IQRF® Alliance

Smart City Smart Building Industry 4.0

Interoperable Wireless Solutions

Smart City

- Street lighting and parking systems
- Traffic monitoring and control systems
- Infrastructure (bridges, tunnels, pipes,...) monitoring
- Environment, pollution, and noise monitoring
- Waste management

Smart Building

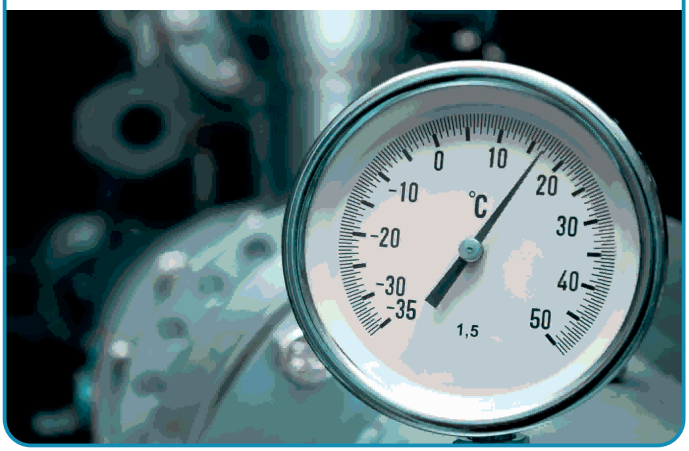
- Building automation systems
- Indoor lighting and heating
- Humidity, temperature, CO_2, vibrations, construction or snow depth monitoring
- Workplace occupancy and people counting

Industry 4.0

- Tool, machine and device monitoring
- Worker, forklift, and goods indoor tracking
- Infrastructure (e.g. ProfiBus) monitoring
- Coal wagons defrosting, turbine blades control

Other IoT applications

- Transport applications
- Railway embankments monitoring
- Water, electricity and gas metering
- Snowgun control, beehive monitoring, etc.



References

There are **300k+ running IQRF devices** all over the world deployed since 2008: street lights in Israel, shopping mall lights in Mexico, nuclear power plant turbines in Poland, rail condition monitoring and control in UK, tools on automotive production line in Czech Republic, street parking in Hungary, coal defrosting in Slovakia, etc.

Simple Secure Reliable Interoperable

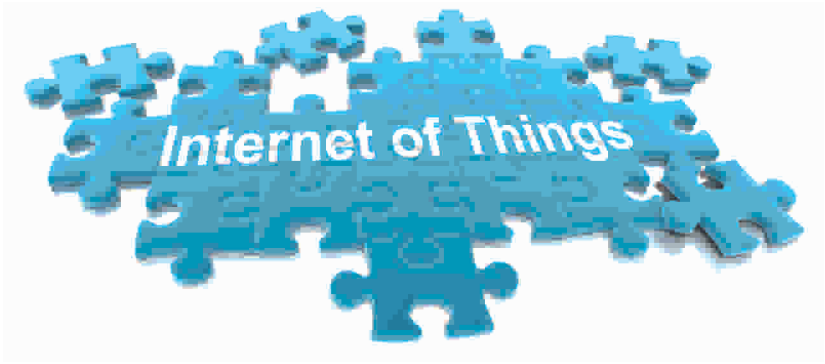
IQRF Alliance

IQRF Alliance is an open international IoT alliance (including design houses, manufacturers, cloud providers, telco operators, system integrators, research and innovation centers, technical high schools and universities) with the mission to **deliver #1 wireless IoT devices and solutions based on the IQRF Technology**.

- IQRF Summit and local meetups
- Meetings and networking events
- Joint pilot projects
- On-line member zone

- IQRF Standard
- IQRF Interoperability certification
- Development support
- Reliable and secure wireless platform

- On-line marketplace and e-shop
- Joint stands on key exhibitions
- On-line and printed case studies
- International PR activities



Internet of Things

IoT is a big puzzle with hundreds of pieces that must fit one to each other.
IQRF Alliance members are building up an ecosystem of interoperable end-devices, gateway, software, clouds, mobiles apps, integration platforms etc. to enable their customers to realize a wide range of IoT project quickly and effectively.

Membership Benefits

New business opportunities	Easy interoperability	Shared marketing costs
Fast growing community	Mature technology	Ready products & solutions

IQRF Smart School

...program for academic institutions

IQRF Smart School is a program for academic institutions - especially technical high schools and universities. This program enables students to easily catch the fast-moving train of the Internet of Things and M2M wireless communication.

- free membership in the IQRF Alliance
- professional events
- on-line member zone
- cooperation on commercial projects

- free learning materials
- professional training and support
- discount on hardware
- teachers and students certification

- marketing materials
- promotion on Alliance website
- competitions for students
- higher value for employers

IQRF Start-up

...program for young companies

Young companies working on a product directly related to the IQRF Ecosystem can benefit from a two-year free-of-charge IQRF Alliance membership. IQRF Start-ups get excellent technical support, are linked to other Alliance members, are promoted through Alliance web site and social media and get a chance to demonstrate their products and solutions on IQRF Summits. Join the program to maximize your chance to succeed on the IoT Market.

IQRF Summit and Meetups

...opportunity to meet partners

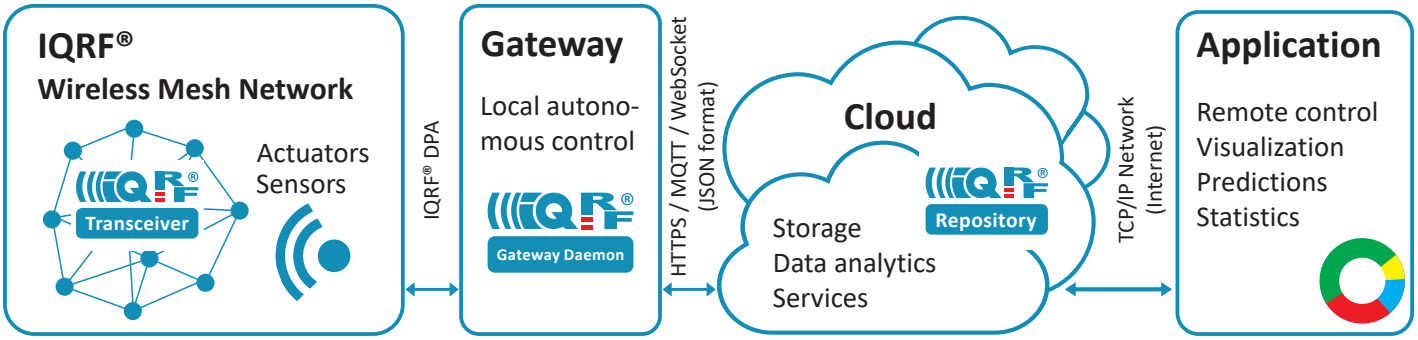
At joint events such as the IQRF Summit or IQRF Meetups, members of the IQRF Alliance can meet each other and discuss ongoing projects. They can find partners for their IoT projects, consult their ideas with IoT professionals and make their activities public, as well.

In an informal environment, such as networking dinner, it is often easier to face IoT challenges. Academic institutions can meet different type of companies on the IQRF events and that's where a number of joint development projects begin.

IQRF Alliance connects the world of research and education to the world of business and experience.

Internet of Things with IQRF®

Typical design of IoT application with IQRF® network



IQRF® Features

LOW POWER
4.55 nAh/B @ TX
50 nA @ sleep
Years on AA battery

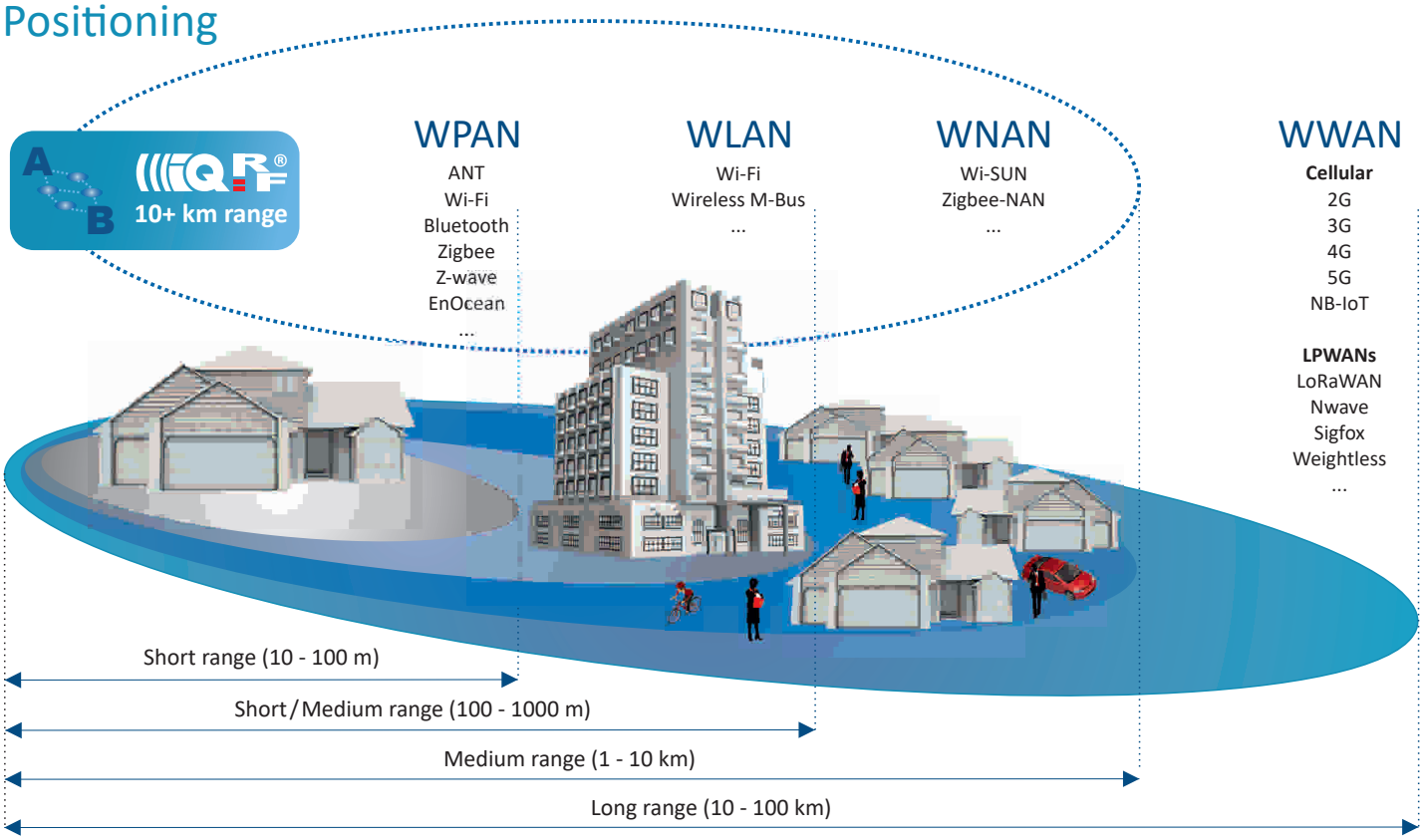
UP/DOWN
Fast link
20 kb/s
Centralized maintenance

SECURE
AES-128
Encryption
Based on standards

RANGE
500+ m
8 mW
Reasonable coverage

ROUTING
IQMESH®
up to 240 hops
Robustness + reliability

Positioning



Wireless your device. Simply.

IQRF Ecosystem

Cloud Platforms & Services

Services

TechData · MICRORISC · rds · JOTIO · JABLOTRON

IoT Platforms & Clouds

IBM Cloud · ZAT · Microsoft Azure · TCPRO the cloud provider · INTELIGLUE IoT Data & Management Platform

Lighting Plaforms & Solutions

logimic Software systems · DATmoLUX · ARDEK PECHMAN · Savee

IQRF Repository

HTTPS / MQTT / WebSocket
JSON format

Commissioning Tools

MasterDC · rds · MICRORISC



Gateways

MICRORISC · unipi

IQRF Gateway Connectors

IQRF Tech

Edge SW

logimic Software systems

IQRF Gateway Daemon

Linux

IQRF DPA

End Devices

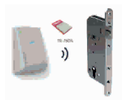
sensor · binary output · DALI · proprietary

Sensors & Actuators

AUSTYN INTERNATIONAL Ltd. · PROTRONIX SENSE & EASY · SANELA · TESLA BLATNÁ, a.s. · EFG · MICRORISC








Lighting Products

DATmoLUX · Liteplan · SPECTRASOL BIODYNAMIC HUMAN SOLUTIONS · NIKATRON



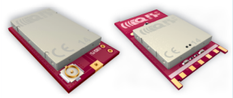

Lighting Connectors

MICRORISC · Liteplan · NIKATRON



Transceivers

IQRF Interoperable



Simple · Secure · Reliable · Interoperable

Defrosting of coal wagons in Slovak powerplant

1
Austyn Global Supervisor system for control

over **500**
infrared heaters controlled by the IQRF network

over **1.8**
MW of input power for infrared heaters

The defrosting system consists of
1) **450 infrared heaters** with 3.6 kW output and **108 heaters** with 1.2 kW output,
2) **automatic RS AGS system** controlling defrosting based on data from temperature sensors in the tunnel and on the wagons. Data are transferred wirelessly through the IQRF mesh network.
This system ensures reliable electricity production and heating for the town of Prievidza with more than 47,000 inhabitants.

iLersen Central Heating - industrial automation sys.

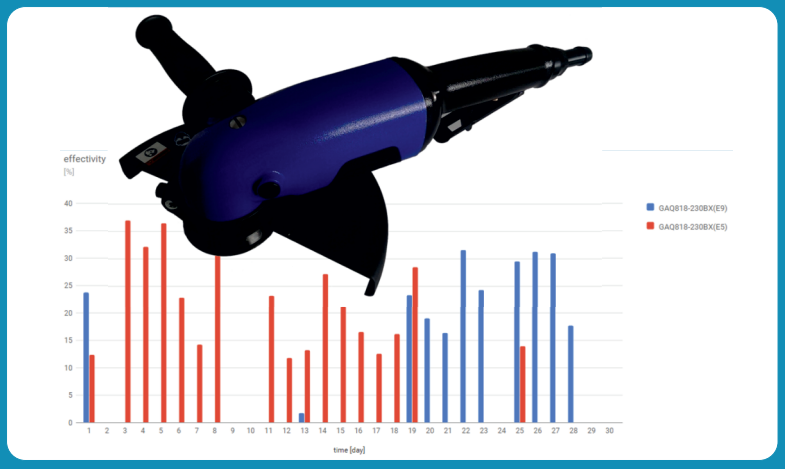
1
modular control system

up to **50**
industrial heaters per zone

∞
unlimited number of zones

Logimic industrial automation system monitors and controls the **heating** of industrial halls based on **temperature profiles**, indoor/outdoor **temperature**, working **hours**, etc. Each hall is fitted with an **IoT Gateway** (Aurora Hub IoT), divided into **zones** with one wireless temperature **sensor** and a set of wirelessly controlled **heaters** located on the ceiling of the hall. Data is stored in the **AWS** cloud. Thanks to continuous analysis, recommendations, and alerts, the client gains valuable inputs to **optimize heating and reduce costs**.

Wireless pneumatic grinding tools



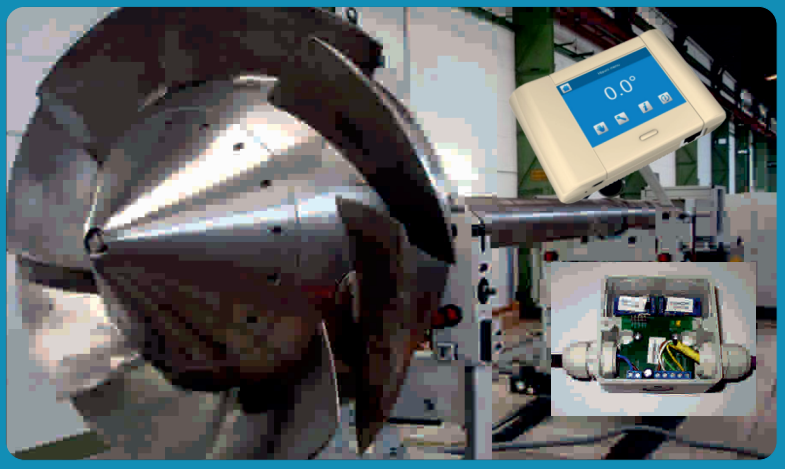
0
no need for external electricity

over **100**
meters wireless range in open space

over **1,000**
EUR savings per device

The solution consists of **wireless pneumatic grinding tools** equipped with an electricity generator and **online dashboard** with information about tools status, a whole history, recommendations for a maintenance, comparison of workers and tools and a visualization of the working process in a timescale.
The **efficiency** of workers and tools is improved by continuous monitoring and recommendations. There are significant **cost savings** due to warning of the **upcoming malfunction** of tools.

Wireless control of 1.5 MW turbine blades



2
transceivers in every rotor for redundancy and higher reliability

over **4**
years trouble-free operation

over **40**
systems equipped with this control

There was a request to **control turbine blades** wirelessly (because of previous unreliable wired solution) in the **power plant JAWORZNO III** in Poland. The solution was provided as a custom development project by IQRF experts for Sigma Group.
Blade angle and **rotation speed** are remotely wirelessly monitored and controlled.
IQRF wireless technology is highly robust and reliable so it is possible to use it also in this very harsh environment.

Hotel heating optimization Hotel Patria - Slovakia

AUSTYN INTERNATIONAL Ltd.

1 reservation system controlling heating

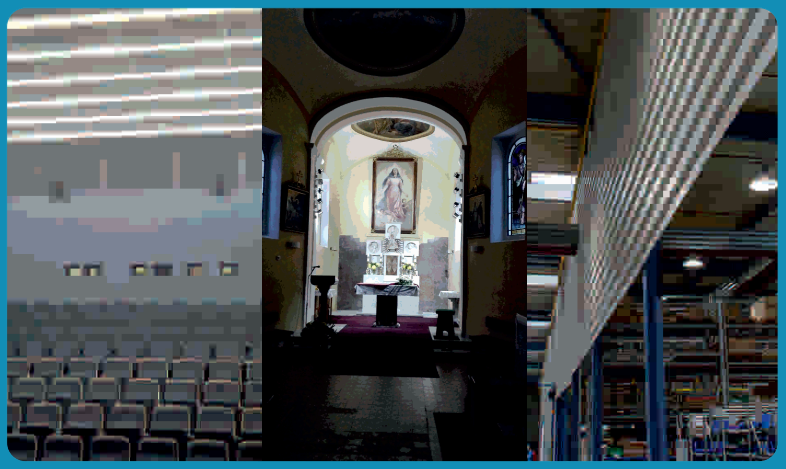
9 floors with rooms in a hotel controlled

over **180** electronic digital thermostatic heads installed

The smart heating system consists of
1) electronic digital radio **thermostatic heads** with protective covers
2) **gateways** in the technical room of each floor
3) a **control software** of the heating system connected to the **existing hotel booking system.**
The system automatically sets up room temperature based on check-in and check-out information from the booking system. This significantly helps to **reduce costs** in hotel Patria in Slovakia.

Lighting control in cinema, church, sports&industry hall

DATmoLUX



over **10** different sections in halls for comfortable operation

over **7** preset scenes for different occasions

1 system for remote wireless control

The light control system consists usually of
1) **LED lights**, wirelessly controlled in IQRF network,
2) **user interface** with pre-set **scenes** for different **occasions** and control of different **sections** in the hall,
3) settings of parameters like **light intensity, duration, time schedules**, and others.
The system works in **cinemas, sports halls, and production hall JULI Motorenwerk** in the Czech Republic.

Temperature monitoring in freezers in Prague hospital

IQRF Solutions

5 CO_2 sensors installed to monitor strict conditions

7 temperature sensors installed in freezers and refrigerators

100% scalable system for additional sensors and other devices

As a pilot project, **battery CO_2 sensors** were installed in the Prague hospital, among others in the intensive care unit, where there are very strict operating conditions. **Calibratable temperature sensors** were installed in the **refrigerators** and **freezers** where expensive and sensitive medicines and injections are stored, often worth several million euros. The entire system is scalable, additional sensors and devices can be added. The system transfers the measured temperature from sensors to a central application in MS Azure.

Air-quality monitoring in Prague school

PROTRONIX SENSE & EASY

4 months of continuous measurement

over **47%** of the schoo ltime students spent in a bad-quality air with high CO2 (>1000 ppm)

over **74%** of the school time students spent in dry air (RH<30%)

The entire large school for 600 students was covered by a network with only **10 combined sensors of CO2, T, and RH.**
After a long-term **4-months** measurement, it was found that minimum recommended values of **relative air humidity** had not been reached for most of the school time and maximum allowed **CO_2** values had been exceeded for almost half of the time.
These variables and their values are directly linked to the concentration and health of students.

Air-quality monitoring in city streets

TESLA BLATNÁ, a.s.

4 weather parameters monitored

5 air pollutants measured

up to **240** sensors in one network

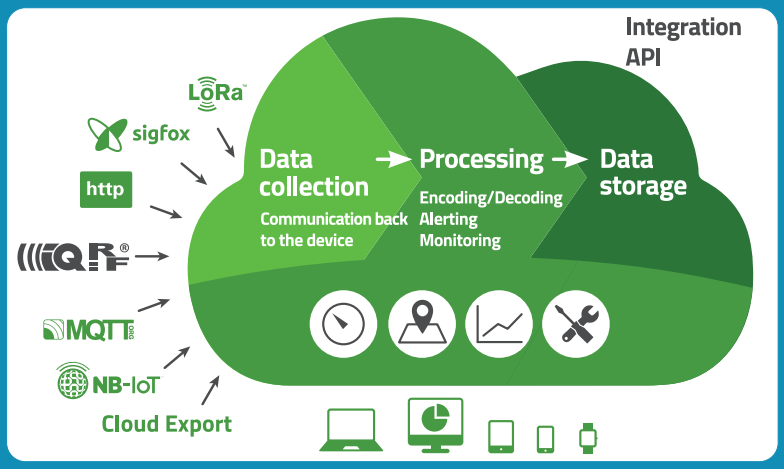
The combined environmental module contains all necessary sensors for outdoor monitoring.

1) CO (0-500 ppm)
2) SO_2 (0-50 ppm)
3) NO_2 (0-20 ppm)
4) O_3 (0-20 ppm)
5) humidity (0-100% RH)
6) dust (25-500 µg/m3)
7) light VIS/UVA/UVB
8) temperature (-40 °C to +125°C)
9) pressure (260-1260 hPa)

Other IQRF interoperable devices can be added to a network.

IoT Cloud with Smart Services

TCPRO the cloud provider



over **10** communication protocols

100 projects per organization

up to **10,000** devices per organization

This software and related services enable you to operate public city IoT network as well as private corporate one.

IoT Cloud is focused on various fields and solutions:

- Smart city
- Smart agriculture
- Smart energy
- Industry IoT
- Smart metering
- Data collection
- Message processing
- Data analytics
- Visualization
- API ready

Street lighting network - ideal backbone for IoT

RADEK PECHMAN

over **10** types of LED luminaires

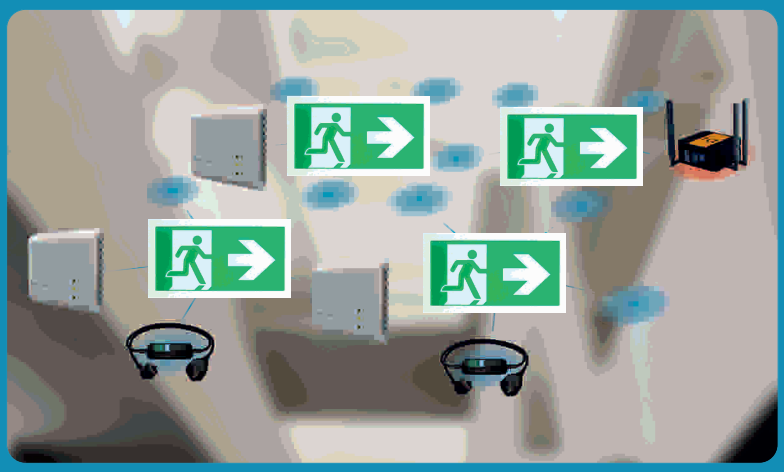
over **20** types of sensors, meters and actuators

over **10,000** installed end devices and gateways

Radek Pechman company produces all major active parts of street lighting network. **Luminaires, switchboards, drivers, control systems, actuators, sensors, electric vehicle charging stations** and many more. The production consists of everything that is connectable to the street lighting network through the IQRF network. The target of this solution is to **connect systems** and **services** through the existing street lighting network using the IQRF to get **information** which can be used to inform people and to live in a healthier and better functioning city.

Emergency lights - IoT backbone in buildings

Liteplan



over **60** parallel non-colliding networks

over **200** network devices per network

up to **50** square kilometers per network

The **emergency lights** in the IQRF network can be used as a **backbone** for other devices such as sensors and actuators.

Network **deployment** and device management is easy with ready software.

There can be up to **239 lights** in one network. In case of more devices, it is possible to work in **more networks** working on **different RF** channels.

In the open space, the range of 1 IQRF transceiver is up to **500 m,** providing coverage in the MESH network for **many square kilometers.**

IQRF® Alliance

Sponsor

IQRF Tech

IQRF Solutions

MICRORISC

Contributors

IBM

TechData

Adopters

EFG

rds

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PROTRONIX SENSE & EASY

Vinchi Techsolutions LLP Invisible to Visible...

MICROCHIP

logimic Software systems

ETHIOT

SFS

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Liteplan

DEPRAG machines unlimited

NIKATRON

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SANELA we make water cool

JOTIO

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ZAT

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MasterDC

startup disrupt

INTELIMENTS intelligence to your instruments

Adera

MIKROE

IMEIA

Politechnika Świętokrzyska WYDZIAŁ ELEKTROTECHNIKI, AUTOMATYKI I INFORMATYKI

ZÁPADOČESKÁ UNIVERZITA V PLZNI

JABLOTRON CREATING ALARMS

CTU CZECH TECHNICAL UNIVERSITY IN PRAGUE

BRNO UNIVERSITY OF TECHNOLOGY

VSB TECHNICAL UNIVERSITY OF OSTRAVA

and many others...

Join us! Together we are stronger.

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