

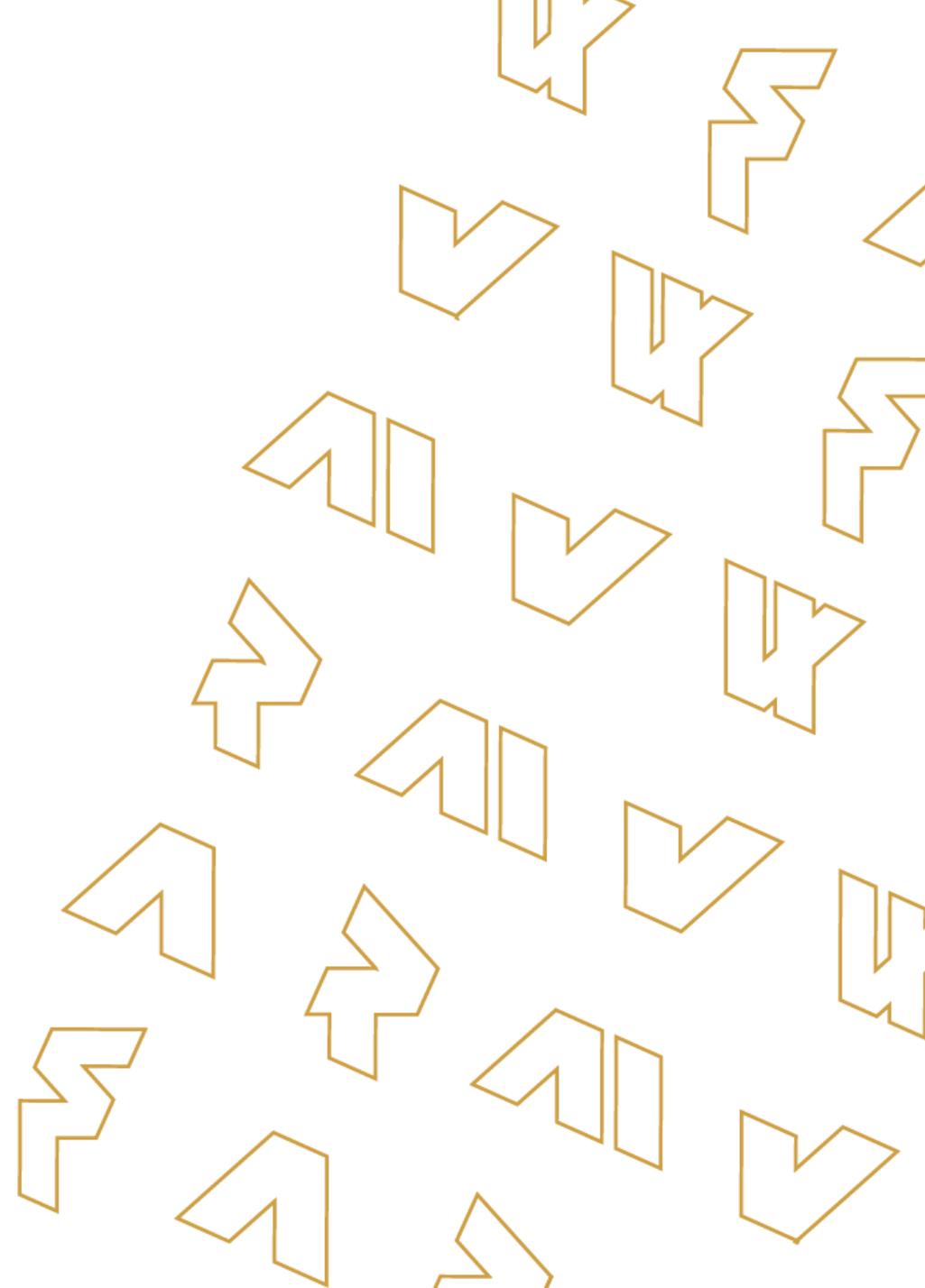
# LiFi use cases

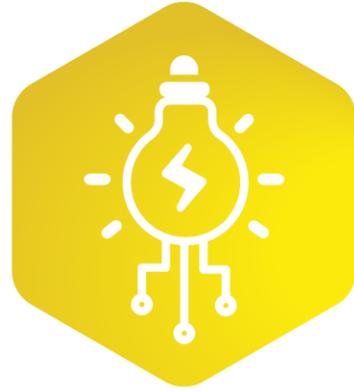
Bringing value for our residential customers.



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# MediaLiFi



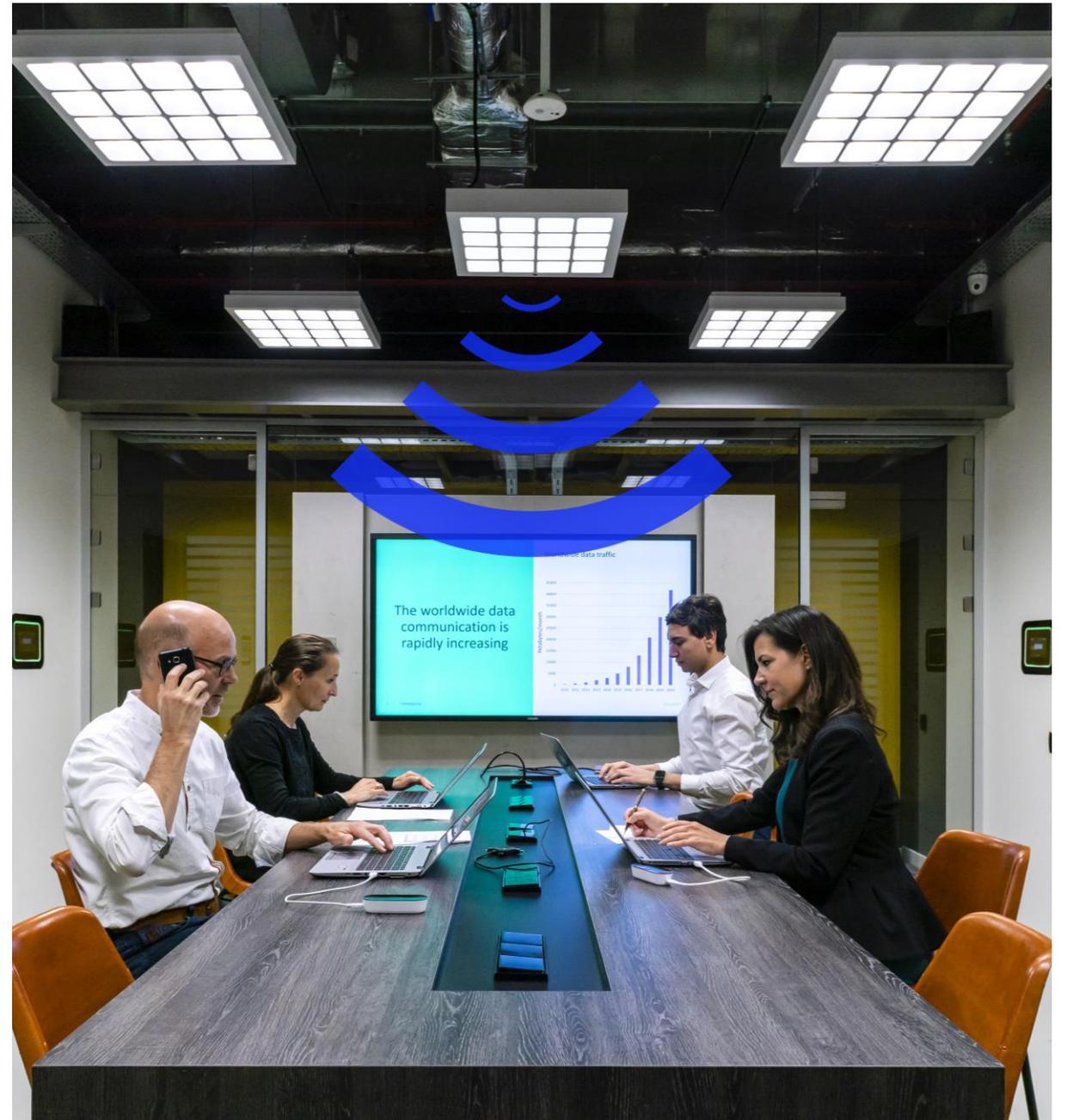
The MediaLiFi project has received funds from CDTI, co-funded by FEDER.





# LiFi for 5G and beyond

A technology to complement 5G



# LiFi for 5G and beyond

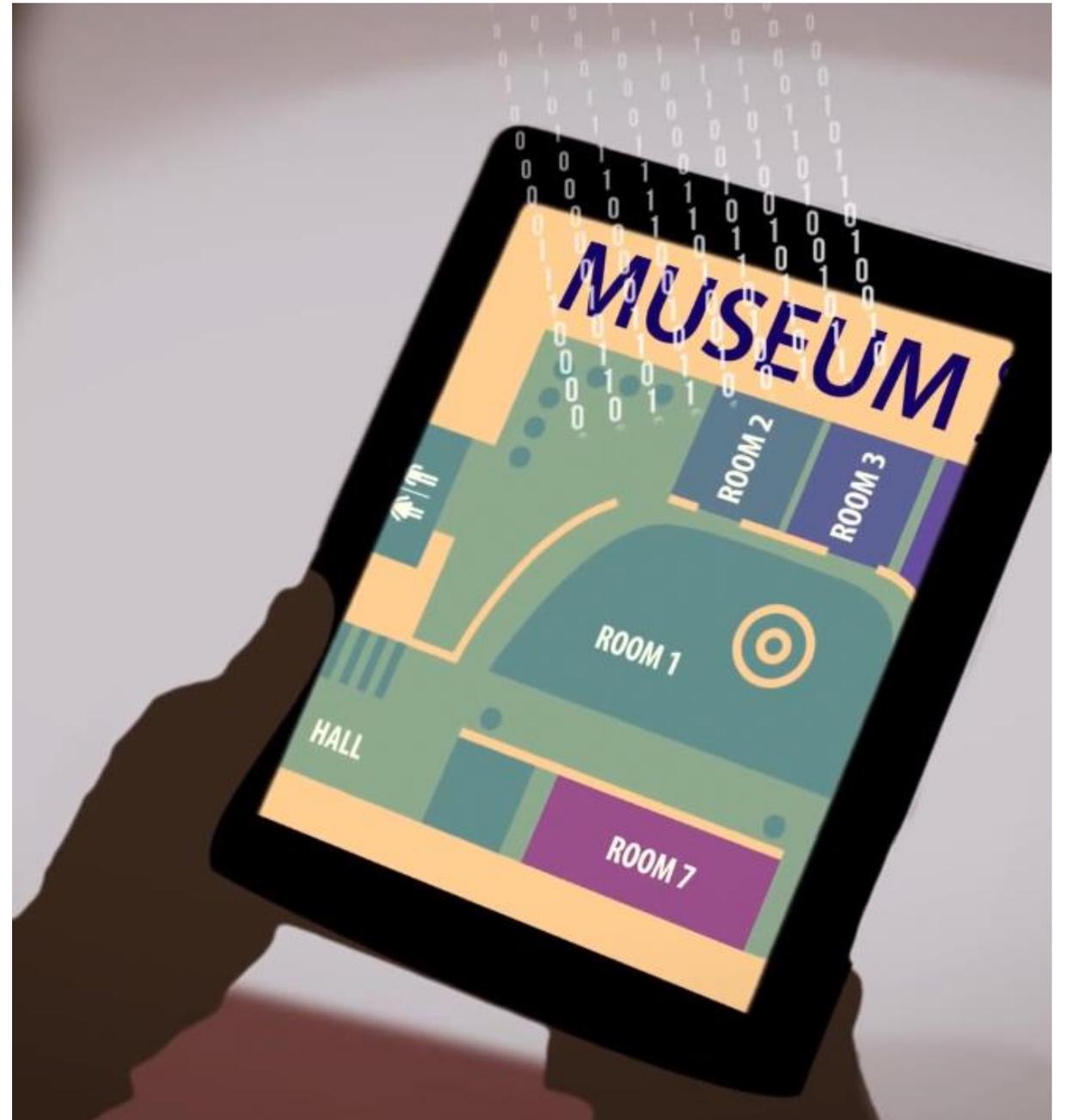
No radio frequencies, cyber secure and rapidly deployable saving missions time and money.

- 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

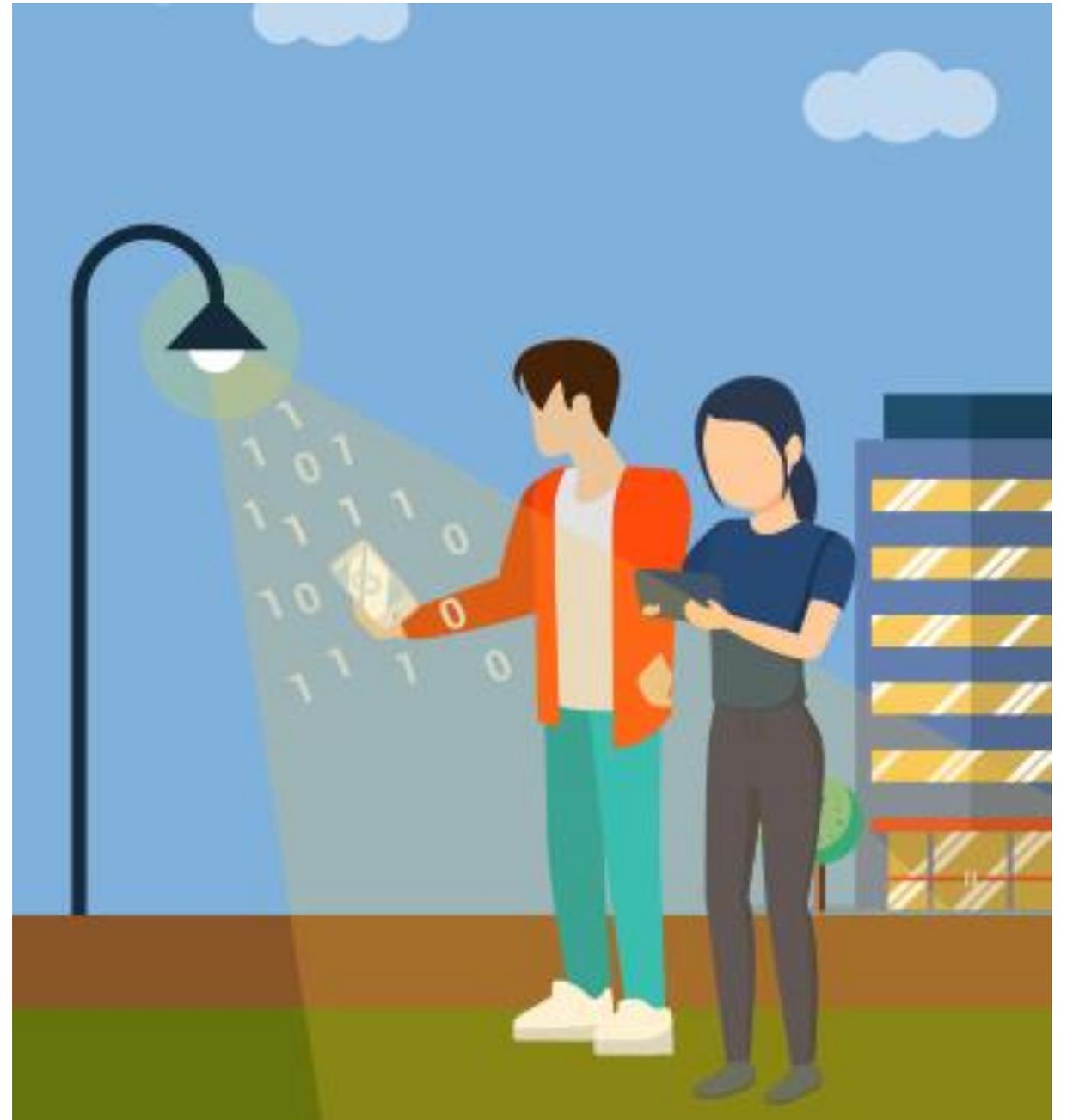
Optimizes indoor - outdoor floor plan information

- 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

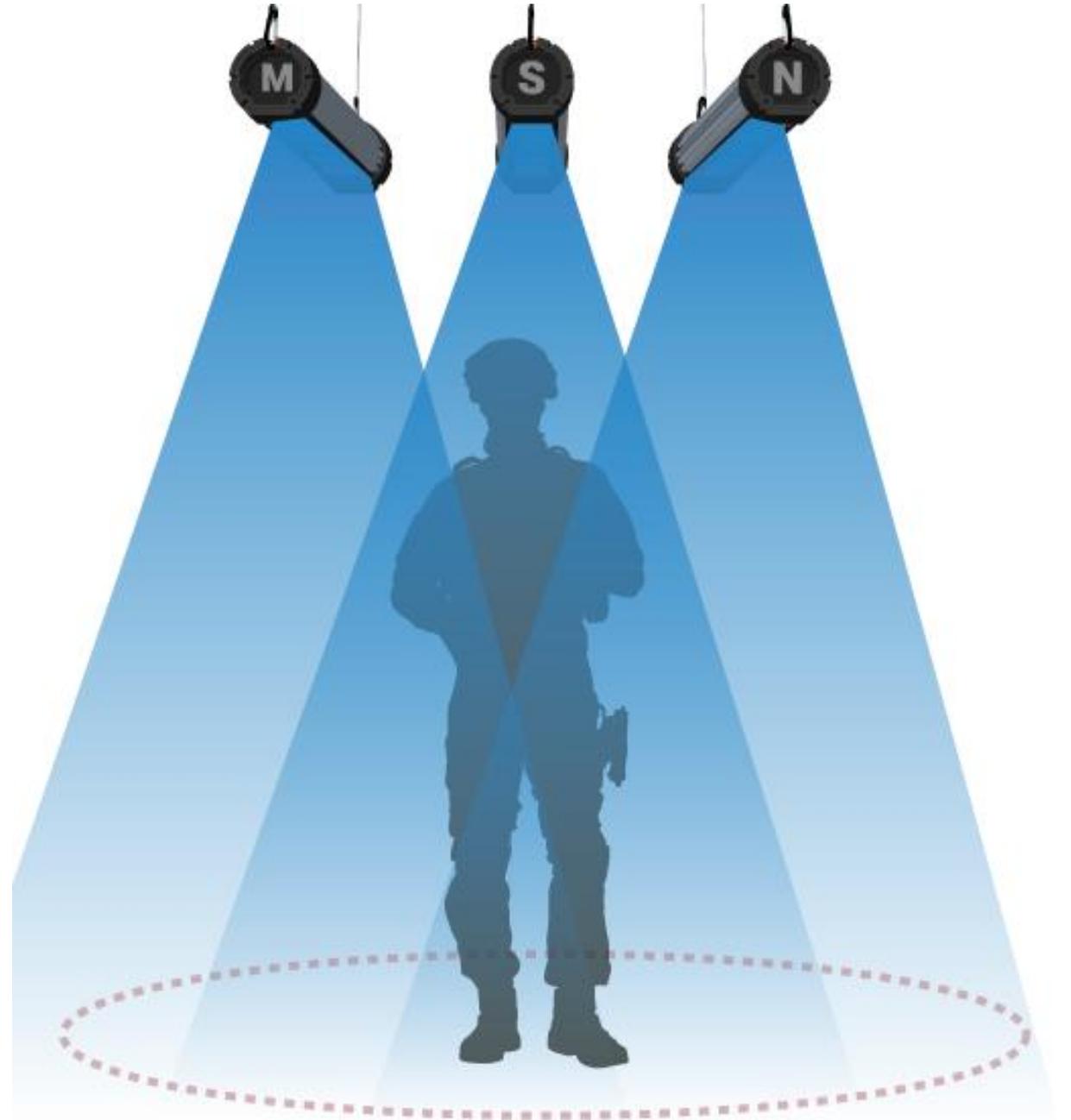
poor connectivity can result in students falling victim to the digital divide.

- 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

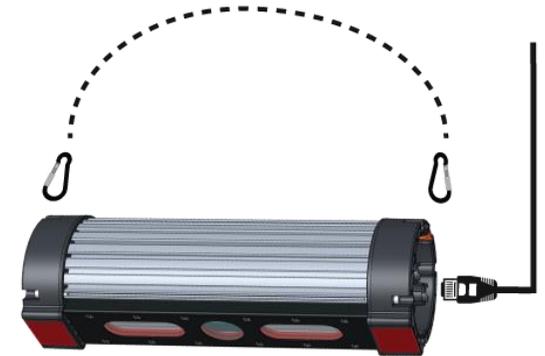
LiFi designed for military defence.



# Save Missions and Lives with LiFi

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

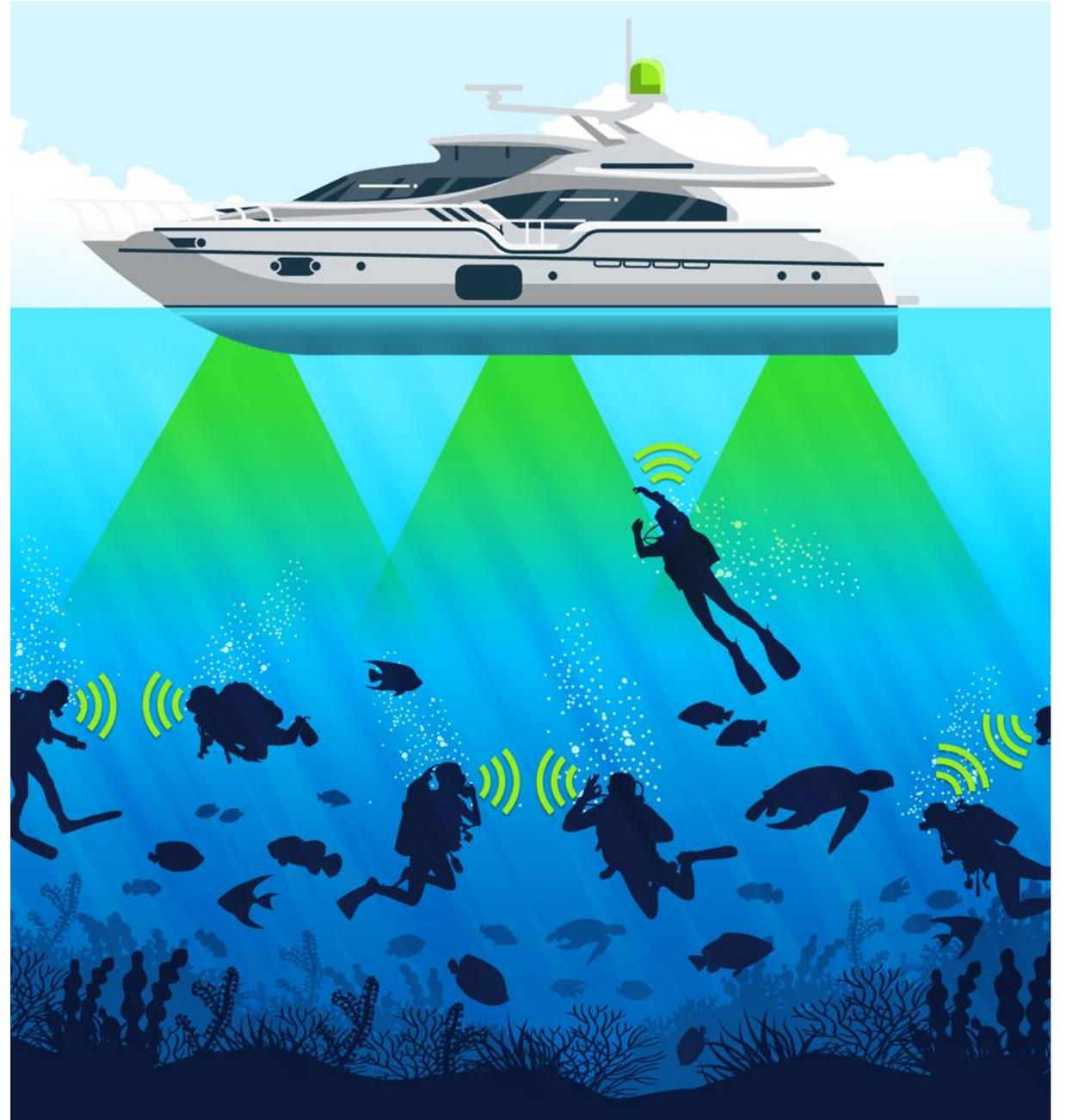
- LiFi is not vulnerable to eavesdropping through walls or tent canvas.
- Highly resistant to close range jamming attempts.
- Designed to counter insider threats.
- Data transmitted is only available to the right people in the right place.
- LiFi systems were up and running in tens of minutes.
  - Compared 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

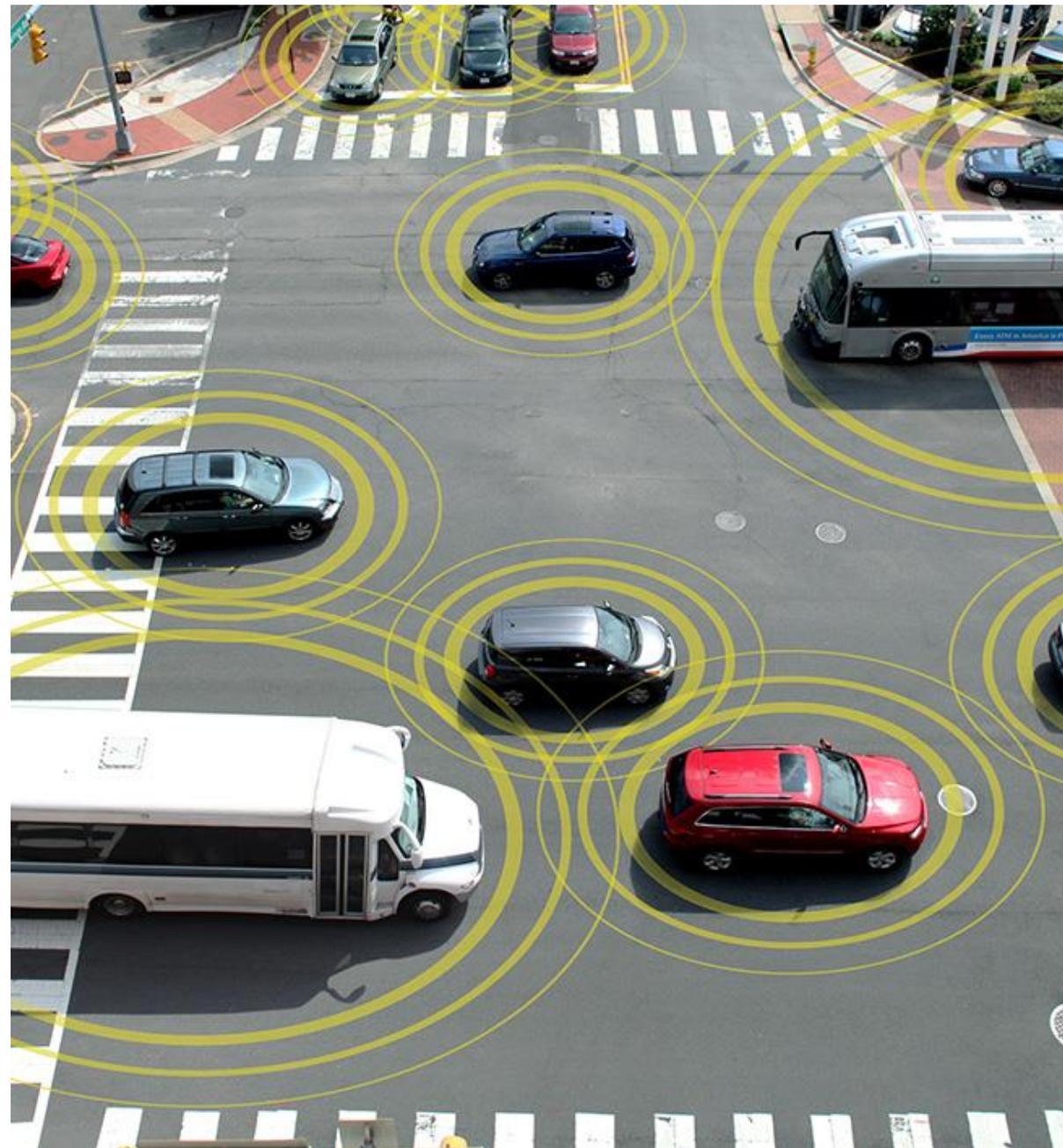
"IOT Based Indoor Localization with LiFi in Smart Homes

- 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

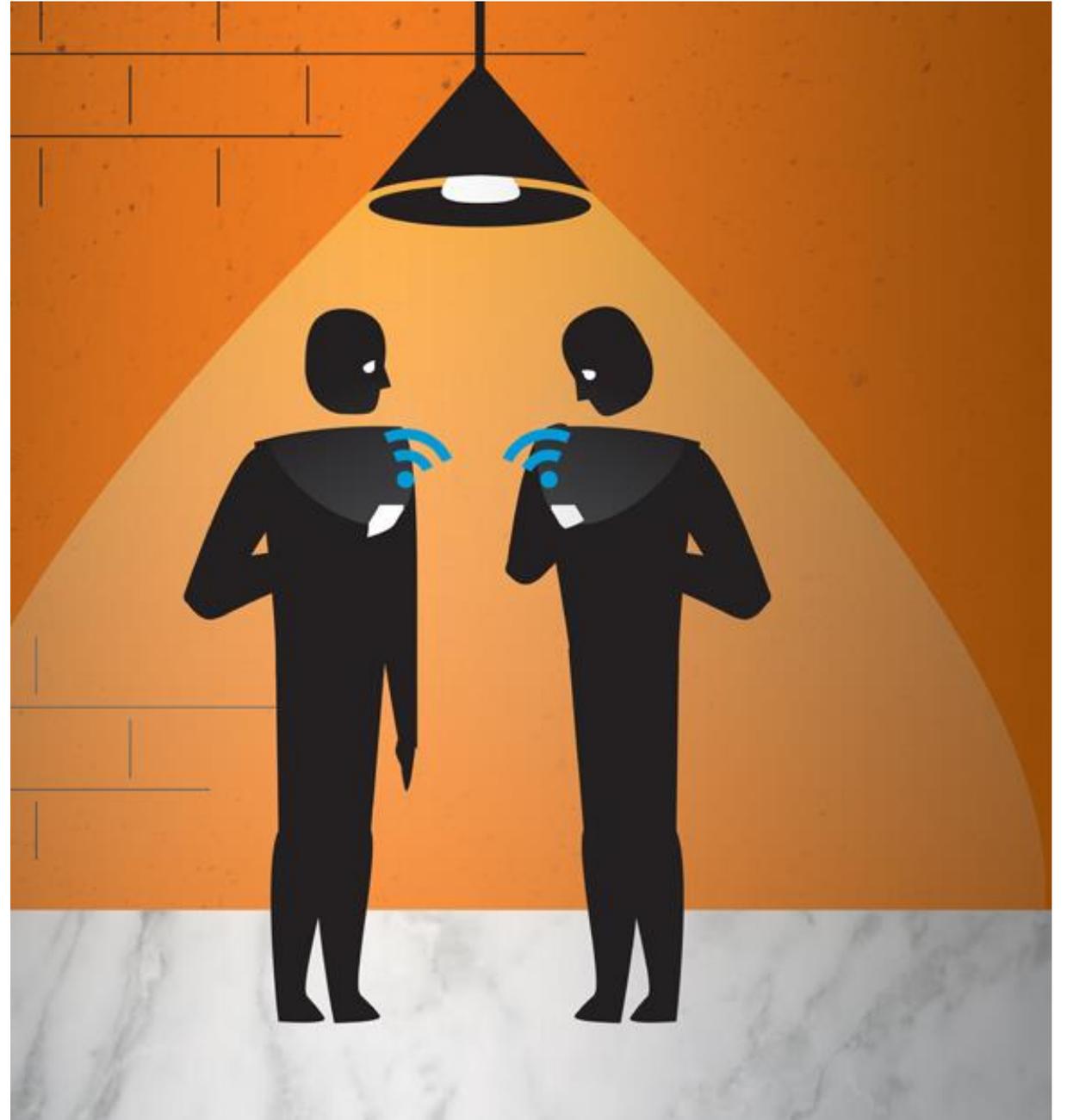
Data transmission takes place without contact, in real time, at very high data rates.

- 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

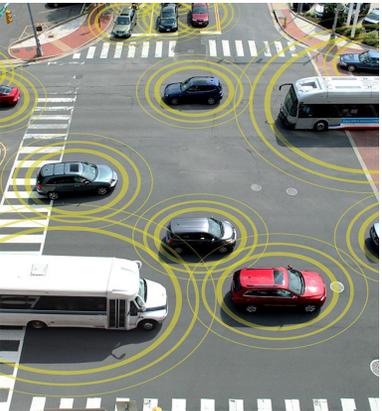
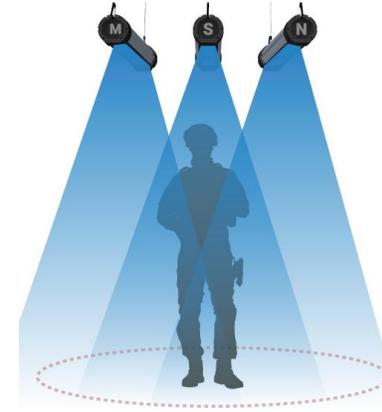


# LiFi for Security

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

