Poynting

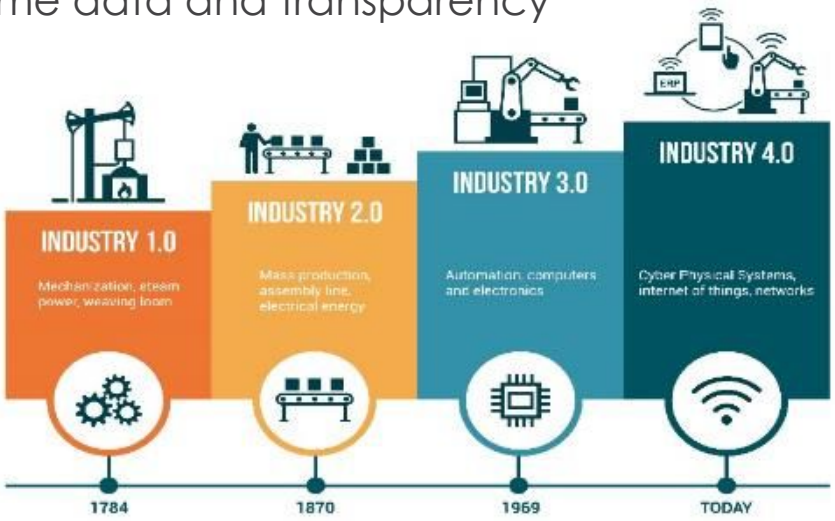
Making wireless happen

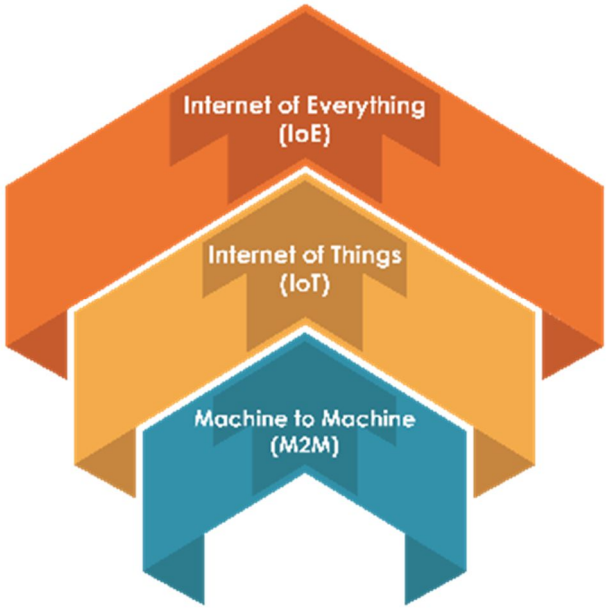
M2M/IoT Technology Overview

www.poynting.tech

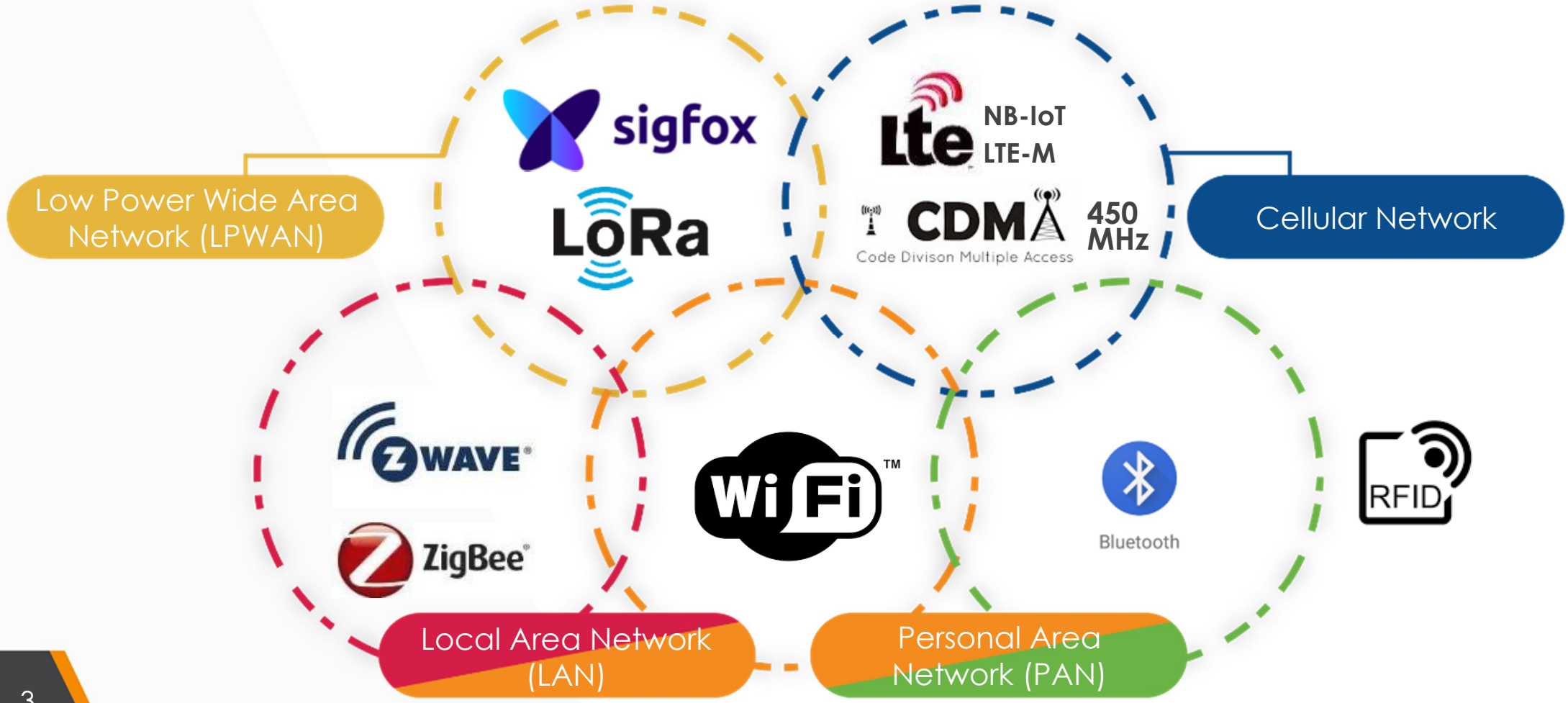
What is Industry 4.0, M2M, IoT & IoE?

- Industry 4.0 refers to the 4th Industrial revolution
  - M2M concepts are combined with a vast network of sensors, devices and machines making use of computational intelligence (e.g. programmatic algorithms)
  - Devices are connected to the internet for providing access to cloud computing/Artificial Intelligence (AI), big data and analytics
  - Real time data and transparency





Which M2M / IoT Technologies?



Popular M2M / IoT Technologies

- **RFID**: for the access and tracking of identifying RF tags, e.g. in passports, access control tags, etc.
- **Bluetooth, Zigbee & Z-Wave** are mostly personal network technologies for connecting RF devices at a range of within 10m to 100m, e.g. home automation, Bluetooth audio streaming to headset, etc.
- **LoRa & Sigfox** are low bandwidth RF technologies, meant to cover over wide areas, and are often used to connect devices for utilities, water, energy, etc.
- **WiFi** use the ISM bands to provide medium distance but higher bandwidth connectivity with the original intent of replacing LAN cables while connecting computer equipment. WiFi is now widely used for connectivity of personal and other IoT networks.
- **WiFi HaLow** is essentially WiFi in the lower 868/915MHz license free ISM frequency bands, and is intended to provide IoT connectivity over larger distances, typically in rural areas.
- **LTE-M & NB-IoT** has similar applications to LoRa & Sigfox, where low bandwidth connectivity is required over larger areas. LTE-M/NB-IoT however is carried over the existing LTE cellular networks, where low power consumption devices are connected to form the IoT. LTE-M and NB-IoT devices therefore use the existing cellular frequency bands.
- **CDMA450** is a cellular technology, which is able to propagate over vast distances due to the low 450MHz frequency band. This technology is currently being used for Smart Meters, but also for other IoT applications.

Main Technologies & Frequency Bands

Frequency Bands are Region Dependant

Antennas don't care about technology, just ensure they cover the correct frequency band (current & future)

			433MHz	868MHz EMEA	915MHz US & APAC	2.4GHz ISM & Wi-Fi	5GHz ISM & Wi-Fi	450MHz	700MHz	800MHz & 850MHz	900MHz	1800MHz - 2100MHz	2300MHz	2500MHz - 2700MHz	3400MHz - 3800MHz
			ISM Frequency Bands					GSM/UMTS/LTE Frequency Bands (Country Specific)							
Wi-Fi	WiFi	IEEE 802.11 standard for Ethernet replacement				✓	✓								
	Wi-Fi HaLow	HaLow is Wi-Fi at a lower frequency ISM band		✓	✓										
Mobile Cellular	2G	GSM, DCS, GPRS, EDGE								✓	✓	✓			
	3G & 4G	UMTS, HSPA, CDMA2000, LTE						✓	✓	✓	✓	✓	✓	✓	✓
	5G	Trials 2018, Larger scale rollout 2019/2020					✓	✓	✓	✓	✓	✓	✓	✓	✓
M2M & IoT Technologies	RFID	Access and tracking of identifying RFID tags	✓	✓	✓	✓	✓								
	Bluetooth BLE	Bluetooth Low Energy (e.g. BT 4.0), BT 5.0 for IoT				✓									
	Zigbee	IEEE 802.15.4 Low-power, RF mesh network		✓	✓	✓									
	Z-Wave	Primarily home automation RF technology		✓	✓										
	LoRa	Low-Power Wide-Area Network (LPWAN)	✓	✓	✓										
	Sigfox	Proprietary technology using ISM bands		✓	✓										
	LTE-M/NB-IoT	IoT standards using existing LTE networks						✓	✓	✓	✓	✓	✓	✓	✓
	CDMA450	CDMA at the lower frequency bands for M2M/IoT						✓							

aka CBRS Bands