Western European Enterprise Edge Computing Spending Forecast, 2018-2023

Market Study
Fourth Quarter, 2018

Western European Enterprise Edge Computing Spending Forecast, 2018-2023

A Market Study

Published Fourth Quarter, 2018
Version 1.0
Report Number: 4Q2018-07

*iG*R
12400 W. Hwy 71
Suite 350 PMB 341
Austin TX 78738

Table of Contents

Abstract **1**

Executive Summary **3**
Table A: Western European Enterprise Spending on EC, 2018-2023 ($M) 4
Figure A: Western European Enterprise Spending per year on EC, 2018-2023 ($M) 4
What this Means **5**

Methodology **6**

What is 5G? **7**
5G Timeline **7**
Figure 1: Timeline for IMT-2020 (5G) 8
5G Use Cases **8**
URLLC **9**
Massive IoT **10**
5G Services and Use Cases **10**

What is Edge Computing? **12**
Table 1: Different Kinds of Edge Computing 13
Criteria around what goes at the edge **14**
Where can edge compute be placed? **15**
Edge computing in 4G **15**
Figure 2: The 4G LTE Network without Edge Computing 16
Figure 3: The 4G LTE Network with Edge Computing behind the EPC 16
Figure 4: The 4G LTE Network with Edge Computing in front of the EPC 17
Edge Computing and 5G **17**
Figure 5: 5G System Architecture – Network Function Interactions, Non-roaming 18
Figure 6: Non-roaming architecture for the NEF 19
Figure 7: Example of an Integrated MEC Deployment in a 5G Network 20
Figure 8: Illustrating Edge Computing in 5G 20
Figure 9: Example of an Integrated MEC Deployment in a 5G Network 22
Brief overview of MEC building blocks **22**
Figure 10: MEC Server Building Blocks 23
Figure 11: MEC Reference Architecture 24
Edge Computing with Public Cloud and the MNO **25**
Figure 12: Edge Computing with the MNO 25
Figure 13: Edge Computing with the MNO and Public Cloud 26
Figure 14: Edge Computing with the MNO, Enterprise and Public Cloud 27
Summary **27**

Examples of Enterprise Edge Computing **28**
ABB – Energy Optimization **28**
DHL – Warehouse Insight **28**
DroneWorks – Drone Predictive Maintenance **29**

Figure 15: DroneWorks Azure Architecture 29
FANUC – Predictive Maintenance 30
FreeWave – Predictive Maintenance and Production Line Productivity 30
Hangar Technology – Drone Data Insight 31
HIROTEC – Predictive Analytics and Production Line Visibility 31
Kaeser Kompressoren – Predictive Analytics 32
Mazak – Production Line Productivity 32
Rockwell Automation – Operational Insight 32
Sentryo and VINCI Energies – Security and Manufacturing Network Visibility 33
Shimane Fujitsu – Production Line Visibility 33
Tetra Pak – Predictive Maintenance 34
Texmark Chemicals – Predictive Analytics and Production Visibility 34
Other examples from Sprint 35

Pros & Cons of Edge Computing 36
Benefits of Edge Computing 36
Cons of Edge Computing 36

Forecast: Western European Enterprise Spending on Edge Computing 38
Methodology and Assumptions 38
EC Spending Forecast 40
Table 2: Western Europe Commercial Building Penetration of EC, 2018-2023 40
Figure 16: Western Europe Commercial Building Penetration of EC, 2018-2023 41
Table 3: Western Europe Commercial Buildings with EC, 2018-2023 41
Figure 17: Western Europe Commercial Buildings with EC, 2018-2023 42
Table 4: Western Europe Commercial Buildings with EC by Vertical, 2018-2023 42
Figure 18: Western Europe Commercial Buildings with EC by Vertical, 2018-2023 43
Table 5: Western Europe Enterprise Spending on EC, 2018-2023 ($M) 43
Figure 19: Western Europe Enterprise Spending on EC, 2018-2023 (in millions) 44

EC Vendor Profiles 45
ADLINK 45
ADVA Optical Networking 48
Affirmed Networks 50
Allied Telesis 52
Altiostar 53
Amazon Web Services (AWS) 55
American Tower 56
Anixter 58
Aricent (Altran Group) 60
Artesyn Embedded Technologies 62
Athonet 64
AT&T 66
CBRE 67
Cisco 69
CommScope 72
Compass Datacenters 75

Corning SpiderCloud Wireless **76**
CPLANE NETWORKS **79**
Crown Castle **80**
DartPoints **82**
Dell **84**
ECI Telecom **86**
EdgeConneX **88**
EdgeMicro **90**
Ericsson **92**
GE Digital **95**
HPE **97**
Huawei **100**
Iguazio **102**
Intel **104**
InterDigital **106**
JMA Wireless **108**
Juniper Networks **110**
Limelight Networks **112**
Mavenir **114**
MECSware **117**
NEC **119**
NetFoundry **121**
Nokia Networks **123**
NVIDIA **127**
Packet **129**
Quortus **131**
Radisys **133**
RTI (Real-Time Innovations) **137**
Saguna Networks **139**
SBA Communications Corporation (SBA) **141**
Smart Edge **143**
Sprint **144**
STRATACACHE **146**
T-Mobile US **148**
Telenity **150**
Vapor IO **151**
Vasona Networks **153**
Verizon **157**
Vertical Bridge **159**
VMware **160**
ZTE Corporation **163**

Definitions **167**
Definitions Table 167

About *iG*R **189**
Disclaimer **189**

Abstract

Edge computing (EC) – and there are several different versions/approaches – emerged on the wireless industry stage several years ago and especially in Western Europe. Edge computing has the potential to be as disruptive a technology as anything that is being discussed today – 5G New Radio, NFV/SDN, C-RAN, etc. In fact, EC is quite likely to help realize the promise of 5G particularly since the new 5G system architecture is designed to capitalize on virtualization. This is especially true in Western Europe, with its highly industrialized economies, established mobile operators, and highly developed wireless and mobile industry.

In this report, *iG*R defines an edge computing hardware platform as a secure, virtualized platform which can be "open up" to third parties – content providers, application developers, etc. That platform might incorporate an LTE radio (including the CBRS band), Wi-Fi, 5G NR or some combination of them. Today, most edge compute implementations use Ethernet and/or Wi-Fi and not cellular. Over time, *iG*R believes that will change as private LTE networks (primarily based on CBRS) get deployed and more 4G/5G-based IoT devices are brought to market.

In this report, *iG*R forecasts enterprise spending on EC-based solutions for the Western European market.

Key questions addressed in this market study include:

- What is EC?
- How does EC work?
- How does EC relate to other edge computing initiatives, such as OpenFog, CORD Project, Open Edge Computing (OEC), Open Compute, and EdgeX Foundry?
- What can be done with EC?
- What are some of the perceived benefits and issues related to EC?
- What are some of the perceived negatives and issues related to indoor small cells?
- What are the key drivers for implementing EC?
- How many commercial buildings will have EC deployed?
- How much enterprise spending is likely to occur on EC-based solutions in Western Europe?

Who should read this report?

- Data center OEMs and operators
- Mobile operators
- Infrastructure OEMs
- Computing infrastructure OEMs
- Small cell product and solution vendors
- Backhaul service providers and equipment OEMs
- Financial analysts and investors.