

# LORAWAN FACTS

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[Abstract](#)

Non-technical document about LoRaWAN

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## Quick Facts about LoRaWAN

### 1. What is LoRa and LoRaWAN?

LoRa: Stands for **Long Range**. It defines a modulation technique in the physical layer.

LoRaWAN: It defines the protocol in the MAC layer based on LoRa technique (see Table 1 for reference)

**Table 1.** *LoRa vs LoRaWAN*

LoRa		LoRaWAN	
		MAC Packets	LoRaWAN + Class B and C extensions
Frame Modulation and data rate	LoRa GFSK (in Europe)	Frame Modulation and data rate	LoRa GFSK (in Europe)

[1]

### 2. What is the maximum range for LoRaWAN?

Theoretically, 15 km in suburban areas and 2 km in dense urban areas <sup>[2]</sup>

It is suggested to test beforehand and it is expected 5 – 10 km in suburban areas and 1 – 2 km in dense urban areas.

### 3. What frequency band is used to deploy LoraWAN?

It is used ISM (Industrial, Scientific & Medical) band. This is free spectrum and changes per country. In Australia we use the portion: **915 – 928 MHz**.

### 4. What type of LoRaWAN network I can deploy?

- Private Network: Back end server capabilities are run locally in the gateway or deploy by the user. For example, Kerlink runs its own software named SPN that replace backend functionality. SPN stands for *Small Private Network*.
- Public Network: Usually user pay a fee to a third-party provider to run an agent on the gateway and do all backend functionalities (example Actility or Loriot). There is also a free network named *The Things Network*.

## 5. What do I need to deploy a LoRaWAN network?

Basic 4 elements are:

- **End Nodes** (*sometimes call sensors or motes*): Measure real world variables and transmit data using LoRa RF
- **Concentrator/Gateway**: Receive LoRaWAN packet and forward to the server (TCP/IP protocol) Backhaul might be cellular, Ethernet or satellite
- **Network Server**: Manage the network – acknowledge, filter redundant packet, security, etc.
- **Application Server**: It handles operations between end user applications and back end

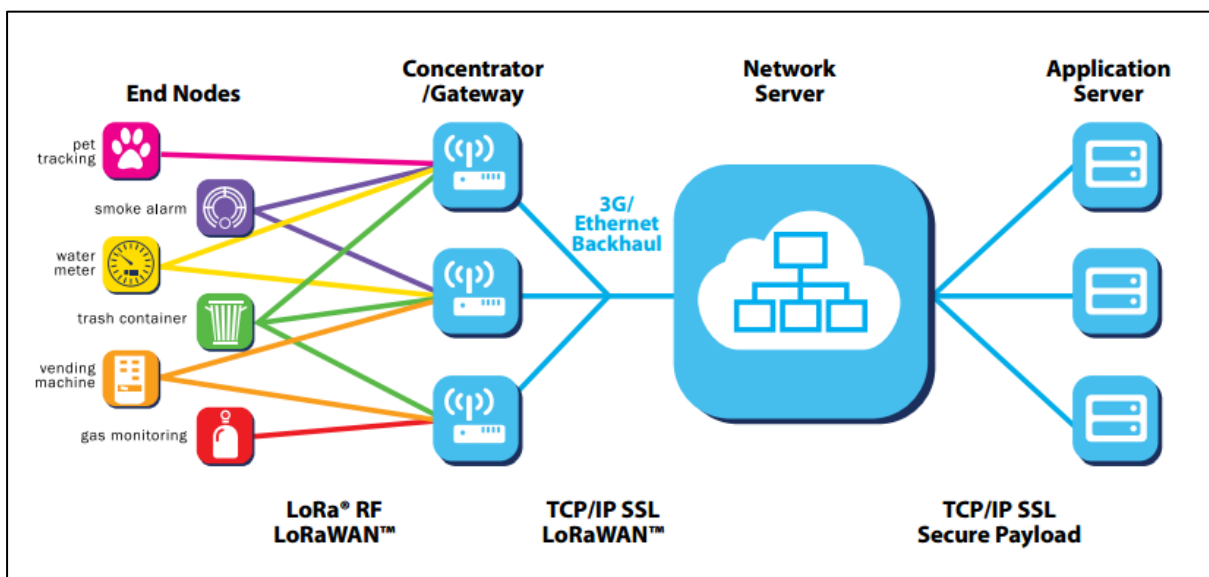


Figure 1. Elements in a LoRaWAN network <sup>[3]</sup>

## 6. Key Players

Table 2 is a very simplified version what is happening currently in the market:

**Table 2.** Simplified version on Key Players LoRaWAN

Space	Name	Comments
LoRa chipset	Semtech	Protocol patented by this company
Body to define LoraWAN standard	LoRa Alliance	Full member list is here: <a href="https://www.lora-alliance.org/The-Alliance/Member-List">https://www.lora-alliance.org/The-Alliance/Member-List</a> Sensor manufacturers, gateway manufacturers, etc. are involved in this Alliance
Sensor (mote) Manufacturers	Any product based on Microchip LoraWAN modules or Semtech Lora Module	Examples: <ul style="list-style-type: none"> <li>• Libelium LoRaWAN based on Microchip module</li> <li>• Development boards (Arduino) based on Microchip module</li> <li>• MultiConnet mDot based on Semtech Lora module</li> </ul>
Gateway Manufacturers	Kerlink, Multitech Conduit, LinkLabs, etc	
Network Server	<ul style="list-style-type: none"> <li>• Loriot (you need to pay)</li> <li>• Actility (you need to pay)</li> <li>• The Things Network – TTN (Free)</li> </ul>	

## 7. What is class A, B and C motes in LoRaWAN?

Currently, class A is the basic mode and it is supported for all gateways by default. Class C is another option and Kerlink is currently supporting this. Class B seems to be not available.

- Class A: Asynchronous mode. Sensor transmits at any time to the gateway, then listen to the gateway for a window of 1 and then 2 seconds for any downlink message. After that it goes to sleep until next transmission
- Class B: Synchronise transmission with the gateway
- Class C: Node is listening all the time except when transmitting. Since there is a lot power consumption in this mode, this is only for AC-powered applications

## 8. What is the maximum payload I can transmit from a mote?

It can be loosely say up to 242 bytes when the fastest data rate is used.

## 9. What is the standard in APAC region and around the world?

Lora Alliance is currently in version 1.0.2 of the standard. The main versions are:

**Version 1.0.1:** It defines European Union, US and China.

- Australia not specifically mentioned, but it is understood that is an offset of the US version

**Version 1.0.2:** Regional parameters are defined and we have:

- Australia definition
- AS923 that includes: Brunei, Cambodia, Hong Kong, Indonesia, Japan, Laos, New Zealand, Singapore, Taiwan, Thailand and Vietnam

## References

- [1] <https://www.thethingsnetwork.org/wiki/LoRaWAN/Home>
- [2] <https://www.digikey.com/en/articles/techzone/2016/nov/lorawan-part-1-15-km-wireless-10-year-battery-life-iot>
- [3] [http://www.semtech.com/wireless-rf/iot/LoRaWAN101\\_final.pdf](http://www.semtech.com/wireless-rf/iot/LoRaWAN101_final.pdf)