The user's data is embedded in the LORA stack and can be from 11 bytes to 242 bytes. Range is at its maximum when small data packets are used. Higher data packets shorten the range of transmission.

LORA radios are ideally suited for electric, gas and water meter reading. They are very low power, with long range, up to 20 miles, and economical. Using a LORA system opens the door to multiple possibilities because the radios and gateways are made by many manufacturers and all communicate together.

The Electric Utility Industry has wrestled with developing a standard protocol that allowed all manufacturers to play. Even today's systems lock a utility into solely controlled protocol operated by one vendor. LORA is truly open and anyone can play.

The LORA radios transmit at about 100 ma or roughly 20 to 22 dbm. Longer distances can be covered with slower data rates and small packets. The LORA network operates in a Star configuration (point to point). Ideally the network would be arranged where each end device can hit 2 or 3 Gateways for redundancy. There are many LORA network operators that can handle the flow of data from your head end to the end device. You can also create your own network with the open technology.



LoRa Wide Area Network (LoRaWAN)

LoRaWAN™ is a Low Power Wide Area Network (LPWAN) specification intended for wireless battery operated or powered Things in a regional, national or global network. LoRaWAN targets key requirements of Internet of Things such as secure bi-directional communication, mobility and localization services. The LoRaWAN specification provides seamless interoperability among smart Things without the need of complex local installations and gives back the freedom to the user, developer, businesses enabling the roll out of Internet of Things.

LoRaWAN network architecture is typically laid out in a star-of-stars topology in which **gateways** are a transparent bridge relaying messages between **end-devices** and a central **network server** in the backend. Gateways are connected to the network server via standard IP connections while end-devices use single-hop wireless communication to one or many gateways. All end-point communication is generally bi-directional, but also supports operation such as multicast enabling software upgrade over the air or other mass distribution messages to reduce the on air communication time.

Communication between end-devices and gateways is spread out on different **frequency channels** and **data rates**. The selection of the data rate is a trade-off between communication range and message duration. Due to the spread spectrum technology, communications with different data rates do not interfere with each other and create a set of "virtual" channels increasing the capacity of the gateway. LoRaWAN data rates range from 0.3 kbps to 50 kbps. To maximize both battery life of the end-devices and overall network capacity, the LoRaWAN network server is managing the data rate and RF output for each end-device individually by means of an **adaptive data rate (ADR)** scheme.

National wide networks targeting Internet of Things such as critical infrastructure, confidential personal data or critical functions for the society has a special need for secure communication. This has been solved by several layers of encryption:

- Unique Network key (EUI64) and ensure security on network level
- Unique Application key (EUI64) ensure end to end security on application level
- Device specific key (EUI128)

Some of the companies aligned with the LORA Alliance

