

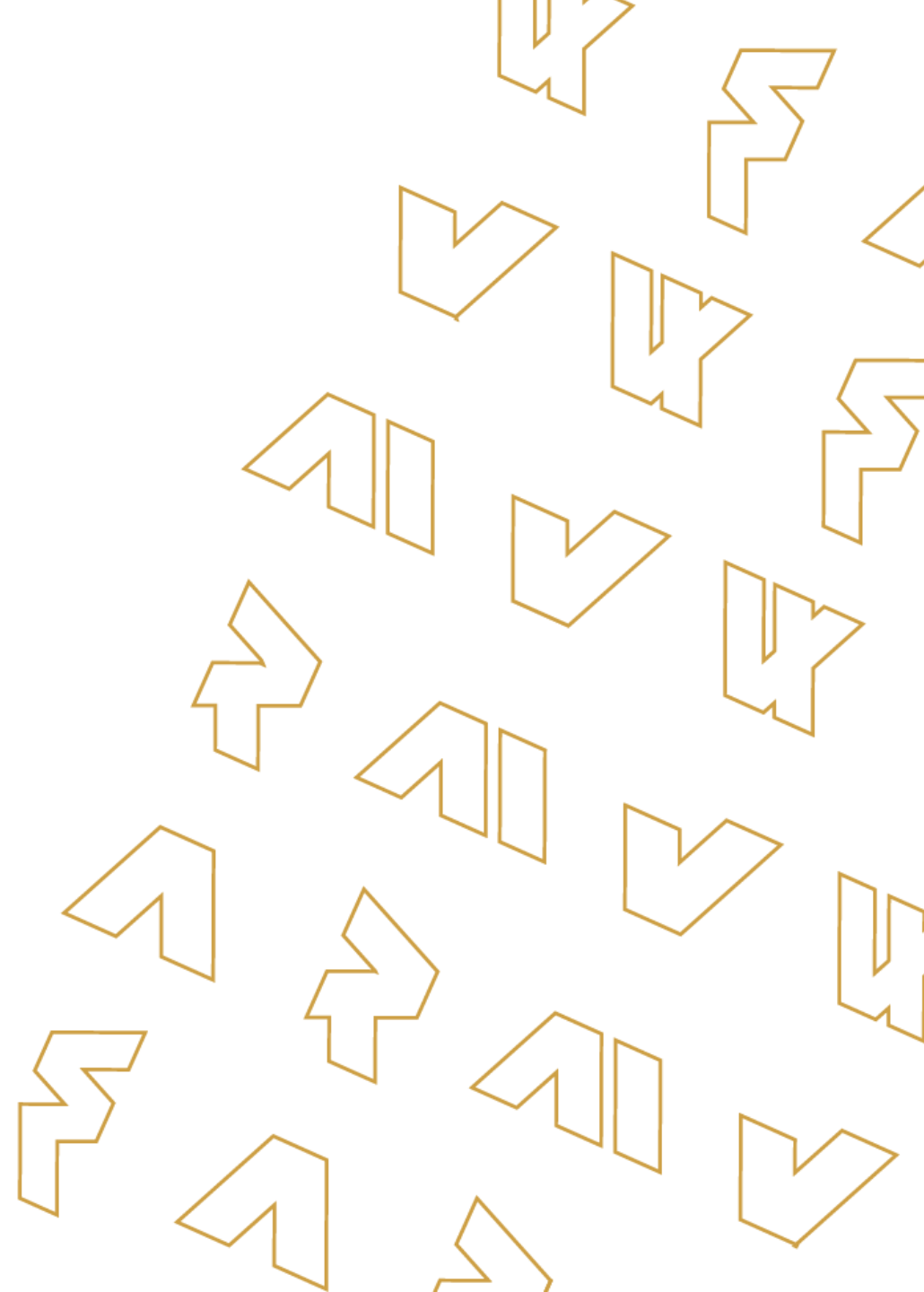
LiFi use cases

Bringing value for our residential customers.



Index

- LiFi for 5G and beyond
- Indoor positioning system
- Localised advertising
- LiFi for the wellbeing
- Connect the student devices and the teacher
- Save Missions and Lives with LiFi
- Underwater communication
- Smart home automation
- Autonomous driving
- Dense urban areas
- Augmented reality
- LiFi for security





MediaLiFi

Financing entity



Coordinator



Research organizations



The MediaLiFi project has received funds from CDTI, co-funded by FEDER.



LiFi for 5G and beyond

A technology to complement 5G



LiFi for 5G and beyond

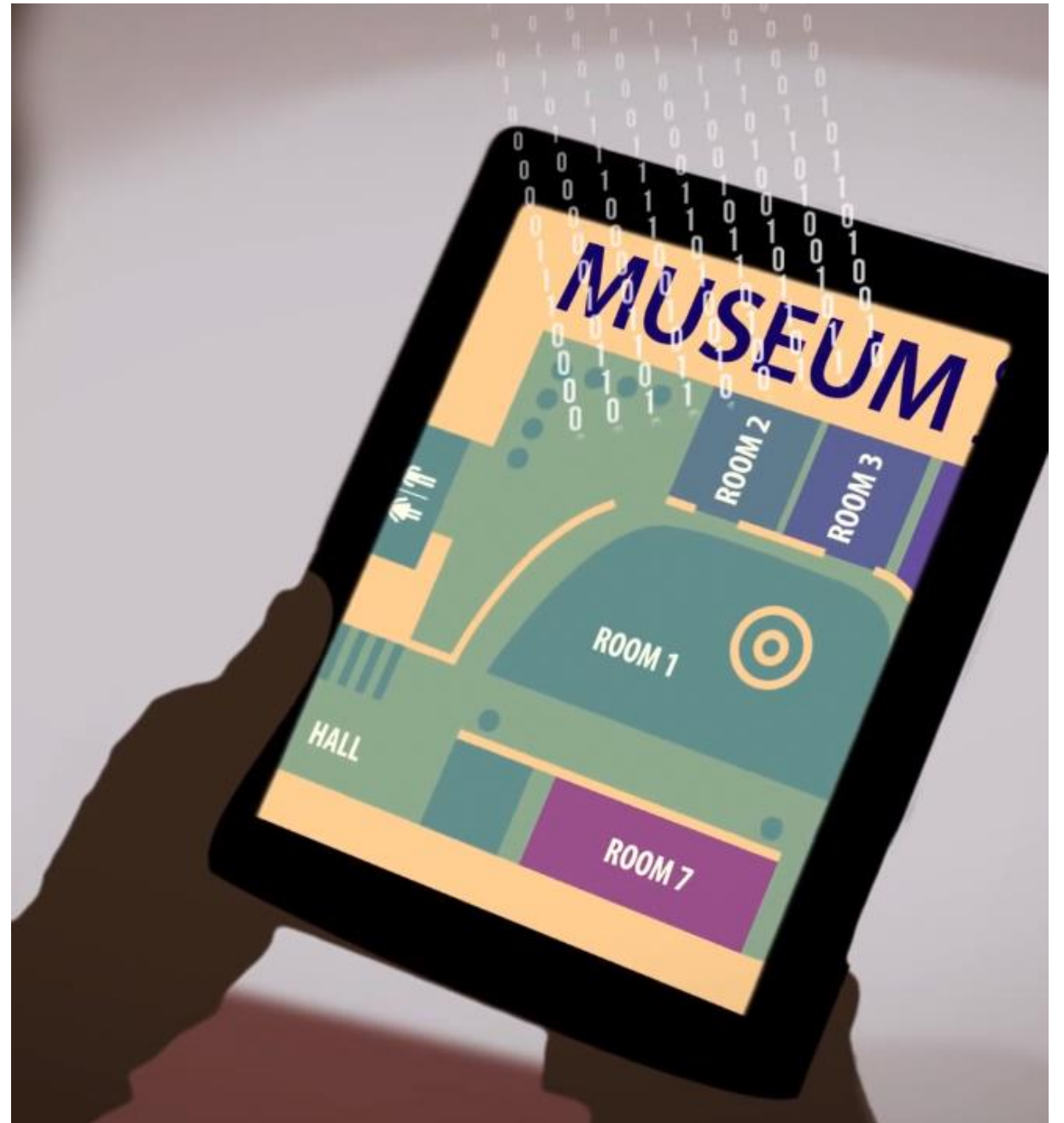
No radio frequencies, cyber secure and rapidly deployable saving missions time and money.

- Combine 5G with Light Fidelity (LiFi) technology:
 - Better mobile broadband (>100Mbps), connectivity, and speeds.
- Pave the way for 5G
 - Secure and reliable two-way wireless communication
 - At speeds beyond traditional wireless technologies such as Wi-Fi and Bluetooth.
- Allows users to access the internet roam around the space while staying connected to high-speed secure wireless internet through light.
- Build the best network possible for customers.



Indoor Positioning System

The ability of GPS to give a precise location is only precise when outdoors.



Indoor Positioning System

Optimizes indoor – outdoor floor plan information

- Indoor Positioning System – Smart Buildings
 - Function like GPS – but for indoor environments.
- Visualization of pedestrian traffic. (data analysis)
- Applications
 - Indoor navigation,
 - Inventory management,
 - Asset tracking,
 - Proximity marketing,
 - Improved shopping experiences
 - Improved customer interaction
 - Location-based gaming.
 - Empty spaces in a parking lot
- For retail establishments, hospitals, museums, universities, logistics centers, airports, etc.



Localised advertising

Offering product recommendation and advertisement based on their position



Localized advertising

By using shop display lighting as a LiFi broadcast channel,

- Provides customers with a way to look for and access points of interest while using their smartphone.
- It is possible to transmit advertising information on the goods being viewed,
- This will allow the merging of the high street and online shopping experience,
- Novel retail business models to emerge.
- Catalogue information, discount coupons, and advertising videos could all be provided to shoppers.



LiFi technology for the wellbeing

The Bee Law & Mareas 7 suites



LiFi technology for the wellbeing

The Bee law

- Public exposure to electromagnetic fields raises questions from fellow citizens.
- National Frequency Agency (ANFR), a State public establishment created "Bee" law,
 - Sobriety, transparency, information and consultation in exposure to electromagnetic waves
 - They receive and make available to residents the information files
 - They may require a simulation of the exposure to the waves emitted by an installation
 - They may require an inventory of existing installations.
- Establishments offering WiFi access to the public must clearly indicate this by a pictogram.
- In establishments welcoming children under 3, the law prohibits WiFi.
- In the classes of primary schools WiFi must be switched off when not in use for educational activities.
- Big efforts to provide LiFi for safety and wellbeing.

LiFi technology for the wellbeing

Mareas 7 suites – Cantabria

- A HOUSE THAT CARES FOR YOU: good for you, good for the environment.
- Co-living format
 - Shared houses designed for living and working
 - Oriented to the well-being
 - Promotes creativity and art as value.
 - The health of people and the planet are placed at the centre of the design: LiFi
- Use of LiFi over radio-frequency waves
 - Wellness
 - [WELL](#) certificate by the GLOBAL WELLNESS INSTITUTE & ACTIU
 - Increase the comfort and well-being of its occupants
 - Healthier environment
- “ Internet system combined with LIFI for the coworking area, an alternative technology not based on electromagnetic waves, 100 times faster than Wifi connection, healthier, safer and more ecological.”



Connect the student devices and the teacher

Connectivity in the classroom opens up a world of knowledge and resources.



Connect the student devices and the teacher

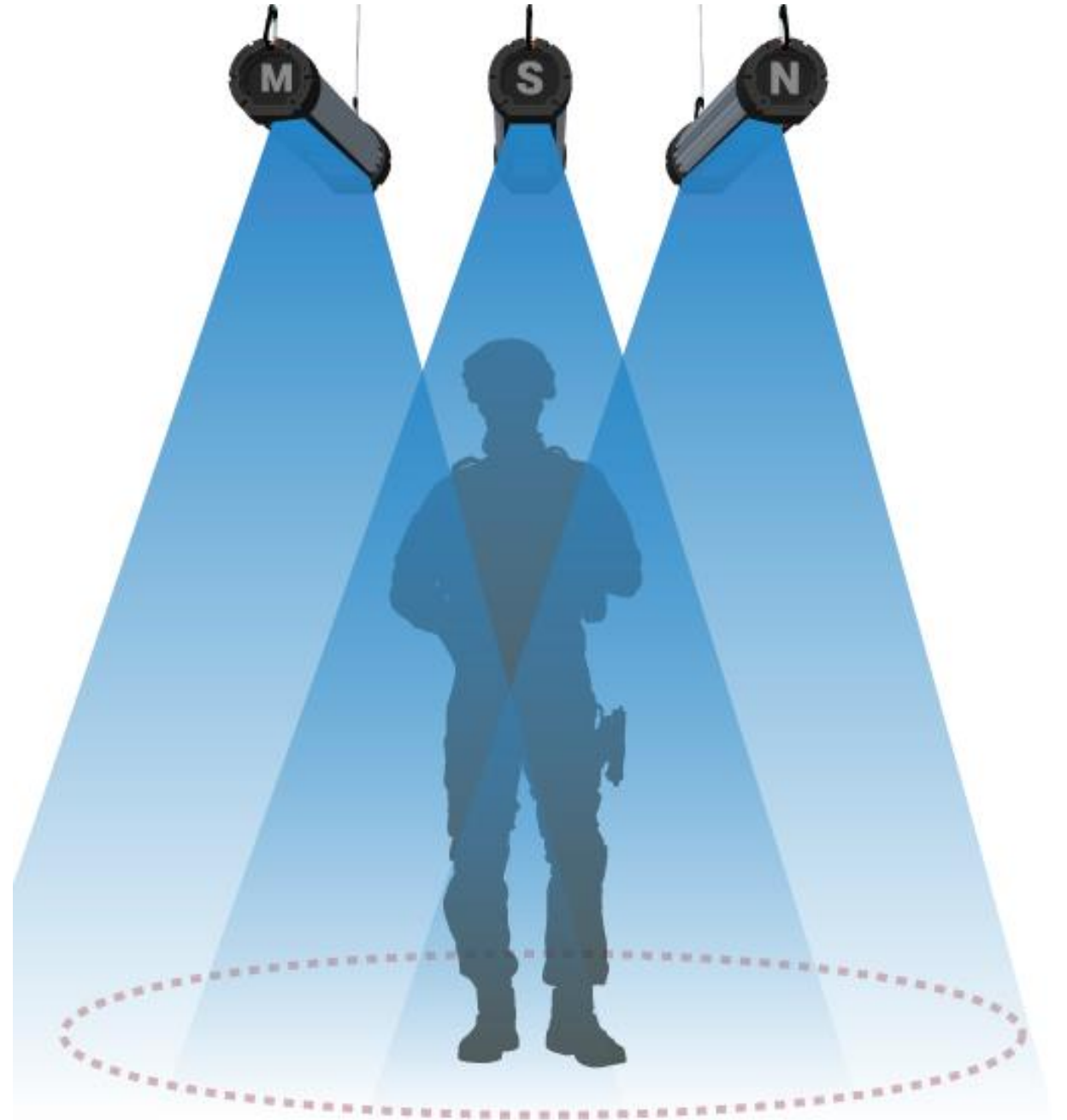
poor connectivity can result in students falling victim to the digital divide.

- Teachers can send videos, notes or explanations directly to the students' devices.
- Wi-Fi networks struggle to provide quality due to:
 - being overloaded with activity by hundreds of students.
 - staff downloading content at the same time.
- Promote high-quality professional learning and leadership amongst education practitioners.
- Benefits:
 - high-speed.
 - bidirectional and fully networked wireless communication.
 - greater security
- Serve multiple classrooms simultaneously
- Each student was given access to LiFi Stations that plug into their laptops
- “LiFi can unlock complete new educational environments by enabling next-generation technology like virtual and augmented reality”



Save Missions and Lives with LiFi

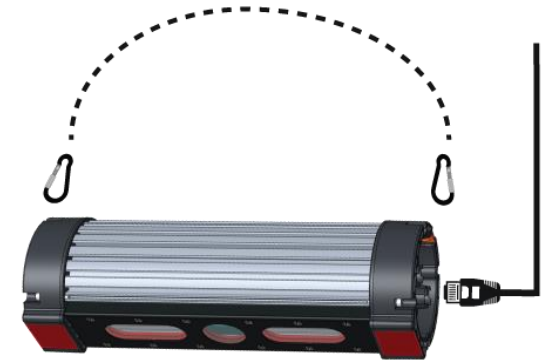
LiFi designed for military defence.



Save Missions and Lives with LiFi

No radio frequencies, cyber secure and rapidly deployable saving missions time and money.

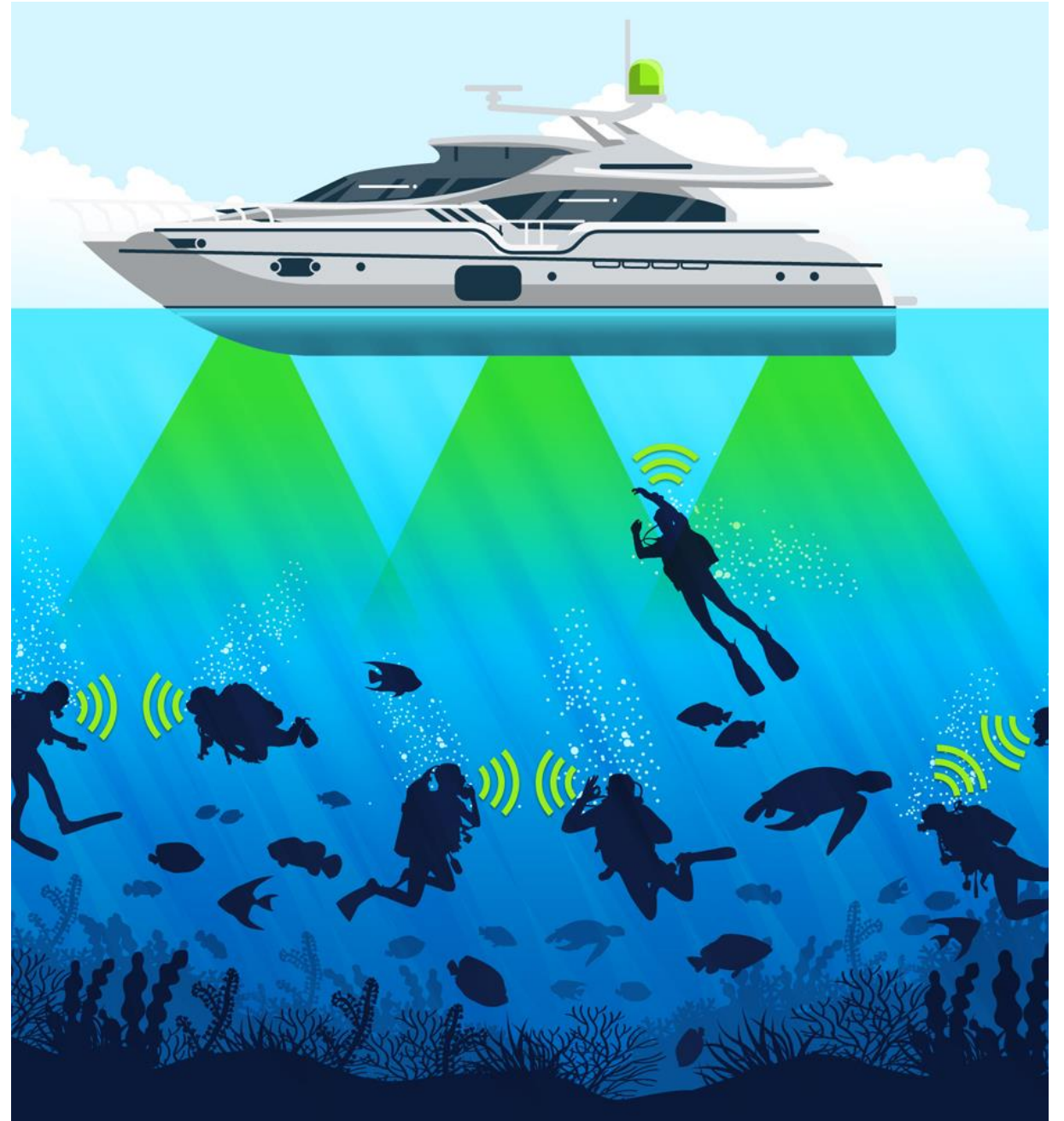
- LiFi is not vulnerable to eavesdropping through walls or tent canvas.
 - Highly resistant to close range jamming attempts.
 - Designed to counter insider threats.
 - Data transmitted is only available to the right people in the right place.
 - LiFi systems were up and running in tens of minutes.
 - Compared to hours for Ethernet-based coms.
 - Also much quicker to take down when it was time to move out.
 - Designed for the field.
 - Possible water-resistant for rapid deployment in harsh environments
-
- Now it is designed for the military but it could be taken to campers, festivals, hunters, fishermen, and other people who go to the field often.





Underwater communication

Military and scuba divers operating under vessels.



Underwater communication

The length of ROV cabling limits their operational range.

- Underwater remotely operated vehicles (ROV) are controlled by wired connections.
- Radio waves are quickly absorbed in water
- Since light can travel through water, Li-Fi could offer much greater mobility.
- Therefore, LiFi can enable communication from diver to diver, diver to mini-sub, diver to drilling rig, etc.



Smart home automation

The internet of everything



Smart home automation

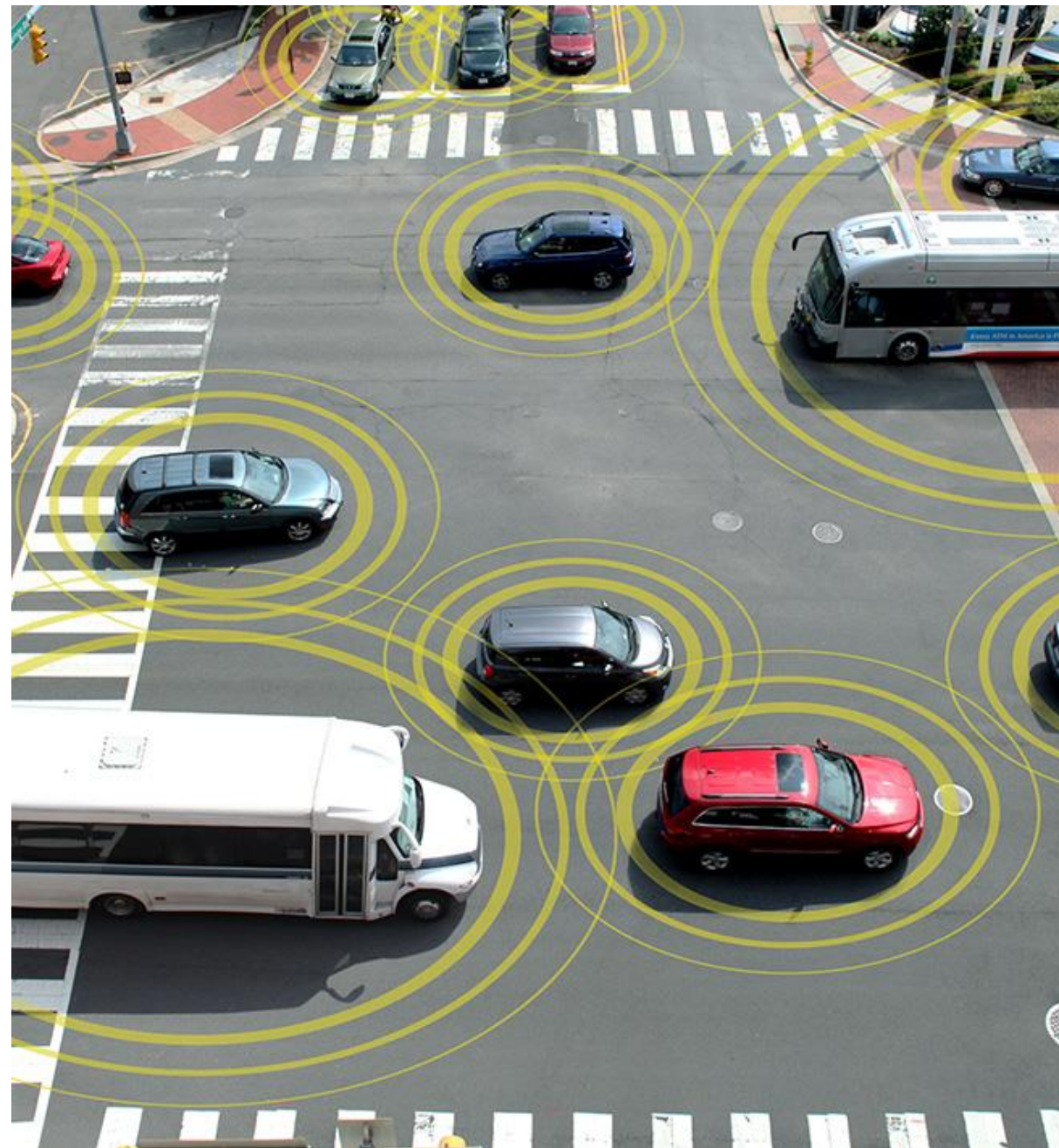
"IOT Based Indoor Localization with LiFi in Smart Homes

- Very secure, less expensive, fast and energy efficient
- Smart home has best for old people.
- Our homes already have lighting widely installed.
- Wi-Fi positioning algorithm with LiFi assisted coefficient calibration
- LiFi is good for dealing with the estimate accuracy challenge.
- LiFi based positioning expand the location accuracy by 80% with no system implementation overhead.
- The use of LiFi enabled lighting will transform the applications that can be envisaged, not only the interconnection of devices, such as televisions, computers and Hi-Fi, but also connecting ordinary domestic appliances, such as fridges, washing machines, microwaves and vacuums.



Autonomous Driving

Autonomous vehicles traffic control and safety



Autonomous Driving

Enhancing vehicle-to-vehicle and vehicle-to-infrastructure communication

- The upcoming 5G technology, will not be sufficient enough to ensure autonomous vehicle safety.
- WiFi It is highly susceptible to interference and wireless communication capacities reach their limits
- Connecting devices, machines and vehicles.
- Increase safety and comfort in road traffic.
- Best uses:
 - In low visibility during heavy rains or foggy weather.
 - Tunnels and hills
 - speed limits, steep curves, and work zones
 - Pedestrian safety

Dense urban environments

Available high data rate access for users



Dense urban environments

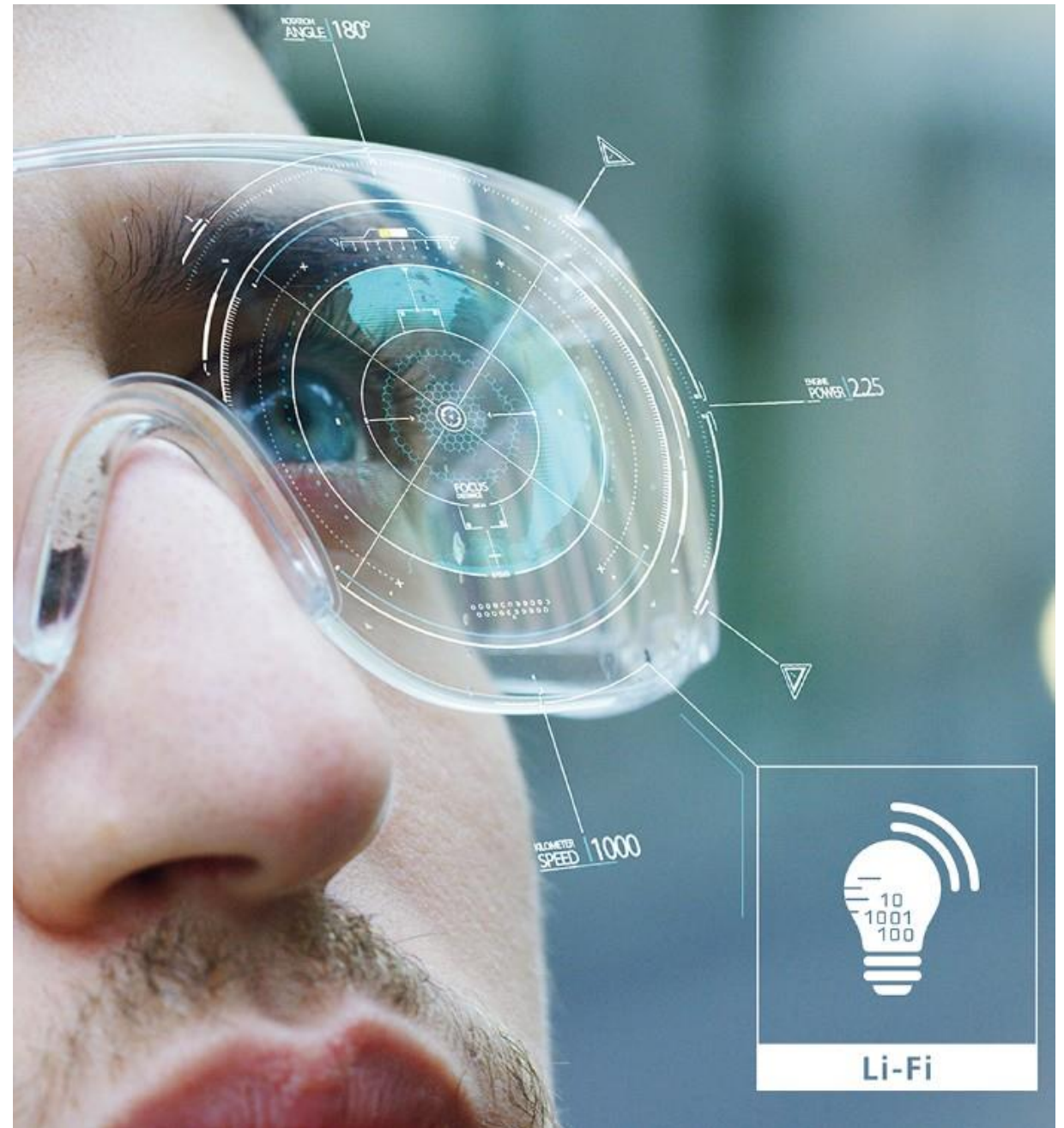
Dense urban environments tend to have complete artificial lighting coverage.

- Artificial lighting already existing in cities can provide high data rate access for users as they move through the city.
- Examples:
 - Along a hotel corridor or reception hall users can receive high data rate downloads.
 - High speed wireless communication would be available in every room.
- Since the light waves do not propagate through walls the interference-free wireless communication, and spectrum does not have to be shared among a large number of users in the rooms.
- In cellular communication, the distance between radio base stations has come down to about 200-500 metres.
 - instead of deploying new radio base stations in our cities, street lamps could provide both
 - Illumination during night,
 - High speed data communication 24/7.
 - There is an additional cost benefit as installing new radio base stations are expensive.



Augmented Reality

Using visible or infrared light to send and receive data.



Augmented reality

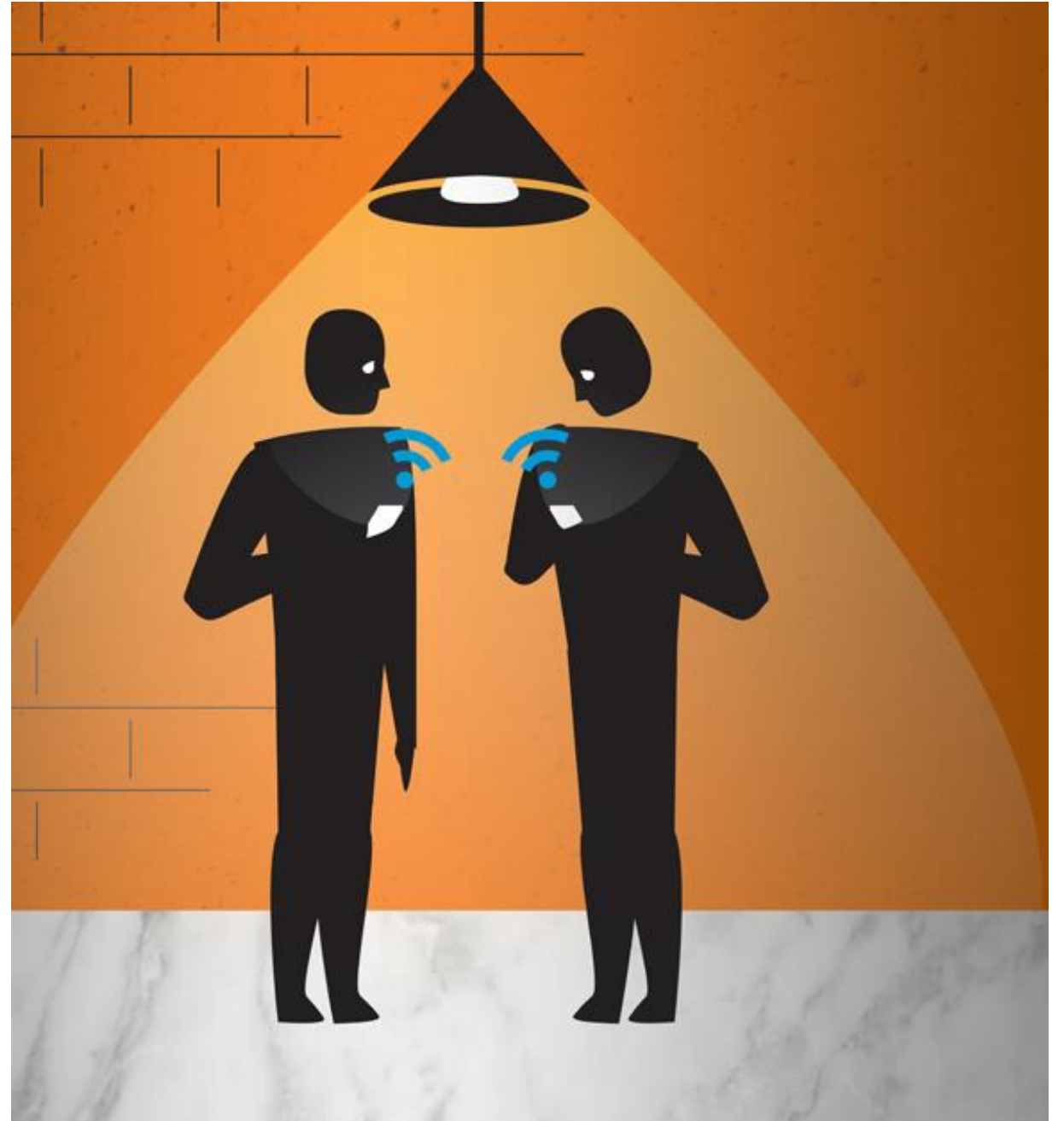
Data transmission takes place without contact, in real time, at very high data rates.

- Depending on the application, large amounts of data need to be transferred and interactive content resulting directly from a user's actions must be available in a certain period of time.
- Wireless data transfer techniques are preferably installed in AR glasses. The usual standards such as WLAN and Bluetooth are, however, limited in bandwidth and not designed for real-time transmission.
- Exhibits in museums and galleries are illuminated with specific lighting.
- Li-Fi enabled lighting can provide localised information within that light.
- This means that a visitor's camera or mobile phone can be used to download further information regarding the object being viewed from the light that illuminates the exhibit.



LiFi for Security

LiFi is considered to be more secure even in the absence of encryption

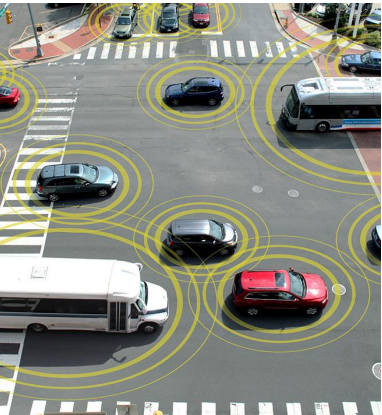
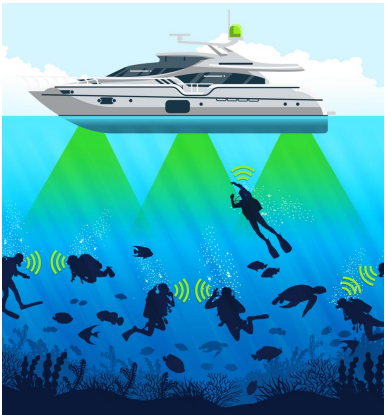
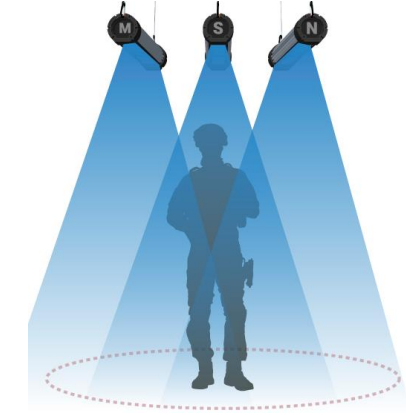
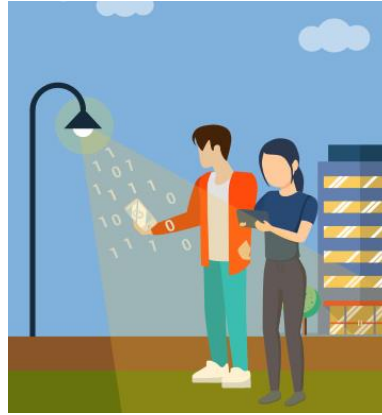
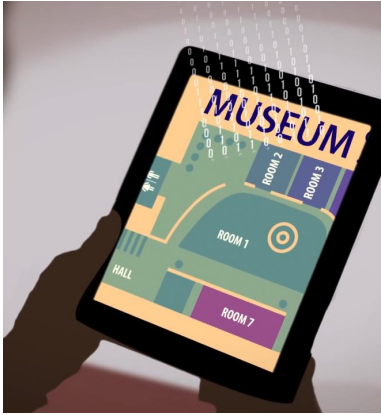


LiFi for Security

We can create the conditions that allow us to shut the door on our wireless data.

- LiFi is significantly more secure than other wireless technologies
- Light can be contained in a physical space.
- Physical barriers can be implemented (doors and windows) to contain and protect the light
- Existing security protocols for encryption and authentication can be leveraged in LiFi systems to provide even more secure wireless systems.

To summarize



Thank you

