TYPE	DESCRIPTION	REGULATION	TYPICAL RANGE	MAX OUTPUT POWER	SECURITY	IT IS GOOD FOR…	IT IS BAD FOR	REQUIRES…	KEEP IN MIND FOR COSTING…
Bluetooth	Bluetooth, BLE and ANT are radio protocols meant for Personal Area Networks (PAN). Mostly these are on a person's body or in close proximity to them.	License free ISM band	20m (line of sight)	0.003 W	Devices are paired – which is a process of exchanging encryption keys.	Devices that stay in close proximity of eachother, like between a smartphone and a headset, heart rate monitor, bicycle speedometer.	Devices that are separated by more than a few metres, and devices that need a high communication data rate.	A bluetooth "base station", which is included in most smartphones.	This is a popular option for health monitors and smart homes as many people have Smartphones.
WiFi	WiFi is meanly meant for broadband network connections in a confined space. Normally less than 100 square metre per access point.	License free ISM band	50m (indoors)	0.1 W	Recently WiFi security suffered from many exploits.	Works well within the area it is setup in. Great for security cameras, power meters or anything that is installed in a fixed location, has power, and needs the bandwidth.	Only works in space where it is setup and has limited range. Also uses a substantial amount of power, so it is not ideal for battery operated devices.	A WiFi access point, which can be connected to the internet or a local area network.	Although we cannot assume that everyone has home Wifi, this is a great option for industry.
GSM	GSM is the second generation mobile telephone system. It is mainly meant for voice, but also supports data in the form of SMS and GPRS. Because this is an old system, it is widely adopted and hardware is available at low cost.	Needs an expensive dedicated regional frequency/channel	35km (hard technical limit)	2 W	This old standard also suffers from exploits.	Long range capabilities, used most commonly in industry such as traffic lights, tracking of trucks and sometimes animal tracking.	Requires a lot of energy, so not ideal for battery operated devices.	Requires a contract with a mobile telephone service provider.	It is always on and thus can consume a lot of energy. Due to the good roaming capabilities tracking over borders is easier using GSM.
LoRaWAN	LoRaWAN is a low speed, but long range and low power communication protocol. It is an open specification so anyone is free to implement the protocol themselves on their own equipment.	License free ISM band	5-10km typical (heavily dependant on line of sight)	0.025 W	Based on sessions, where every session is started with static keys, but after a key exchange a unique set of AES keys are used.	Running an isolated or private network on a farm or in a city. LoRaWAN is ideal for sensors that only seldomly send a value, like a soil moisture sensor sending its measurements every 10 minutes, or a water trough alarming that it is empty. It is also a good system for the tracking and monitoring of wildlife in a predefined area.	Limitations on the used frequency band can cause high latency on delivered messages. It is therefore not an option for IoT products that require an immediate feedback loop such as health monitoring. Due to the limited coverage of a private network, it is not ideal for tracking of vehicles that travel long distances.	Investing in one's own network with base stations, or getting a contract with a service provider that has coverage where you need it. A base station will however need an internet connection and power.	The costs of investing in creating one's own network will be off set by having your own network which means you can create coverage where it is needed and nothing else exists.
Sigfox	Sigfox is a proprietary network and protocol. It is meant for remote meter reading, but can be used for any remote data uplink. It is low speed and low power, but also long range.	License free ISM band, but base stations are only run by Sigfox.	15 miles	0.025 W	By default, data is conveyed over the air interface without any encryption.". Every device does have a unique static ID. It has the ability to do end-to-end encryption in the application layer. View White Paper	Remote electricity or water meter reading. Mostly uses where you do not need to have downlink messages to the device.	Message heavy applications as Sigfox limits the amount of messages one can send to a message every 10 mins in a 24 hour period. Slow speed as a sms can take a minute to send thus not an option for IoT products that require an immediate feedback loop such as health monitoring. Not ideal for live tracking a vehicle.	Sigfox coverage where you need it, as well as a subscription to use the sigfox network.	You cannot install your own base station and are limited to where the stations are setup. This does limit you in terms of the range. However, the costs of setting up your own network may be prohibitive
NB-IoT	NB-IoT runs in the mobile telephone radio spectrum, and piggybacks on old, unused GSM channels, or free space between LTE channels.	Needs an expensive dedicated regional frequency/channel	10-15km	0.2 W (max)	NB-IoT inherits LTE's authentication and encryption.	Upgrading of GSM based systems. Mostly for sensor readings, tracking and fleet management. In the future the coverage should be comparable to GSM.	A high speed internet connection.	A subscription with a mobile telephone provider.	Subscription, sim card, data costs, hardware.
LTE	LTE is the 4th generation mobile network system. Even though it supports voice calls, it was designed for better scalability and wireless broadband. The range is normally less than GSM, but the attainable data rate is orders of magnitude more. LTE can compare to long range WiFi.	Needs an expensive dedicated regional frequency/channel	2km	0.2 W (max)	Multiple unique identifiers, static keys, and encryption methods used for the different protocol levels.	Broadband wireless internet connection. Streaming security camera video.	Low power, long range end devices that should last for years on batteries.	A subscription with a mobile telephone provider.	Subscription, sim card, data costs, hardware.
LTE Cat-M	Cat-M1 and Cat-M2 are extensions to the LTE networks, providing a low speed, low power and long range protocol for the transmission of small ammounts of data. Because it is run on top of LTE base stations, implementation is cheaper as no dedicated hardware is necessary.	Needs an expensive dedicated regional frequency/channel	10-15km	0.2 W (max)		Not deployed yet, so only for experimentation.	A high speed internet connection.	A subscription with a mobile telephone provider.	Subscription, sim card, data costs, hardware.
Satellite	The connectivity products offered by satellite providers are quite wide. It ranges from satellite phones that can only send SMS's or make phone calls, to broadband internet connections for aeroplanes. The main benefit of satellite communication is the good global coverage.	Needs an EXTREMELY expensive dedicated global frequency/channel	>10000km	1.6 W (minimum – for SMS)		Broadband wireless communication, satellite phones in areas with no other connectivity, global tracking.	Realtime systems, as satellite communication has a high latency. Because satellite communication takes a lot of power, it is also not ideal for wildlife monitoring – although dedicated systems for wildlife tracking exists.	Purchase of satellite phone and contract	Expensive but worth the investment when travelling to locations with little to no other network coverage.