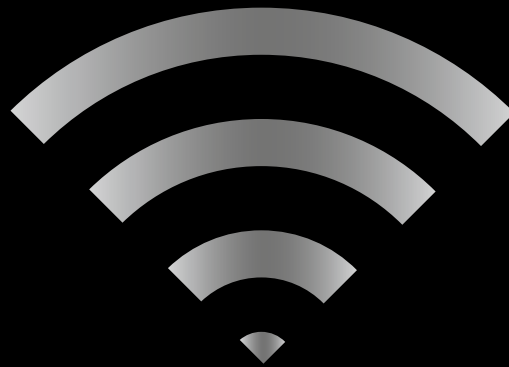




# WIRELESS CONNECTIVITY

**FUTURE MARKETS. DISCOVERED TODAY.**



TECHNOLOGIES

APPLICATIONS

VISIONS

# >31 BILLION CONNECTED IoT DEVICES IN 2018 (Source: IHS Markit)

▲ Average annual growth rate between 2013 – 2030

Communications  
15.8 billion devices  
▲ 6,9%

Consumer  
6.3 billion devices  
▲ 14.6%

Commercial and Industrial Electronics  
5.4 billion devices  
▲ 25.6%

Computers  
2.2 billion devices  
▲ 21.5%

Automotive and Transportation  
928 million devices  
▲ 21.5%

Medical  
406 million devices  
▲ 20.8%

# SPARKS ARE FLYING IN THE MICROCHIP INDUSTRY

*Wireless connectivity is an exciting and rapidly growing market for the semiconductor industry and developers and manufacturers of networked devices alike.*

According to the market researchers at IHS Markit, 125 billion networked appliances, machines and gadgets are already anticipated to be in use in 2030; in 2018, that figure still stood at something in the region of 31 billion. Concurrent with this development, the volume of data transferred is continuing to increase: IHS Markit expects the current annual growth rate of 20 to 25 per cent to increase to 50 per cent annually within the next 15 years. According to Microsoft, 20,000 GB of data are currently transported over the Internet per second at present.

In the process, an ever-increasing proportion of such data is transferred with the help of wireless technologies. This strikes us as a good reason to dedicate the new issue of The Quintessence to these wireless technologies. In our view, this is an exciting market; one that not only covers the many and varied technical solutions, but also fields of application in all manner of sectors and areas of our lives. There are networked cars, to name just one example: 125 million passenger cars with integrated connectivity are forecast to be sold between 2018 and 2022 according to market research institute Counterpoint. One of the drivers for this is the development of autonomous cars.

The healthcare industry is another important market for wireless technologies: Wi-Fi devices in hospitals exchange medical data with the cloud, while patients can be given wearables that transmit vital body functions to their doctor. As revealed by a market survey conducted by P&S Market Research, the IoT healthcare market is expected to reach a volume of USD 267.6 billion by the year 2023.



Indeed, without wireless technologies, Industry 4.0 would also be entirely infeasible. The closely linked networking of products and machinery increases efficiency, lowers costs and conserves resources. Consultancy firm Accenture estimates that the Industrial Internet of Things will generate an additional USD 14 trillion for the global economy in the run-up to 2030.

As such, wireless data transfer will become an increasingly significant sector for chip manufacturers, too. According to IHS Markit, semiconductor manufacturers saw revenues of USD 131 billion from wireless applications in 2017, in comparison

to a total revenue of USD 428.9 billion. So, there you have it: wireless connectivity is a varied and rapidly growing market for the semiconductor industry and developers and manufacturers of networked devices alike. And – on that note – I hope you enjoy reading this issue!

Slobodan Puljarevic  
President of EBV Elektronik

# CONTENTS

**3 | MARKET OVERVIEW**  
Sparks are flying in the microchip industry

**6 | LET THERE BE LIGHT**  
Prof. Harald Haas, the “Father of LiFi”

**78 | GLOSSARY**

**80 | PREVIOUS ISSUES**

**81 | ORDER FORM**

**82 | INFO POINT; IMPRINT**

**83 | MEET THE TEAM**

## TECHNOLOGIES

**18 | NETWORKS CONNECT ...**  
... people, offices, cities and countries

**20 | THE RIGHT WIRELESS TECHNOLOGY FOR EVERY APPLICATION**  
A comparison of wireless standards

**22 | GUEST EDITORIAL STMICROELECTRONICS**

**24 | (TRANS)MISSION IMPOSSIBLE WITHOUT ANTENNAS**  
New solutions for ever higher requirements

**26 | GUEST EDITORIAL XILINX**

**28 | HIGHER NETWORKING, LOWER POWER CONSUMPTION**  
A spotlight on energy efficiency

**30 | CYBERCRIME CALLS FOR PROTECTION ON MANY LEVELS**  
Encryption, authentication and more

*Thanks to a variety of technologies and standards, connectivity will soon be omnipresent.*

## APPLICATIONS

**34 | UP, UP AND AWAY**  
Wireless solutions for aviation

**36 | WEARABLES ONLY WITH WIRELESS**  
From a fitness tracker to a mobile ECG

**38 | COMPLETELY NEW AUDIO EXPERIENCES**  
Headphones and smart speakers

**40 | A TEXT MESSAGE FROM THE FACTORY**  
On the way to Industry 4.0

**42 | THE CAR – A ROLLING SMART DEVICE**  
Staying connected on the road

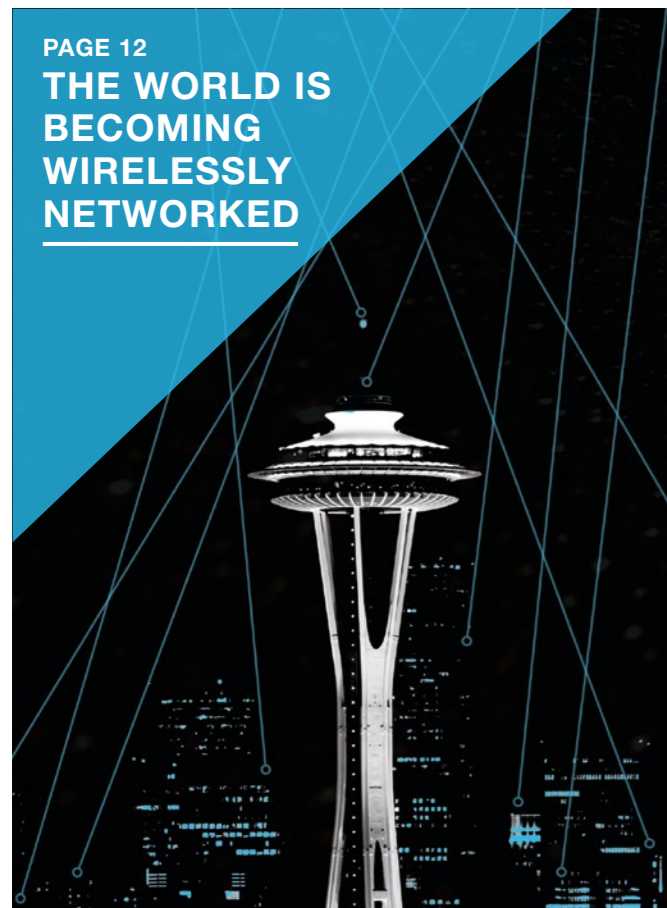
**47 | ONE EYE ON THE ENTIRE SUPPLY CHAIN**  
Tracking all over the world

**50 | CONTROLLING LIGHTING WHEREVER AND WHENEVER**  
Reducing the effort of installation

**52 | SMART NETWORKS FOR SMARTER CITIES**  
Information as a basis for urban living

**54 | REMOTELY READABLE SMART METERS**  
... increase energy efficiency

**56 | A BETTER LIFE IN A SMART HOME**  
The challenge of interoperability



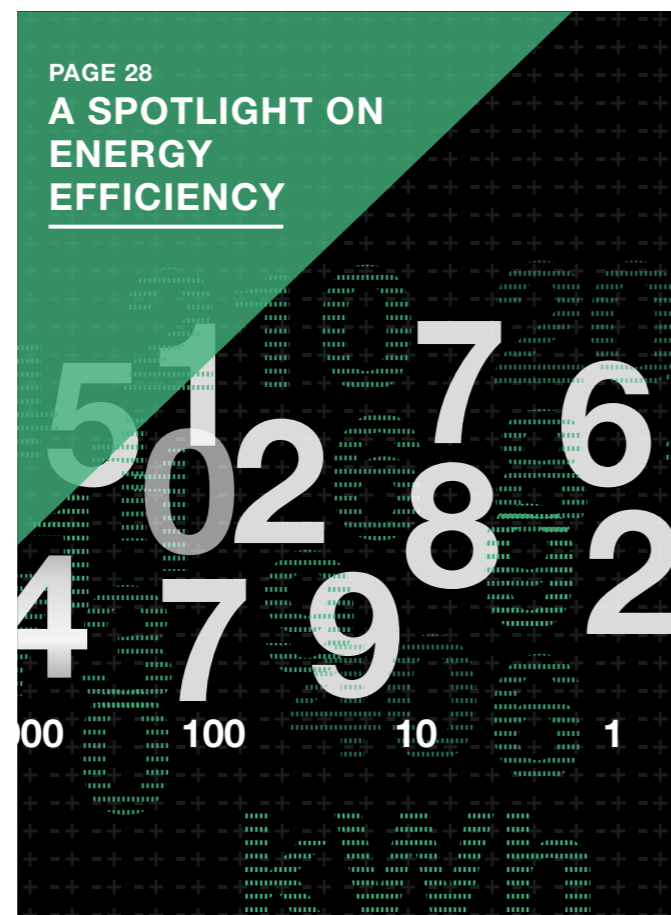
**PAGE 12**  
**THE WORLD IS BECOMING WIRELESSLY NETWORKED**

*Wireless technologies facilitate the flexible networking that makes the digitalised world possible in the first place.*

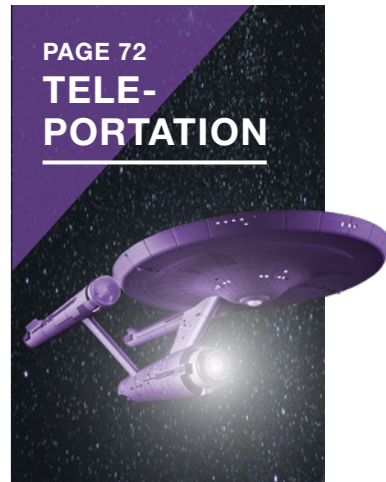
## OVERVIEW

**12 | THE NETWORKED WORLD IS IN MOTION**  
The Internet of Things is becoming reality

**14 | THE WIRELESS FUTURE**  
Facts and figures



**PAGE 28**  
**A SPOTLIGHT ON ENERGY EFFICIENCY**



**PAGE 72**  
**TELE-PORTATION**

## VISIONS AND VIEWS

**68 | WIRELESS – A TECHNOLOGY THAT COMES IN MANY FLAVOURS**  
Expert discussion on standards, security and trends

**72 | BEAM ME UP, SCOTTY!**  
Can matter also be transmitted wirelessly?

**74 | INSPIRED BY PIONEERS**  
Hedy Lamarr, Hollywood star and inventor

**76 | START-UPS**  
Innovative ideas from young companies



**PAGE 52**  
**SMART CITIES SUBSIST ON INFORMATION**

## ELECTRONICS INSIDE

**60 | A MULTITUDE OF OPTIONS**  
An interview with Uros Mali, EBV Elektronik

**62 | PRODUCT PRESENTATION**  
Solutions from Toshiba, STMicroelectronics and ON Semiconductor

*Thanks to wireless technologies, the networking of people and things is becoming a matter of course: anytime and anywhere.*