

TOWARD A ROADMAP FOR IOT RESEARCH, INNOVATION AND DEPLOYMENT: IOT & EDGE

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IoT and Edge: Instruments, Priorities and Partnerships, 25th Feb 2021

The background features a network diagram with several yellow circular nodes connected by thin, light-yellow lines. The nodes are scattered across the frame, creating a web-like structure. The overall color scheme is a bright, uniform yellow.

MARKET ANALYSIS

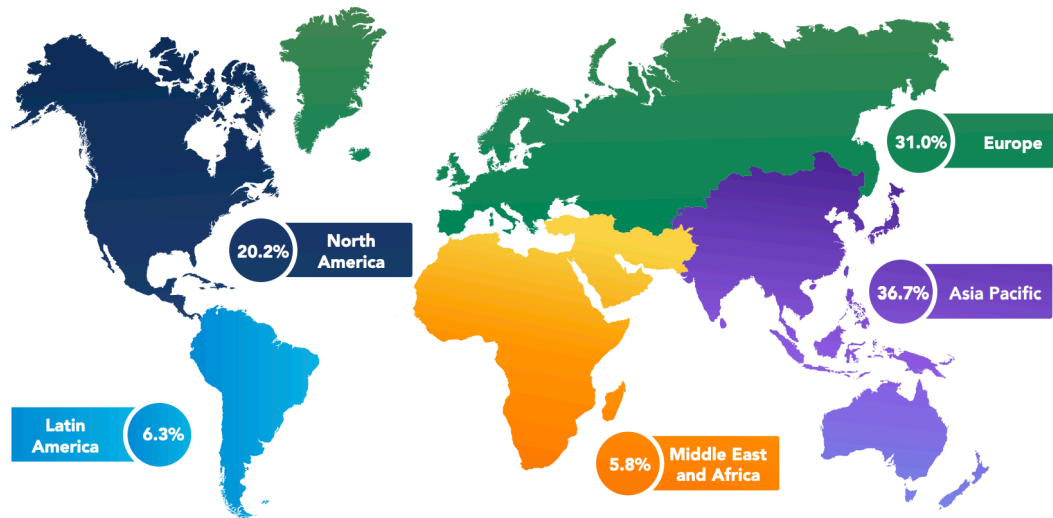
MARKET DIMENSIONS



UPDATED PROJECTIONS FOR EDGE COMPUTING

- Global CAPEX to reach ~100 USD Bn in 2025 with a CAGR of approximately 33%-35% depending on the study
- Operators are leading adoption with cloud providers most likely to provide platform environments in the future
- Europe at 31% of investments by 2028, with multinational network operators in western Europe as largest customers

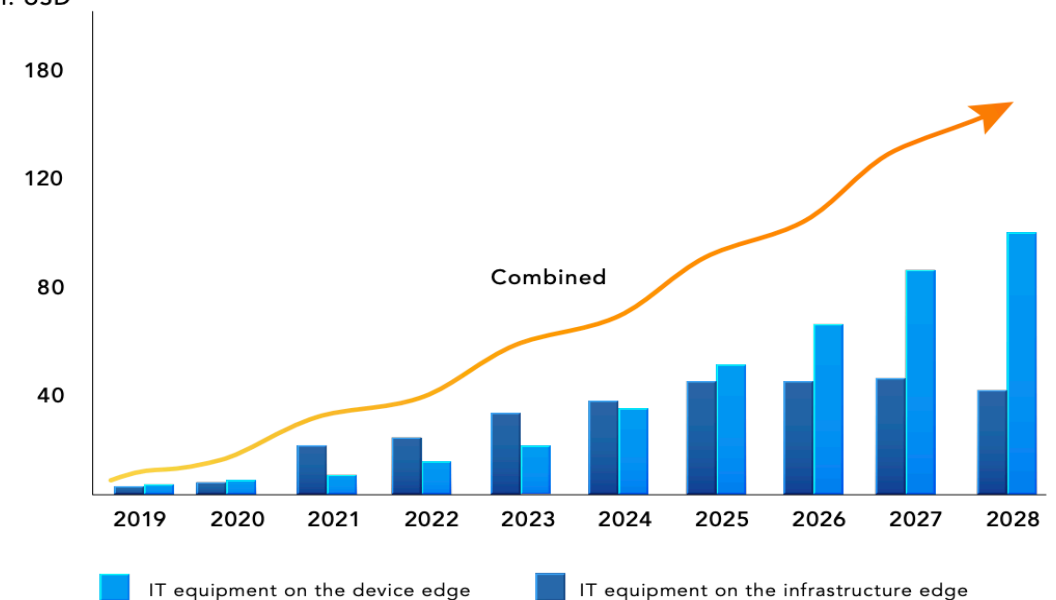
Global Edge Infrastructure Investments



Source: Tolaga Research / State of the Edge

Regional and Domain Potential

bil. USD



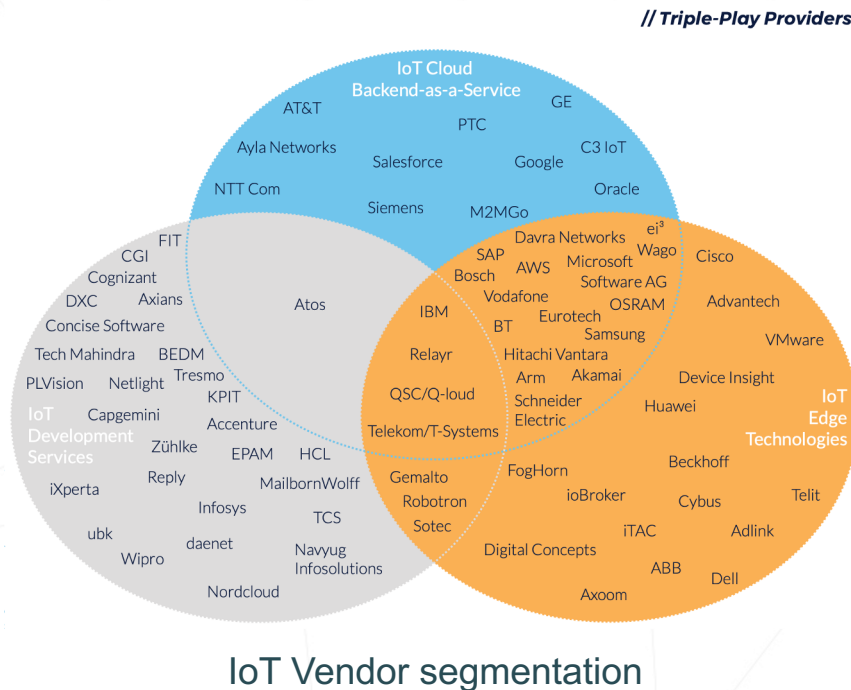
Global annual CAPEX on Edge

[Source: State of the EDGE 2020 - <https://www.lfedge.org/wp-content/uploads/2020/04/SOTE2020.pdf>]

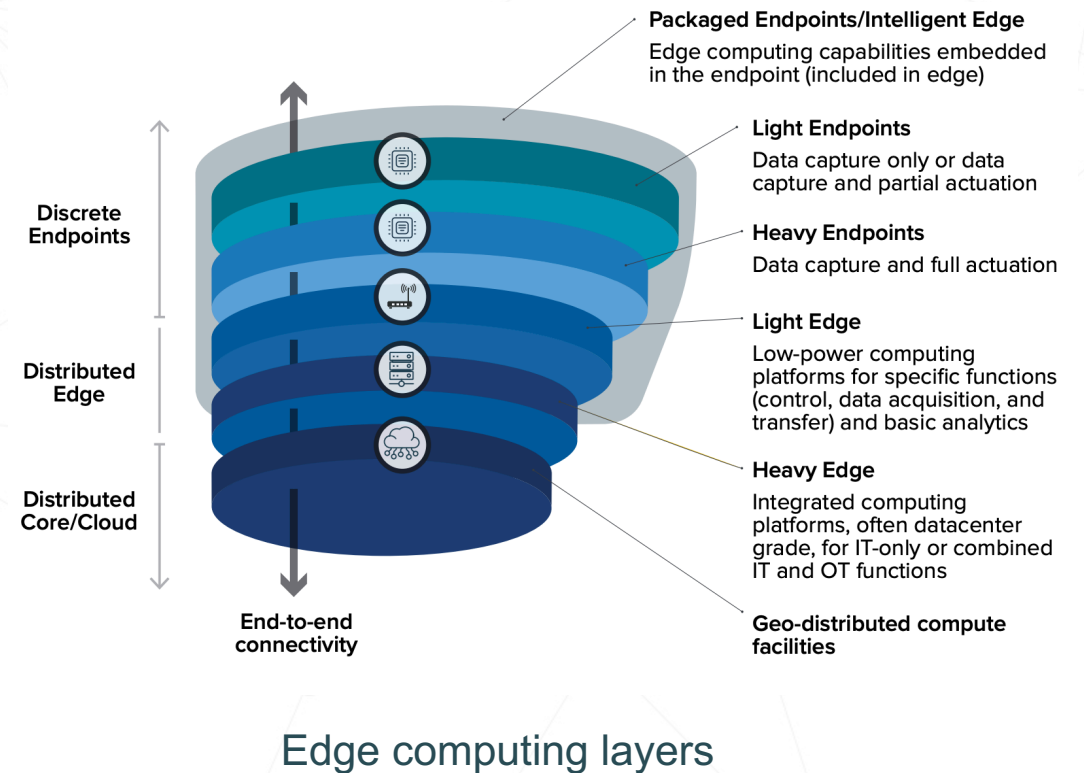
[EUROPEAN KEY PLAYERS' CATEGORIES]



- Blurring lines between cloud & edge
- Cloud migrating to edge through frameworks, partnership with niche vendors and code migration
- IoT development services providers are mostly separate from Cloud and Edge services



[Source: Internet Of Things (IoT) Vendor & Service Provider Comparison - https://www.reply.com/Documents/Report_CVU_IoT_licensed_for_Reply.pdf]



[Source: The Edge Cloud: Enabling an Intelligent Digital World - <https://www.rtinsights.com/wp-content/uploads/2020/05/The-Edge-Cloud-Enabling-an-Intelligent-Digital-World.pdf>]

EUROPEAN LANDSCAPE



European front runners in Edge-IoT

Application / Services

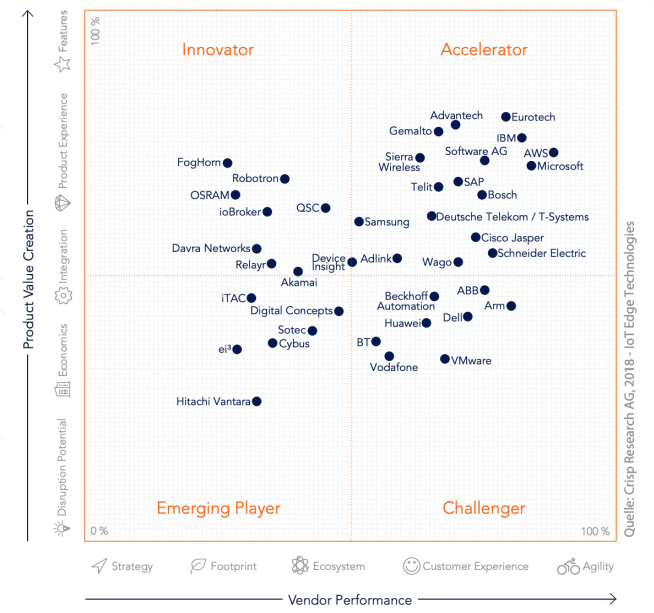
Support services

Devices & Premises

- **Network operators** are front-runners in edge computing investments
- Europe has strong players in **hardware and service providers**. With accelerators "champions" like Eurotech, Gemalto, Software AG, SAP, Bosch, Deutsche Telekom, Telit, Schneider Electric, etc.
- Moving from **use cases towards platform-centric environments** leaders are non-european AWS, Microsoft

We need your input!

Organizations active in Cloud-Edge-IoT



Edge Vendor Quadrants for DACH region

[IOT APPLICATION DOMAINS]



MAIN MAPPED DOMAINS

- **Smart Food & Farming:** from food production to processing and distribution.
- **Manufacturing:** from efficiency gains to optimization of supply chains.
- **Automotive & Mobility:** connected vehicles market
- **Smart Communities:** solutions for better governance and collective life quality.
- **Healthcare:** from wearables to specific applications.
- **Smart Energy:** everything related to power generation and distribution.
- **Smart living:** home automation through connected smart appliances.
- **Insurance & Finance:** any kind of risk assessment and protection. Customer solutions in banking.
- **Transportation:** covers the logistics issues from industrial to commercial transportation.
- **Retail:** everything related to the last linkage of the traditional value chain, the end-customer.
- **The Media:** Advertising and customer-targeting.
- **Safety and Defence:** from emergency response to better monitoring

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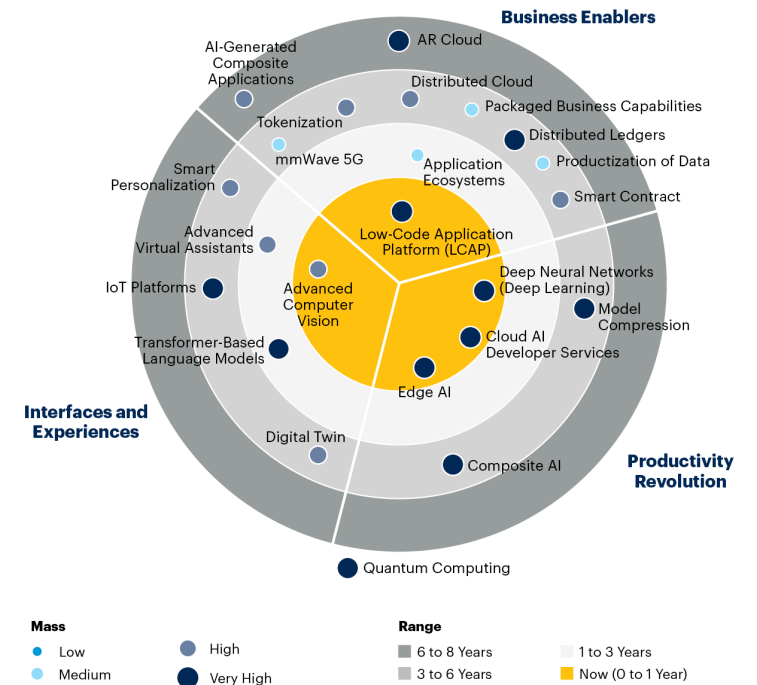
TRENDS & GAPS

TRENDS

- From cloud to edge
- From IoT to AIoTI
- From monitoring to intelligence
- From static to dynamic
- From global/central to local/decentralized
- Sustainability increasingly important > Move to Edge
- From Big Data to relevant data
- From IoT value chain to value network



Emerging Technologies and Trends Impact Radar



gartner.com/SmarterWithGartner

Source: Gartner

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Gartner

[HORIZONTAL BARRIERS]



- Fragmentation
- Lack of standardization.
- Lack of interoperability
- Lack of specialised staff (lack of digital skills)
- Challenges related to safety and security
- Lack of trust in IoT, especially amongst end-users
- Challenges with reliability
- Open platforms not sufficient available
- Limited connectivity

ROADMAPPING AND RECOMMENDATIONS

[EU STRATEGY & MFF 2021-2027]



Technology that works for people

- Strategy on Quantum and blockchain
- Digital Education plan
- White paper on AI
- Action Plan on 5G and 6G
 - 5G corridors for connected and automated mobility
 - EU Governments interoperability strategy
 - Improve work conditions for platform workers

A fair and

- European data strategy
- Industrial strategy package
- Digital Finance framework
- Legislative framework for data governance
- Consumer agenda



An open democ

- Key strategies related to Internet of Things
- Revised IDAS
- New rules for Digital Market
- Media action plan
- EU Democracy action plan

IOT PRIORITIES & EDGE COMPUTING



Economical and societal priorities

1	2	3	4	5	6	7	8	9	10	11	12
Support for SMEs and start-ups	Accurate economic parameters estimate	Data and information as critical assets	Increase of digital skills and competencies	Build Trust	Identification of the Key Regulatory and Legal Issues	Interoperability and Replicability	Security and Reliability by Design	Innovation procurement	Sustainability	Cohesion	Sovereignty

Research, Innovation & Deployment priorities

1	2	3	4	5	6	7	8	9	10
Reliable, low-cost, sustainable and scalable IoT networks	Next Generation IoT data processing architectures	Futureproof security and trust	IoT, processes, and data Interoperability	IoT, Citizens, Privacy-by-design, and Ethics	Real time decision-making for IoT	Autonomous IoT solutions	Human and Sustainable Development in the loop IoT	IoT Data Sharing and Monetization enabling models and technologies	Sustainable and biocompatible devices

KEY R&I&D TOPICS LINKED TO EDGE



Priority	Timeline							Key enablers
	2021	2022	2023	2024	2025	2026	2027	
R2. Next Generation IoT data processing architectures								
R2.1 Novel data processing architectures	Light	Light	Light	Light	Light	Light	Light	<ul style="list-style-type: none"> Artificial Intelligence and analytics Distributed Ledgers
R2.3 Highly scalable and low latency ledgers for IoT	Light	Light	Light	Light	Medium	Medium	Medium	<ul style="list-style-type: none"> Edge computing Advanced electronics
R6. Real time decision-making for IoT								
R6.1 Dynamic orchestration of decentralised AI pipelines	Light	Light	Light	Light	Light	Light	Light	<ul style="list-style-type: none"> Artificial Intelligence and analytics Edge Computing
R6.2 Native AI-capable devices	Light	Light	Light	Light	Medium	Medium	Medium	
R7. Autonomous IoT solutions								
R7.1 Large IoT & digital infrastructures	Medium	Medium	Medium	Medium	Medium	Medium	Medium	<ul style="list-style-type: none"> Artificial Intelligence and analytics Edge Computing
R7.2 Semi-autonomous IoT infrastructures	Light	Light	Light	Light	Medium	Medium	Medium	<ul style="list-style-type: none"> 5G
R7.3 Autonomous IoT infrastructures	Light	Light	Light	Light	Light	Light	Light	
R8. Human and sustainable development in the loop IoT								
R8.1 Sustainable IoT by design	Light	Light	Light	Light	Medium	Medium	Medium	<ul style="list-style-type: none"> Artificial Intelligence and analytics 5G
R8.2 Augmented IoT	Light	Light	Medium	Medium	Medium	Medium	Medium	<ul style="list-style-type: none"> Edge Computing Augmented Reality and Tactile Internet
R8.3 Tactile Internet	Light	Light	Medium	Medium	Medium	Medium	Medium	<ul style="list-style-type: none"> Digital Twins

Expected maturity

- research or TRL 2-4
- technology development and field test or TRL 4-6
- pilot tests or TRL 6-8

[KEY RECOMMENDATIONS]



- Go beyond single node “Operating Systems”
- Increase emphasis on AI and hardware convergence
- Go beyond state of the art data processing architectures for IoT
- Highlight relevance of IoT in the supporting sustainability goals
- Support large deployments of standard and replicable solutions
- Increase harmonisation of IoT cloud-edge standards

IoT and Edge Computing

We need your
input!

**NGIoT white paper:
IoT and Edge computing**

October 2021



March 2021

**NGIoT Roadmap:
IoT Research, Innovation
and Deployment in Europe**

EU-IOT



ngiot.eu



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[THANK YOU FOR YOUR ATTENTION]



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