From the Digital Era to the Intelligent Era!

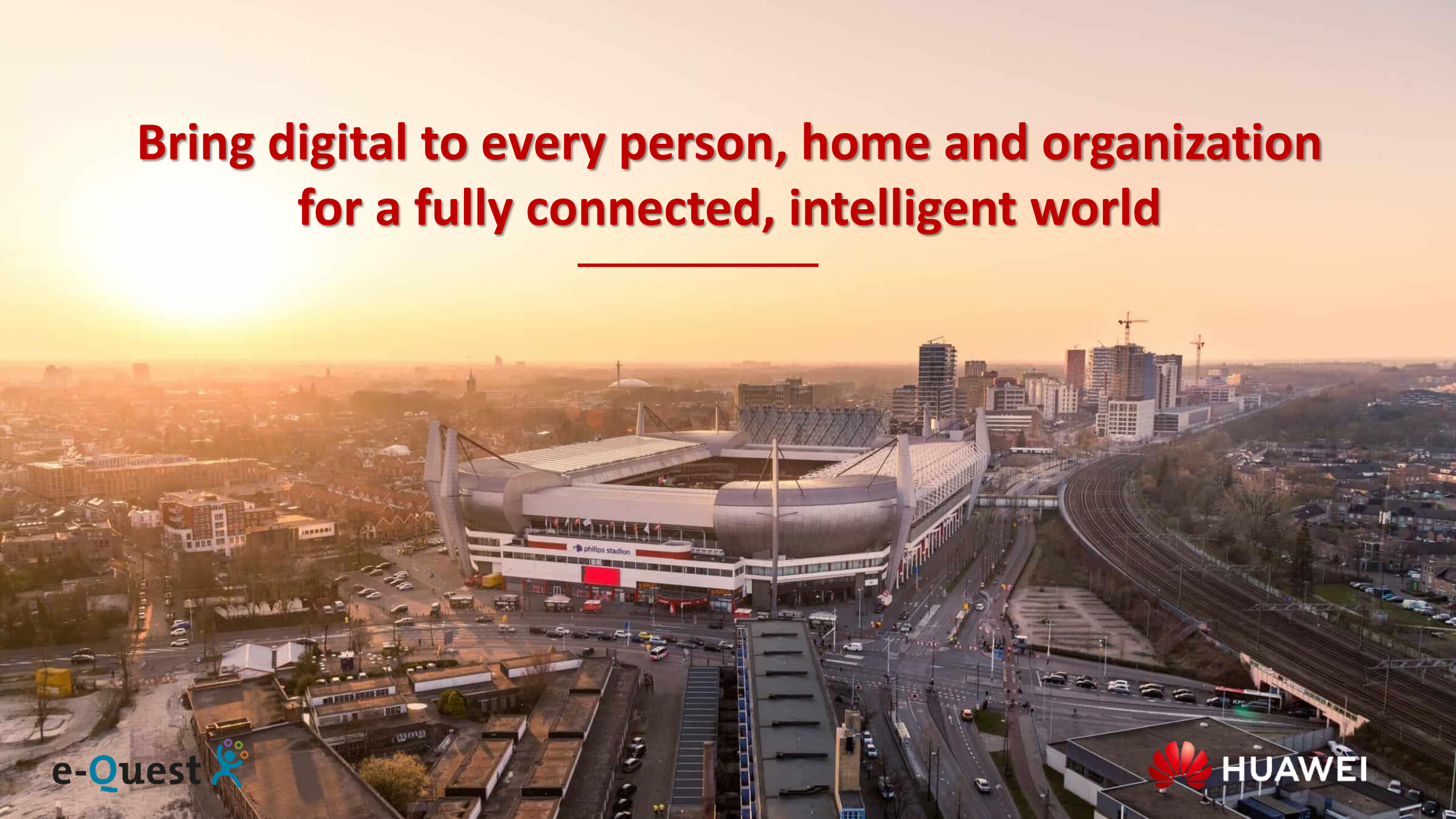
DENNIS TOSSIJN

phone: +31 6 18 41 80 26
email: dennis.tossijn@huawei.com

Thursday, 7 November, 2024

HUAWEI

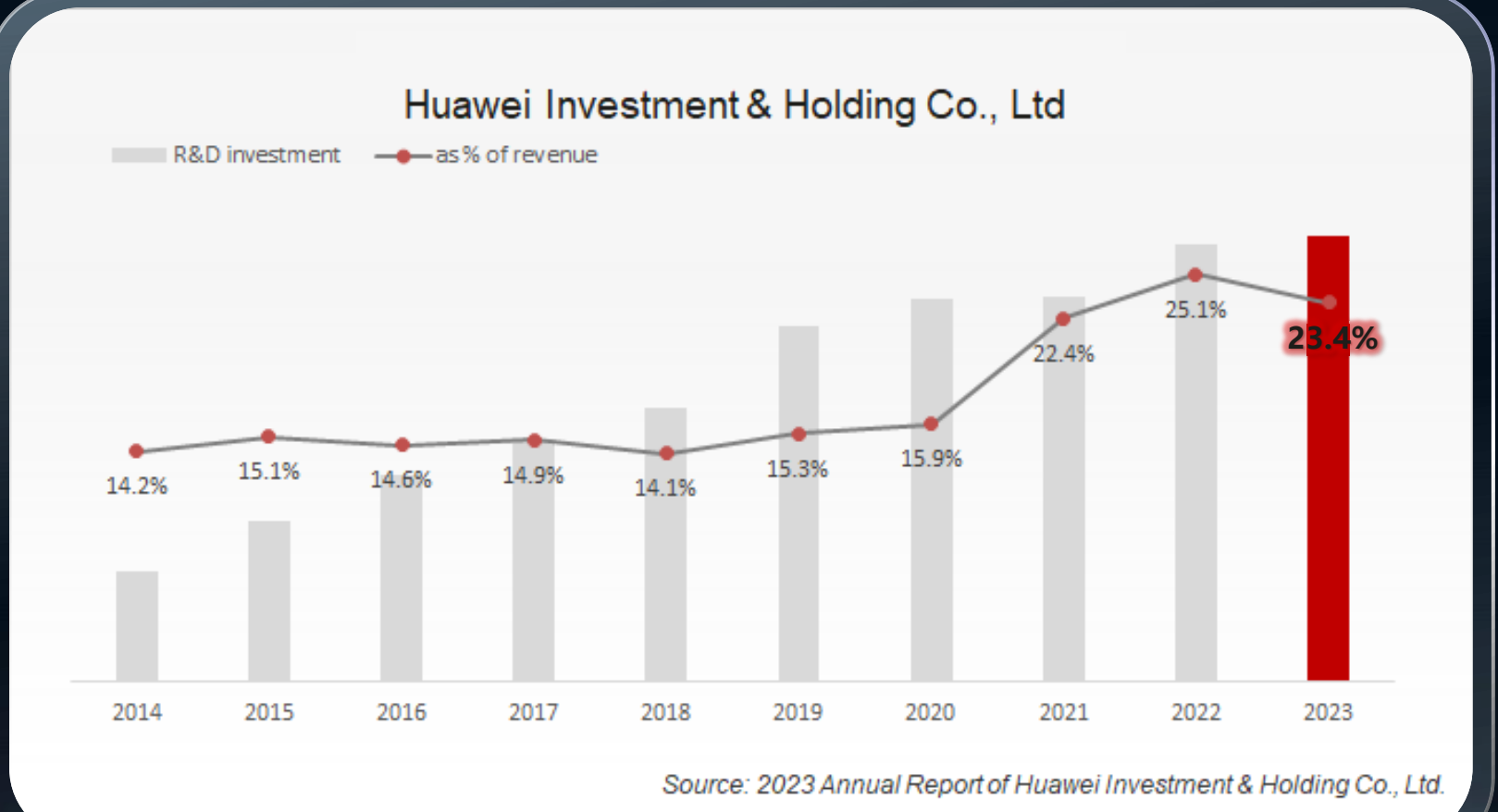
Bring digital to every person, home and organization for a fully connected, intelligent world



e-Quest

HUAWEI

Huawei R&D investment over past 10 years



55%
employees work in R&D

86
foundational tech labs

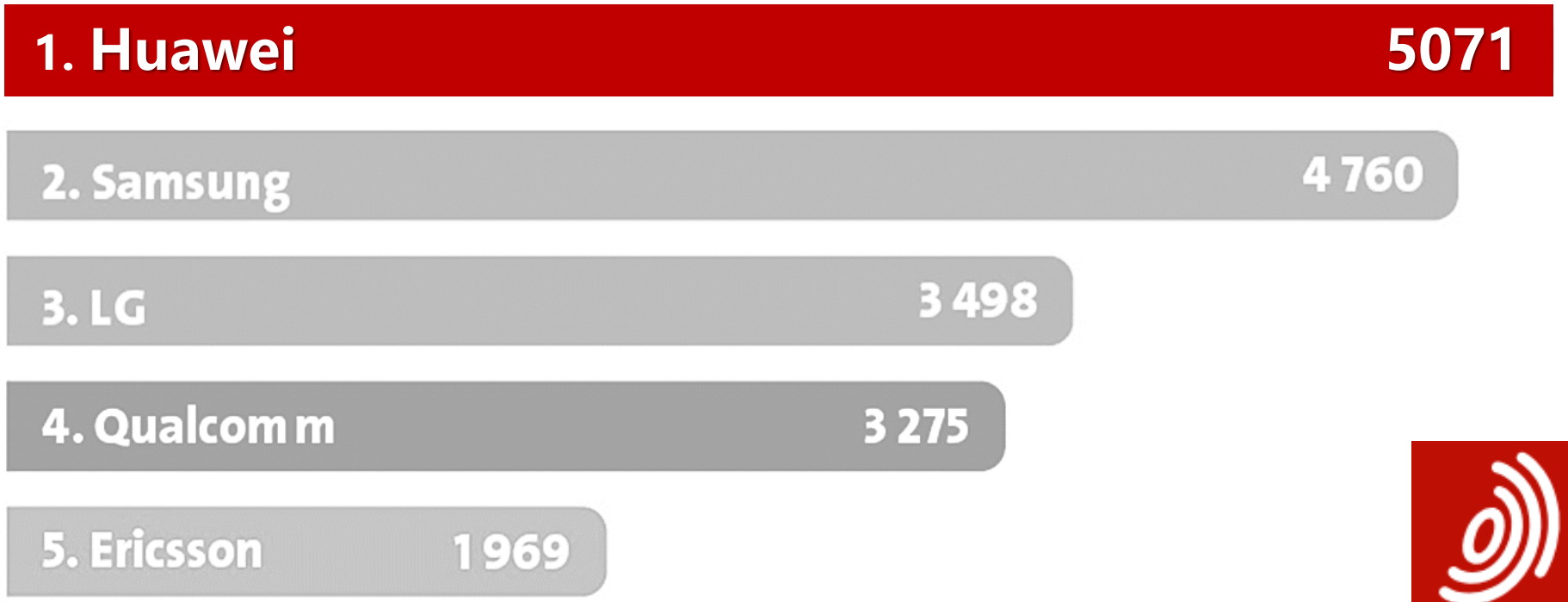
180+
joint labs and innovation labs

140,000+
active patents held globally

Source: https://www.huawei.com/en/annual-report/2023

HUAWEI

European Patent Office (EPO) TOP-5 Patent Index 2023

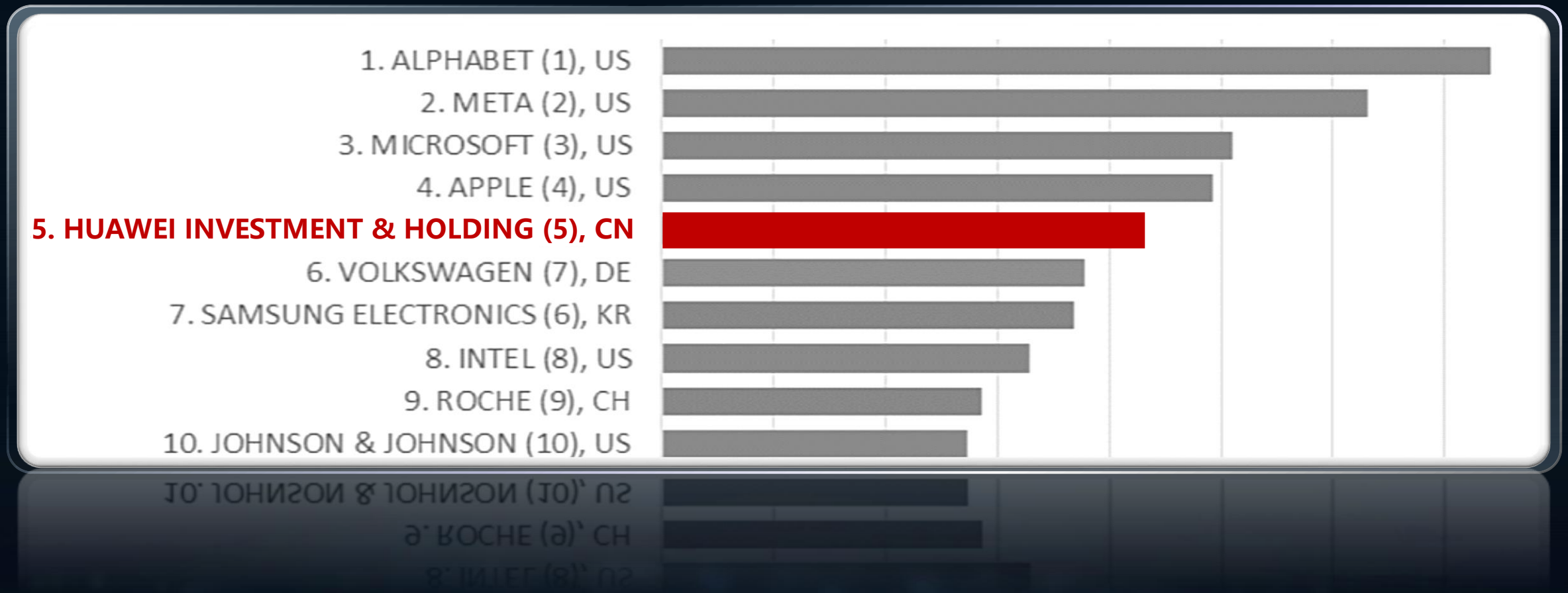


Europäisches Patentamt
European Patent Office
Office européen des brevets

Source: https://www.epo.org/en/about-us/statistics/patent-index-2023

HUAWEI

2023 EU industrial R&D investment scoreboard



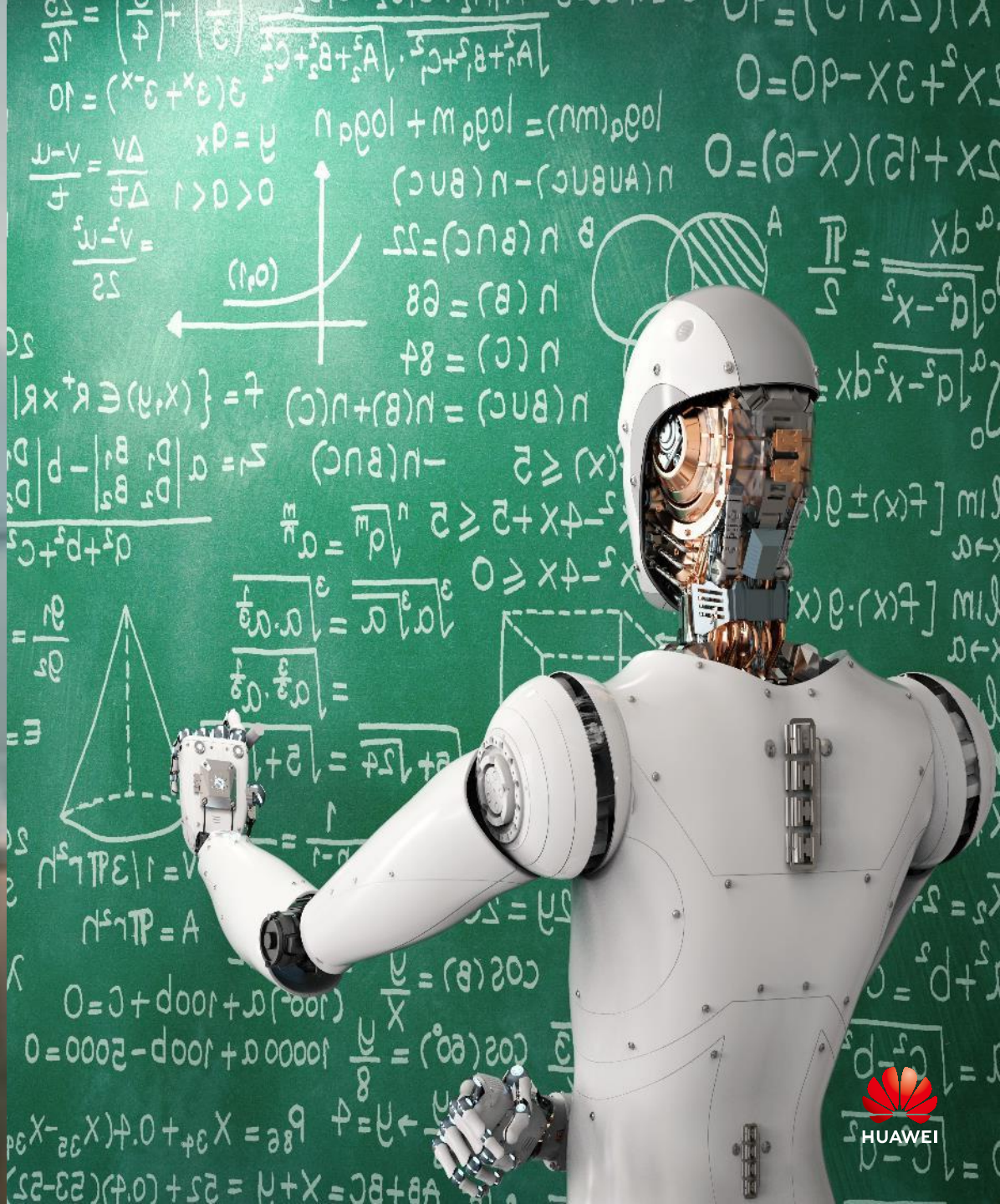
Source: https://iri.jrc.ec.europa.eu/scoreboard/2023-eu-industrial-rd-investment-scoreboard

HUAWEI

HUAWEI

HUAWEI

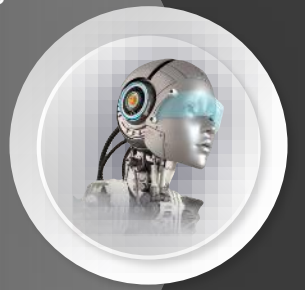
HUAWEI


HUAWEI

Humanity has never stopped envisioning the future

Energy revolution

Timber → Coal → Oil → Natural gas → Hydropower → Nuclear energy → Solar power → ... → **Low-carbon development**

Machines	Electricity	Information	Digital	Intelligent
				
Industrial society		Information society		Intelligent society

Intelligent world

Information revolution

PC Internet → Mobile Internet → Industrial Internet → 5G → Cloud → IoT → 5.5G → AI → ... → **Higher productivity**

HUAWEI

The Nobel price in physics 2024

PRESS RELEASE

8 October 2024

The Nobel Prize in Physics 2024

The Royal Swedish Academy of Sciences has decided to award the Nobel Prize in Physics 2024 to

John J. Hopfield
Princeton University, NJ, USA

Geoffrey E. Hinton
University of Toronto, Canada

"for foundational discoveries and inventions that enable machine learning with artificial neural networks"

They trained artificial neural networks using physics

This year's two Nobel Laureates in Physics have used tools from physics to develop methods that are the foundation of today's powerful machine learning. John Hopfield created an associative memory that can store and reconstruct images and other types of patterns in data. Geoffrey Hinton invented a method that can autonomously find properties in data, and so perform tasks such as identifying specific elements in pictures.

When we talk about artificial intelligence, we often mean machine learning using artificial neural networks. This technology was originally inspired by the structure of the brain. In an artificial neural network, the brain's neurons are represented by nodes that have different values. These nodes influence each other through connections that can be likened to synapses and which can be made stronger or weaker. The network is *trained*, for example by developing stronger connections between nodes with simultaneously high values. This year's laureates have conducted important work with artificial neural networks from the 1980s onward.

John Hopfield invented a network that uses a method for saving and recreating patterns. We can imagine the nodes as pixels. The *Hopfield network* utilises physics that describes a material's characteristics due to its atomic spin – a property that makes each atom a tiny magnet. The network as a whole is described in a manner equivalent to the energy in the spin system found in physics, and is trained by finding values for the connections between the nodes so that the saved images have low energy. When the Hopfield network is fed a distorted or incomplete image, it methodically works through the nodes and updates their values so the network's energy falls. The network thus works stepwise to find the saved image that is most like the imperfect one it was fed with.

Geoffrey Hinton used the Hopfield network as the foundation for a new network that uses a different method: the *Boltzmann machine*. This can learn to recognise characteristic elements in a given type of data. Hinton used tools from statistical physics, the science of systems built from many similar components. The machine is trained by feeding it examples that are very likely to arise when the machine is run. The Boltzmann machine can be used to classify images or create new examples of the type of pattern on which it was trained. Hinton has built upon this work, helping initiate the current explosive development of machine learning.

"The laureates' work has already been of the greatest benefit. In physics we use artificial neural networks in a vast range of areas, such as developing new materials with specific properties," says Ellen Moons, Chair of the Nobel Committee for Physics.

John J. Hopfield, born 1933 in Chicago, IL, USA. PhD 1958 from Cornell University, Ithaca, NY, USA. Professor at Princeton University, NJ, USA.

Geoffrey E. Hinton, born 1947 in London, UK. PhD 1978 from The University of Edinburgh, UK. Professor at University of Toronto, Canada.

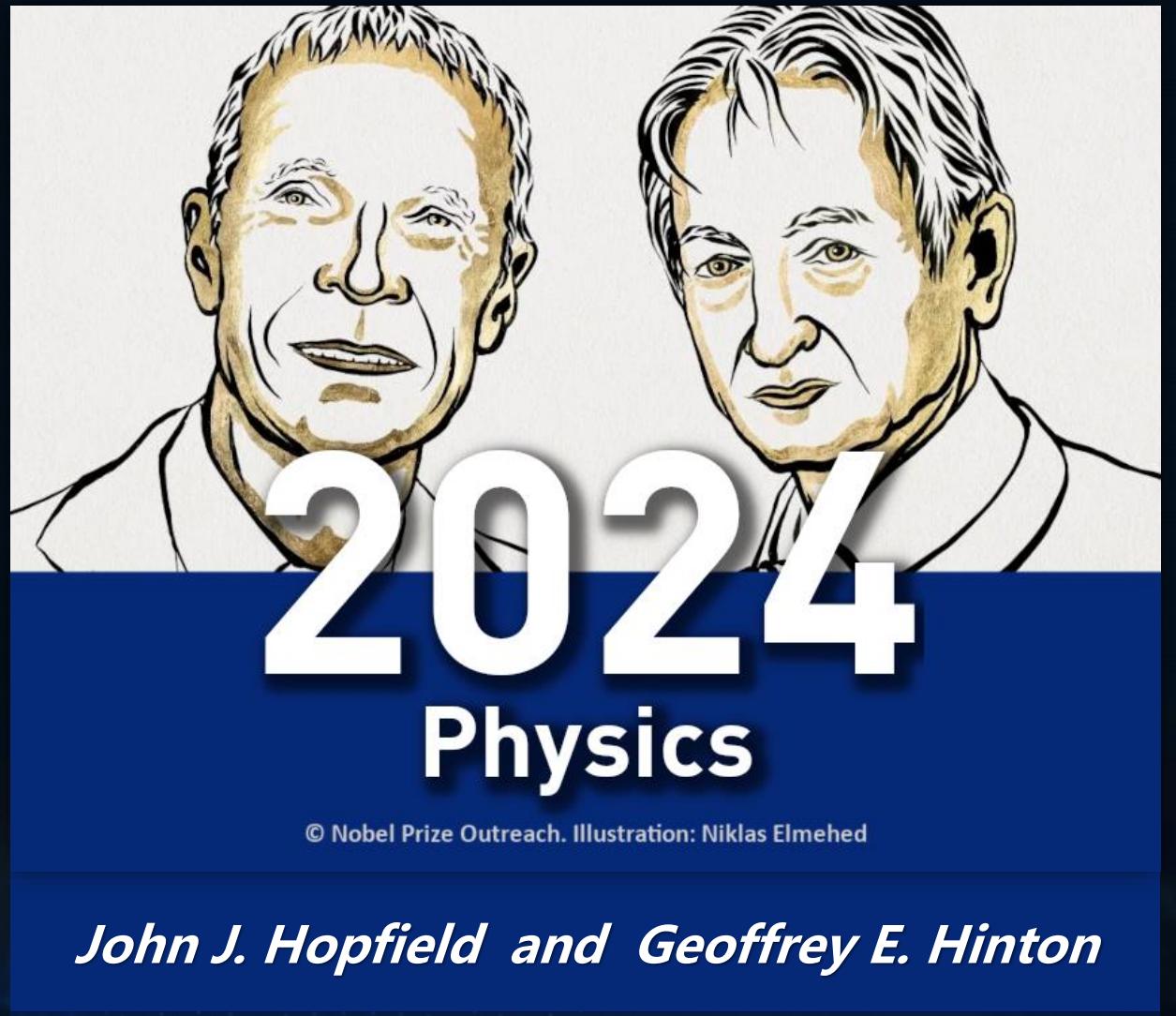
Prize amount: 11 million Swedish kronor, to be shared equally between the laureates.
Further information: www.kva.se and www.nobelprize.org
Press contact: Eva Nevelius, Press Secretary, +46 70 878 67 63, eva.nevelius@kva.se
Experts: Olle Eriksson, +46 18 471 36 25, olle.eriksson@physics.uu.se and Anders Irbäck, +46 46 222 34 93, anders.irback@cec.lu.se, members of the Nobel Committee for Physics.

The Royal Swedish Academy of Sciences, founded in 1739, is an independent organisation whose overall objective is to promote the sciences and strengthen their influence in society. The Academy takes special responsibility for the natural sciences and mathematics, but endeavours to promote the exchange of ideas between various disciplines.

BOX 50005, SE-104 05 STOCKHOLM, SWEDEN
TEL +46 8 673 95 00 • WWW.KVA.SE
BESÖK/VISIT: LILLA FRESCATIVÄGEN 4A, SE-114 18 STOCKHOLM, SWEDEN

KUNGL. VETENSKAPS-AKADEMIEN
THE ROYAL SWEDISH ACADEMY OF SCIENCES

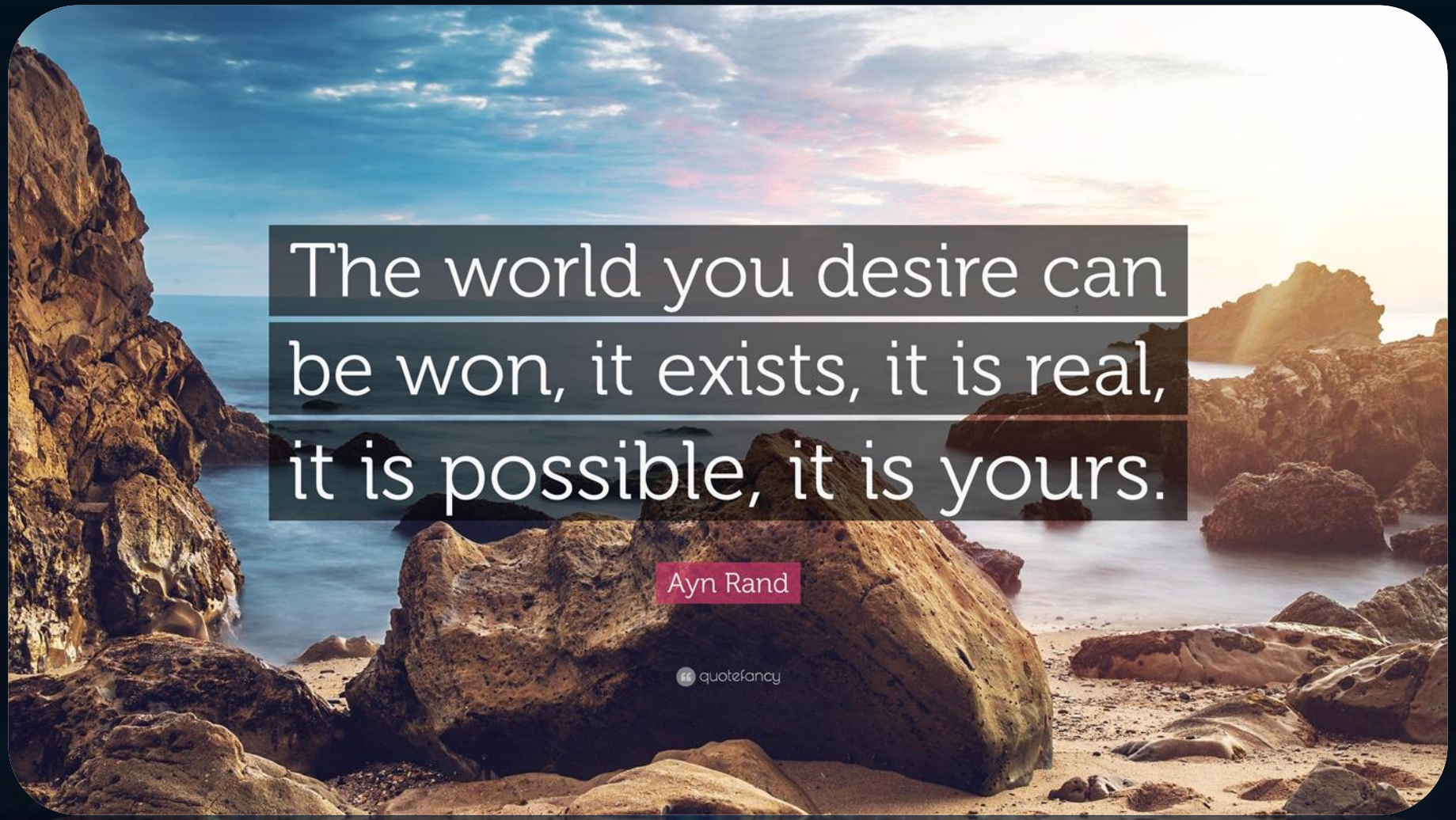
Nobel Prize® is a registered trademark of the Nobel Foundation.



Source:https://www.nobelprize.org/prizes/physics/2024/press-release/

HUAWEI

Is AI a myth in the Enterprise or is it real



HUAWEI

What do we expect of AI in Enterprise Networking?

Enhanced Security

Network Optimization

Automated Network Management

Data Analytics and Insights

Scalability

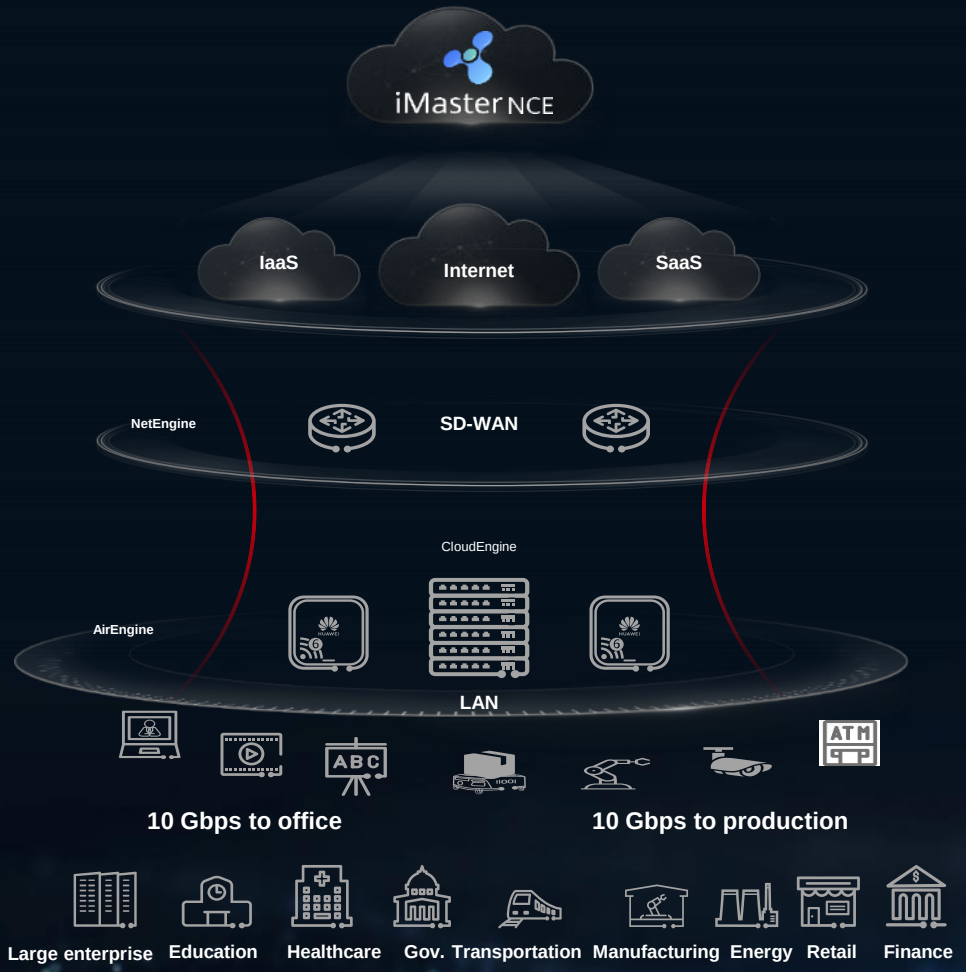
Cost Efficiency

User Experience Improvement

Compliance and Governance

HUAWEI

Build high-quality 10 Gbps campus with CloudCampus



Simplified O&M

Digital map
Unified service orchestration, automatic network deployment, AI-powered O&M, fault locating in minutes

10x
O&M efficiency

Ultimate experience

Audio & video and VIP experience assurance
One device (S8700) for experience assurance for 10,000 users; 4-level experience assurance: application, user, terminal, and network

0
video conference interruption

Simplified architecture

All in one, one for all
One network for OA, production, security, and IoT services
2000 m PoE, pay-as-you-grow

50% ↓
TCO

Ultra-high-speed access

10 Gbps to room, 10 Gbps to AP
Wi-Fi 7: 120-channel smooth HD video
Multi-GE access, high-density 100GE core

5x ↑
Terminal speed

HUAWEI

Digital Map: visibility, automation and intelligent O&M

Trends & challenges

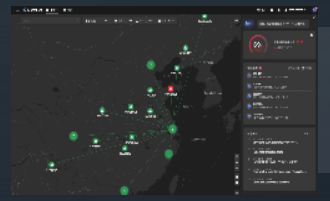
One-screen Monitoring
Too many management systems switching

Fast Provisioning
Scattered branches, Massive devices

Fast Troubleshooting
Frequent network incidents, inefficient service assurance and fault locating

Solution & benefits

One-map visibility

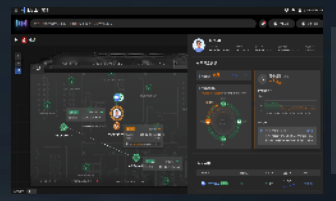


OPEX costs **80% ↓**

One-click provisioning

Provisioning time **20x ↓**

One-second fault location



O&M efficiency **10x ↑**

Four-dimensional visibility: **Network** status, **Terminal** visibility, **User** experience visibility, Application experience visibility.

HUAWEI

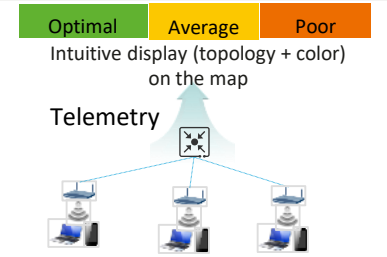
[video] Huawei Digital Map

HUAWEI

User experience assurance (VIP Users)

Real-time awareness of user experience

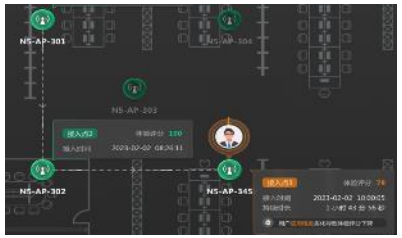
- Telemetry-based network data collection in seconds
- Precise modeling of VIP user experience



Second-level fault detection
vs. traditional minute-level polling

User journey playback

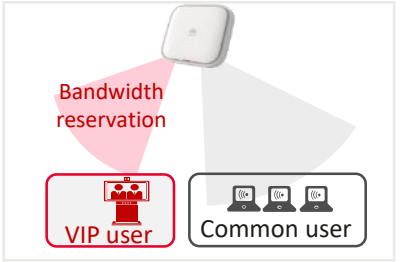
- Traceable experience of any user anytime, anywhere; AI-powered fault analysis



90% ↓ locating time
In minutes vs. In hours

One-Stop VIP experience assurance

- One-Stop setting for VIP, allowing preferential access and bandwidth reservation



90% ↑ assurance efficiency
poor-QoE alarms for VIP users

Campus network digital map

locating faults in seconds and 0 user complaints

Application experience assurance

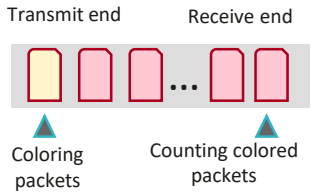
Application experience awareness

- AI-powered identification of 1000+ mainstream applications

1000+ applications identified
1000+ vs. Industry 300+

Visualized full-path

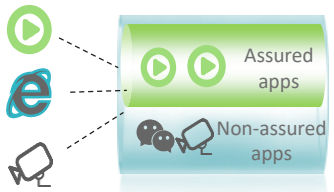
- Unique iPCA-based IFIT. Visualized application quality



95%↓ troubleshooting time
iPCA (Huawei exclusive)

One-Stop application assurance

- Automatic generation of assurance policies



90%↑ conference assurance efficiency
30+ steps → One-Stop

Campus network digital map

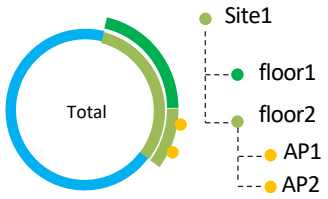
ensuring always-smooth video conferences

HUAWEI

O&M upgrade to build a Green Campus experience

4d Energy Visualization

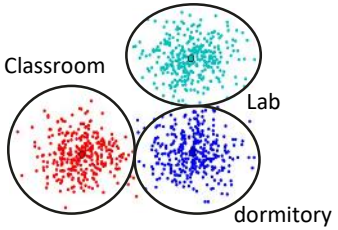
- Multiple dimensions: Overview, site, floor, and device



100%
Energy Visualization
4D VS only AP

Dynamic Energy-Saving

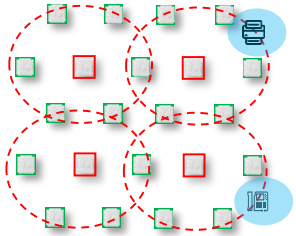
- AI group tidal algorithm, identifying off-peak hours for energy saving



30%↓
Energy Saving
30% VS industry 10%

Key service assurance

- Feature walk algorithm, reserved AP, and no disconnection of dumb terminals



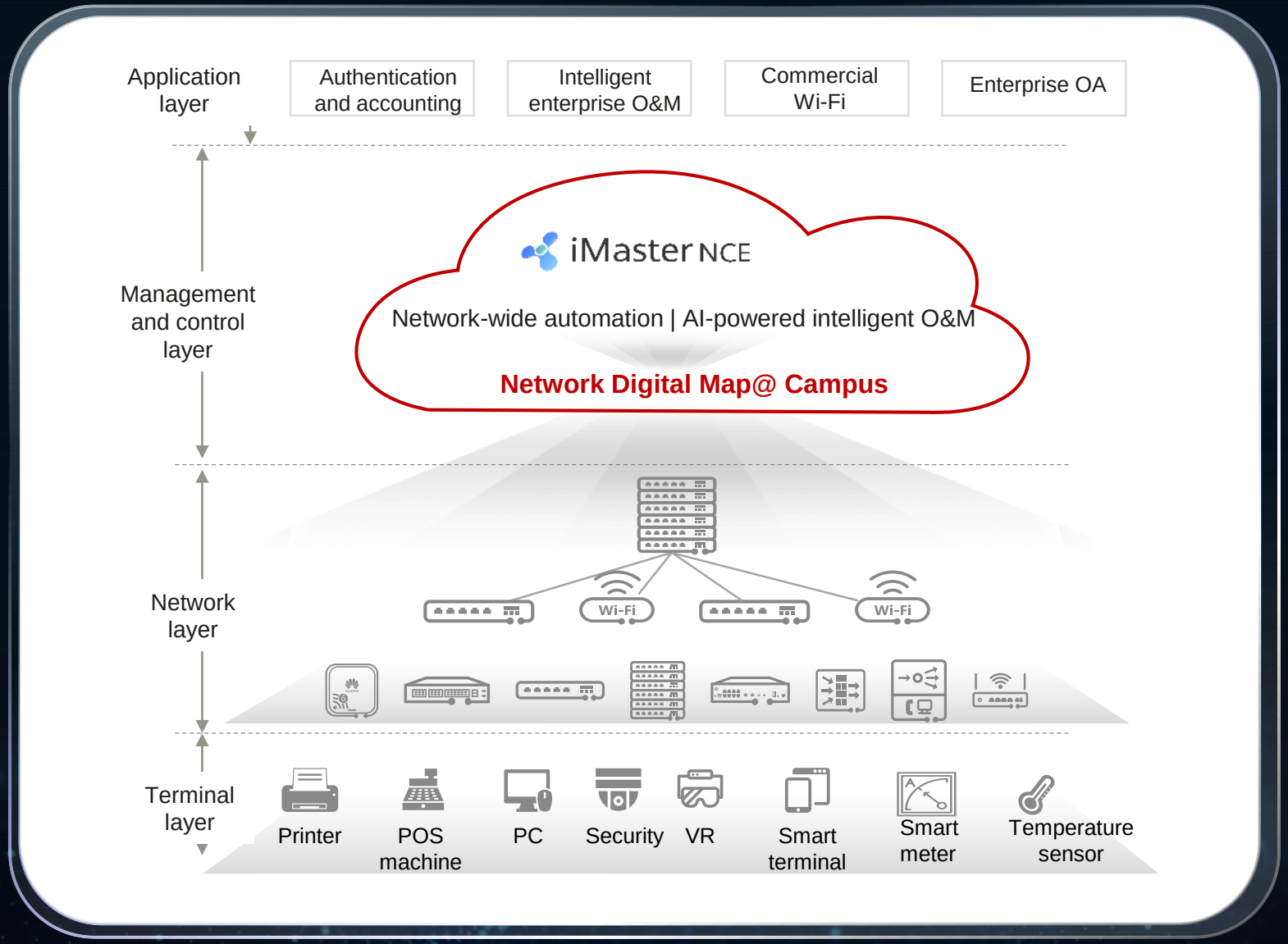
0
Key service interruption
reserved AP VS not support

Campus network digital map

30% energy saving

HUAWEI

Autonomous driving network for campuses



HUAWEI

AI (r)evolution with Artificial General Intelligence (AGI)

Manual labor

« Manual » coders

Machine Drivers

AGI drivers

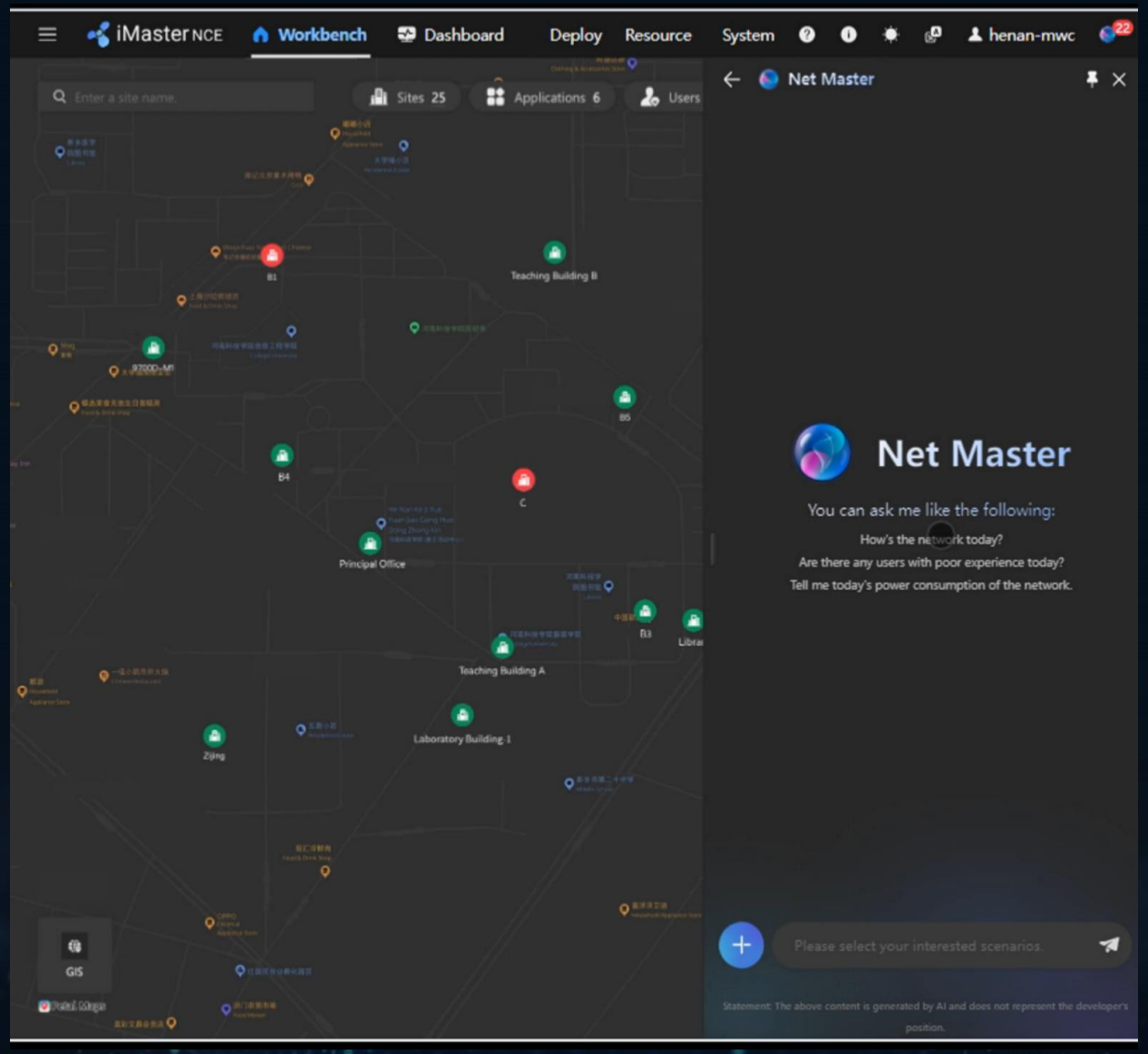
Machine Manufacturers

AGI designers

HUAWEI

[demo] Huawei Net Master - Network agent

- Full network status analysis
- Inquiry about specfic KPI
- Action suggestion
- Action implementation
- …



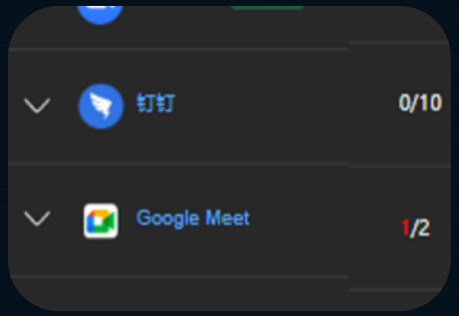
HUAWEI

Our AI solutions in the Campus Network

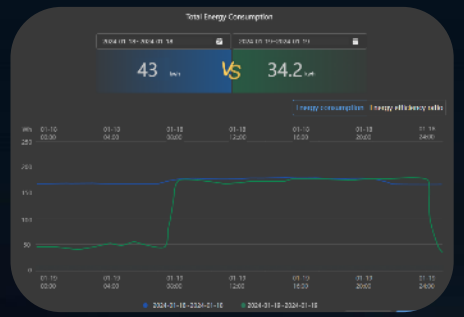
Digital Map Analytics and Insights

Enhanced Security: Qiankun integrated with iMaster-NCE

VxLAN Automated Network Management

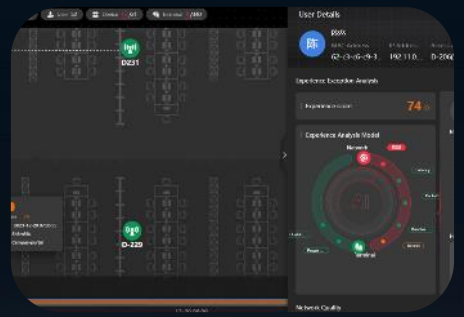


Intelligent Application Performance improvement

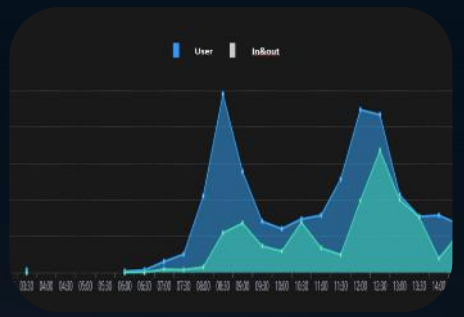


Live Energy saving

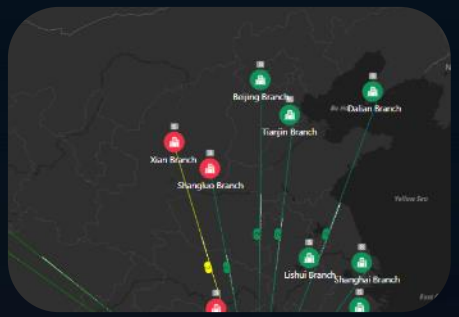
Cost Efficiency



Full user journey Experience Improvement



AI Bandwidth optimization



AI powered Radio Calibration

HUAWEI

Gartner® MQ™ 2024 for Enterprise Wired and Wireless LAN

HUAWEI

Building a Fully Connected, Intelligent World

• iMaster NCE • AirEngine Wi-Fi 7 • CloudEngine S Series Switches • NetEngine AR Series Router

Huawei Named a Leader in the 2024 Gartner® Magic Quadrant™ for Enterprise Wired and Wireless LAN Infrastructure

Highest 3 in the "Ability to Execute"

Gartner, Magic Quadrant for Enterprise Wired and Wireless LAN Infrastructure, 6 March 2024

Gartner does not endorse any vendor, product or service depicted in its research publications, and does not advise technology users to select only those vendors with the highest ratings or other designation. Gartner research publications consist of the opinions of Gartner's research organization and should not be construed as statements of fact. Gartner disclaims all warranties, expressed or implied, with respect to this research, including any warranties of merchantability or fitness for a particular purpose. GARTNER and MAGIC QUADRANT are registered trademarks of Gartner, Inc. and/or its affiliates in the U.S. and internationally and are used herein with permission. All rights reserved.

Source: https://e.huawei.com/en/news/2024/solutions/enterprise-network/huawei-named-a-leader-in-the-2024-gartner-magic-quadrant

HUAWEI

Gartner® Peer Insights™ “Voice of the Customer”

Source: https://e.huawei.com/sg/news/2024/industries/isp/gartner-customers-Infrastructure

HUAWEI

Thank you.

把数字世界带入每个人、每个家庭、
每个组织，构建万物互联的智能世界。

Bring digital to every person, home and organization for a fully connected, intelligent world.

Copyright©2024 Huawei Technologies Co., Ltd.
All Rights Reserved.

The information in this document may contain predictive statements including, without limitation, statements regarding the future financial and operating results, future product portfolio, new technology, etc. There are a number of factors that could cause actual results and developments to differ materially from those expressed or implied in the predictive statements. Therefore, such information is provided for reference purpose only and constitutes neither an offer nor an acceptance. Huawei may change the information at any time without notice.

HUAWEI