

Virtual Core - Gateway to the 'Real 5G'

<https://marketpublishers.com/r/VA5DB36A10E6EN.html>

Date: August 2022

Pages: 171

Price: US\$ 4,500.00 (Single User License)

ID: VA5DB36A10E6EN

Abstracts

This chapter provides an overview of the market size of one of the most potent network functions (NF) in mobile telephony – the core; in the context of the efforts to virtualize them; into virtual machines and containers.

THE DELAYED STANDALONE MODE ROLLOUT

5G SA is clearly taking longer than anticipated. The reasons are many – telco ennui with the constant architectural flux without commensurate returns being the main one. Telcos have had their fingers burnt with the seemingly never-ending development cycle of a reliable and acceptable MANO.

If the MANO experience is a sobering reality check for telcos, they did not lose hope. In came containers and microservices, with a ready-to-deploy orchestrator in form of Kubernetes. Notwithstanding all the challenges surrounding the implementation of containers in performance-intense and latency sensitive network function like the mobile core; the value proposition of containers is beyond doubt – and this was established close to the end of last decade. Containers are therefore no longer the reason for telco reluctance in embracing the SA mode, which lends itself elegantly to SBA.

What is the reason for the delay then?

A few things happened in the last couple of years.

The increasing hostility between the two major geopolitical power blocks has translated into an indirect (or otherwise) embargo on vendors for either side into markets on the other. Ericsson, Nokia, Huawei, ZTE and Samsung among others do not have free access to the markets on the “other side”. Lack of competition and subsequent choices is always problematic for any market, especially the fledgling ones, as it slows the pace

of innovation.

Then of course there was Covid-19! The uncertainty surrounding the pandemic in its early stages (should we now say that we have progressed to the late stage?) definitely inserted a pause in the telco plans for going the SA way. This strategy worked for them, as the pandemic changed data consumption patterns for the better with the global demand for mobile data showing a sharp upward turn. Remote, data-intensive interactions became the norm and are here to stay. The spurt in data can be elegantly addressed using the NSA mode, which focuses only on the throughput enhancement capabilities of 5G. One should also not forget the role played by the Dynamic Spread Spectrum (DSS) technology, which allows 5G networks to run on 4G bands using dynamic frequency allocation at the base station level; although it can be used in lower frequency bands only.

Finally, one must not forget that 5G SA will require a complete ecosystem of mobile edge infrastructure as well as well-defined (in other words, fool proof) use-cases on the enterprise side to make a viable case for itself. And there is the question of telcos requiring to re-engineer their processes to cope with cloud-native 5G-SA core. Telcos typically follow a phased transition to avoid hiccups. Steps include the following:

Deployment of cloud-native 4G EPC to familiarize with cloud-native philosophy

Deployment of dual-mode cores to allow SA and NSA to co-exist

Building a parallel cloud-native infrastructure

Consequently, at Insight Research, we have had to revise our projections for container-based Cores downward for through 2023.

So how does the future portend for 5G SA?

It is bright, unquestionably. We are more knowledgeable and surefooted about dealing with the pandemic. As the global economy kickstarts itself, the use-cases for which network slicing was envisaged, are making a resounding comeback. The war in Ukraine will have an impact on telco spending in the short run as European markets in particular will be subjected to enormous strain arising out of commodity crunch. The subsequent inevitable easing of the situation, however, will engineer a spurt in telco spending in the European region.

Of special interest in the upswing is the support for network slicing. A lesser realized import of network slicing is how attractive it makes 5G for private networks to employed by enterprises. 4G offered the first taste of private mobile networks and 5G SA will make the experience richer and more meaningful. Product and process engineering industries (of course, with deep pockets) are already utilizing this faculty wherever options are available.

The world will be keenly watching the greenfield network rollout of Dish TV, which is said to be 5G SA compliant from the word go. The operator is poised complete its first rollout obligation of 20% coverage by June 2022. Also of interest is the 5G spectrum auction in India, poised for completion in July 2022.

Insight Research forecasts that the demand for container-based Core will witness a sharp upswing during 2023-2026.

Contents

1. EXECUTIVE SUMMARY

- 1.1 The Delayed Standalone Mode Rollout
 - 1.1.1 Core Market Segmentation, by Virtualization Type
- 1.2 Report Organization and Market Forecast Taxonomy

2. THE CORE JOURNEY

- 2.1 The Core and its Evolution
- 2.2 Contours of EPC
 - 2.2.1 SAE and the Flat Architecture
 - 2.2.2 Decoupling of Planes
 - 2.2.3 NAS
 - 2.2.4 Blocks in the EPC
 - 2.2.4.1 SGW
 - 2.2.4.2 PGW
 - 2.2.4.3 ePDG
 - 2.2.4.4 TWAG
 - 2.2.4.5 MME
 - 2.2.4.6 HSS
 - 2.2.4.7 Other optional elements
- 2.3 The 5G Core (5GC)
 - 2.3.1 SA versus NSA
 - 2.3.2 NEC Converged Core
 - 2.3.3 5GC Functions
- 2.4 Virtualization of the Core
 - 2.4.1 Contrary, yet Complementary Trends
 - 2.4.2 The Optimized Spending Pattern
 - 2.4.3 The Mechanics
 - 2.4.4 The Challenges

3. VNFS – VMS AND CONTAINERS

- 3.1 VM-based VNFs
 - 3.1.1 History and Progression
 - 3.1.2 NFV architecture
 - 3.1.2.1 VNF/i/NFVi

- 3.1.2.2 VNFs
- 3.1.2.3 MANO
- 3.2 Containers – The Challengers
 - 3.2.1 What are Containers?
 - 3.2.2 Microservices
 - 3.2.3 Container Morphology
 - 3.2.3.1 Provisioning and Run-time Management Block
 - 3.2.3.1.1 Docker Engine
 - 3.2.3.2 Orchestration Block
 - 3.2.3.2.1 Kubernetes
 - 3.2.3.3 Application Deployment Block
 - 3.2.4 Container Deployment Methodologies
 - 3.2.4.1 Virtual Machine (VM)
 - 3.2.4.2 Bare Metal
 - 3.2.4.3 Cloud or Container as-a-Service (CaaS)
 - 3.2.5 Stateful and Stateless Containers
 - 3.2.6 CNCF and CNFs
- 3.3 Contrasting Containers and VMs
- 3.4 Advantage Container-based VNFs
 - 3.4.1 Freedom from Hypervisors
 - 3.4.2 File-level Resource Management
 - 3.4.3 Portability
 - 3.4.4 Microservices-powered Scalability and Granularity
 - 3.4.5 Quick Operationalization
 - 3.4.6 Quick Orchestration with a Caveat
 - 3.4.7 Containers and 5G
- 3.5 Challenges Confronting Container-based VNFs
 - 3.5.1 Familiarity with VMs
 - 3.5.2 Telco Demands
 - 3.5.3 Latency
 - 3.5.4 Security
 - 3.5.5 Flexibility
 - 3.5.6 Hardware Enhancements
- 3.6 Blending Containers with NFV
 - 3.6.1 NFVi and CNF
 - 3.6.2 MANO and Containers
 - 3.6.2.1 ONAP and CNFs
 - 3.6.2.2 OSM and CNFs

4. TELCO PROFILES

4.1 Telcos – Cautious, Yet Optimistic About 5G-SA

4.2 Telco profiles

4.3 Airtel

4.3.1 Core Virtualization Initiatives

4.4 AT&T

4.4.1 Core Virtualization Initiatives

4.5 BT

4.5.1 Core Virtualization Initiatives

4.6 China Mobile

4.6.1 Core Virtualization Initiatives

4.7 China Telecom

4.7.1 Core Virtualization Initiatives

4.8 China Unicom

4.8.1 Core Virtualization Initiatives

4.9 Deutsche Telekom

4.9.1 Core Virtualization Initiatives

4.10 Etisalat

4.10.1 Core Virtualization Initiatives

4.11 Jio

4.11.1 Core Virtualization Initiatives

4.12 KDDI

4.12.1 Core Virtualization Initiatives

4.13 KT

4.13.1 Core Virtualization Initiatives

4.14 LG Uplus

4.14.1 Core Virtualization Initiatives

4.15 Lifecell Ukraine

4.15.1 Core Virtualization Initiatives

4.16 M1 Singapore

4.16.1 Core Virtualization Initiatives

4.17 NTT DoCoMo

4.17.1 Core Virtualization Initiatives

4.18 Ooredoo

4.18.1 Core Virtualization Initiatives

4.19 Optus (Singtel Optus)

4.19.1 Core Virtualization Initiatives

4.20 Orange

- 4.20.1 Core Virtualization Initiatives
- 4.21 Rakuten
 - 4.21.1 Core Virtualization Initiatives
- 4.22 Saudi Telecom (STC)
 - 4.22.1 Core Virtualization Initiatives
- 4.23 Singtel
 - 4.23.1 Core Virtualization Initiatives
- 4.24 SK Telecom
 - 4.24.1 Core Virtualization Initiatives
- 4.25 Softbank
 - 4.25.1 Core Virtualization Initiatives
- 4.26 Swisscom
 - 4.26.1 Core Virtualization Initiatives
- 4.27 T-Mobile
 - 4.27.1 Core Virtualization Initiatives
- 4.28 TIM/Telecom Italia
 - 4.28.1 Core Virtualization Initiatives
- 4.29 Telenor
 - 4.29.1 Core Virtualization Initiatives
- 4.30 Telefonica
 - 4.30.1 Core Virtualization Initiatives
- 4.31 Telia
 - 4.31.1 Core Virtualization Initiatives
- 4.32 Telkom Indonesia
 - 4.32.1 Core Virtualization Initiatives
- 4.33 Telstra
 - 4.33.1 Core Virtualization Initiatives
- 4.34 Turk Telecom
 - 4.34.1 Core Virtualization Initiatives
- 4.35 Turkcell
 - 4.35.1 Core Virtualization Initiatives
- 4.36 Veon VimpelCom
 - 4.36.1 Core Virtualization Initiatives
- 4.37 Verizon
 - 4.37.1 Core Virtualization Initiatives
- 4.38 Vodafone
 - 4.38.1 Core Virtualization Initiatives

5. SOLUTION PROVIDER PROFILES

- 5.1 Organization Categories
 - 5.1.1 Equipment Vendors
 - 5.1.2 Independent Software Vendors (ISV)
 - 5.1.3 Semiconductor Specialists
 - 5.1.4 Hardware, OS and Firmware Specialists
 - 5.1.5 Niche Solution Developers
- 5.2 Mergers and Funding Related Developments
- 5.3 Company Profiles
- 5.4 6WIND
 - 5.4.1 Core Virtualization Initiatives
 - 5.4.1.1 6WINDGate
- 5.5 Affirmed Networks
 - 5.5.1 Core Virtualization Initiatives
 - 5.5.1.1 vEPC
 - 5.5.1.2 Virtual Slice Selection Function (vSSF)
 - 5.5.1.3 UnityCloud
- 5.6 Athonet
 - 5.6.1 Core Virtualization Initiatives
 - 5.6.1.1 Connectivity Platform
- 5.7 Baicells
 - 5.7.1 Core Virtualization Initiatives
 - 5.7.1.1 vEPC/LTE Core
- 5.8 Cirrus Core Networks (CCN)
 - 5.8.1 Core Virtualization Initiatives
 - 5.8.1.1 vEPC
 - 5.8.1.2 vIMS
- 5.9 Cisco Systems
 - 5.9.1 Core Virtualization Initiatives
 - 5.9.1.1 Ultra Cloud Core
 - 5.9.1.2 Ultra-Packet Core
 - 5.9.1.3 Other Developments
- 5.10 Dell EMC
 - 5.10.1 Core Virtualization Initiatives
 - 5.10.1.1 Open Networking Switches
 - 5.10.1.2 5G Core Solution
 - 5.10.1.3 Other Developments
- 5.11 Enea
 - 5.11.1 Core Virtualization Initiatives

- 5.11.1.1 5G Microcore
- 5.11.1.2 Unified Data Manager
- 5.11.1.3 Other Developments
- 5.12 Ericsson
 - 5.12.1 Core Virtualization Initiatives
 - 5.12.1.1 Cloud Native Application (CNA)
 - 5.12.1.2 5G Core
 - 5.12.1.3 CI/CD
 - 5.12.1.4 Ericsson - Cloud Packet Core
 - 5.12.1.5 Cloud-native NFVi
 - 5.12.1.6 Other Developments
- 5.13 Huawei
 - 5.13.1 Core Virtualization Initiatives
 - 5.13.1.1 Other Initiatives
- 5.14 Intel
 - 5.14.1 Core Virtualization Initiatives
 - 5.14.1.1 5G-UPF
 - 5.14.1.2 FPGA
 - 5.14.1.3 Other Developments
- 5.15 Mavenir
 - 5.15.1 Core Virtualization Initiatives
 - 5.15.1.1 Cloud Native IMS
 - 5.15.1.2 Converged Packet Core
 - 5.15.1.3 vEPC
 - 5.15.1.4 Other Developments
- 5.16 Metaswitch
 - 5.16.1 Core Virtualization Initiatives
 - 5.16.1.1 Packet Core
 - 5.16.1.2 Fusion Core
 - 5.16.1.3 Clearwater IMS Core
 - 5.16.1.4 Other Developments
- 5.17 NEC/Netcracker
 - 5.17.1 Core Virtualization Initiatives
 - 5.17.1.1 Converged Core
 - 5.17.1.2 Other Developments
- 5.18 Nokia
 - 5.18.1 Core Virtualization Initiatives
 - 5.18.1.1 Nokia - Cloud Packet Core
 - 5.18.1.1.1 CNRD

5.18.1.1.2 CMM

5.18.1.1.3 CMG

5.18.1.2 Telecom Application Server

5.18.1.3 5G Core

5.18.1.4 Other Developments

5.19 Oracle

5.19.1 Core Virtualization Initiatives

5.19.1.1 Assorted Core NFs

5.19.1.2 5G SCP

5.19.1.3 5G NRF

5.19.1.4 5G PCF

5.19.1.5 Other Developments

5.20 Red Hat

5.20.1 Core Virtualization Initiatives

5.20.1.1 OpenShift Container Platform

5.20.1.2 5G Core Container

5.20.1.3 Ansible

5.20.1.4 Other Developments

5.21 Samsung

5.21.1 Core Virtualization Initiatives

5.21.1.1 Samsung 5G Core

5.21.1.2 AdaptiV

5.21.1.3 Other Developments

5.21.2 Core Virtualization Initiatives

5.21.2.1 BreezeWAY

5.21.2.2 BreezeNEXT

5.22 VMware

5.22.1 Core Virtualization Initiatives

5.22.1.1 VMWare Telco Cloud

5.22.1.2 NSX

5.22.1.3 X-Factor

5.22.1.4 Other Developments

5.23 Wind River

5.23.1 Core Virtualization Initiatives

5.23.1.1 Titanium Cloud Product Portfolio

5.23.1.2 Kubernetes

5.24 ZTE

5.24.1 Core Virtualization Initiatives

5.24.1.1 Cloud Common Core

5.24.1.2 vEPC

5.24.1.3 TECS

5.24.1.4 Other Developments

5.25 Casa Systems

5.25.1 Core Virtualization Initiatives

5.25.1.1 Axyom Software Platform

5.25.1.1.1 Axyom 5G Core

5.25.1.1.2 Axyom EPC

5.25.1.2 Other Developments

5.26 HPE

5.26.1 Core Virtualization Initiatives

5.26.1.1 HPE 5G Core Stack

5.26.1.2 Other Developments

6. QUANTITATIVE FORECASTS

6.1 Research Methodology

6.2 Forecast Taxonomy

6.3 Analysis of the Overall Virtualized Core Market

6.3.1 Mobile Telephony Generation

6.3.2 End-user

6.3.3 Solution Morphology

6.3.4 Hosting Mode

6.3.5 Regional Breakdown

6.4 Analysis of the VM-based Core Market

6.4.1 VM Morphology

6.4.2 End-user

6.4.3 Solution Morphology

6.4.4 Hosting Mode

6.4.5 Regional Breakdown

6.5 Analysis of the Container-based Core Market

6.5.1 Container Morphology

6.5.2 End-user

6.5.3 Solution Morphology

6.5.4 Hosting Mode

6.5.5 Deployment Methodology

6.5.6 Regional Breakdown

7. GLOSSARY AND ACRONYMS

List Of Tables

LIST OF TABLES AND FIGURES

Figure 1-1: Global Market for the Overall Virtualized Core; by Virtualization Type 2021-2026 (\$ million)

Table 1-1: Market Share Progression for the Overall Virtualized Core; by Virtualization Type 2021-2026 (%)

Figure 2-1: The 5G NSA Network

Figure 2-2: The 5G SA Network

Figure 2-3: 5G and 4G nodes in NEC's Converged Core

Figure 3-1: Interactive Cloud Native Technology Developer Landscape from CNCF

Figure 3-2: VNF versus CNF Stacks

Figure 3-3: Containers and VMs

Figure 5-1: UnityCloud from Affirmed Networks

Figure 5-2: Enea's 5G MicroCore Solution for Private 5G Networks

Figure 5-3: Cloud Infrastructure Requirements as Visualized by Ericsson

Figure 5-5: NFVI Evolution

Figure 5-7: Network Functions and interfaces interoperating with third-party components

Figure 5-8: CMM, CMG and CNRD in Nokia Cloud Packet Core

Figure 5-9: Nokia Orchestration Center

Figure 5-10: Nokia Assurance Center

Figure 5-11: Cloud Operations Manager Functional Overview

Figure 5-12: Service Communication Proxy Architecture

Figure 5-13: NRF System Architecture

Figure 5-14: PCF System Architecture

Figure 5-15: Logical-5G Core Architectural Elements

Figure 5-16: Samsung 5G Core Cloud Native Architecture

Figure 5-17: VMware Telco Cloud Platform

Figure 5-18: VMware Telco Cloud Automation

Figure 5-19: Axyom Software Architecture Components

Figure 5-20: HPE 5G Core Reference Architecture

Figure 6-1: VM-based Core Market

Figure 6-2: Container-based Core Market

Table 6-1: Global Market for the Overall Virtualized Core; by Generation 2021-2026 (\$ million)

Figure 6-3: Market Share Progression for the Overall Virtualized Core; by Generation 2021-2026 (%)

Table 6-2: Global Market for the Overall Virtualized Core; by End-User 2021-2026 (\$

million)

Figure 6-4: Market Share Progression for the Overall Virtualized Core; by End-User 2021-2026 (%)

Table 6-3: Global Market for the Overall Virtualized Core; by Morphology 2021-2026 (\$ million)

Figure 6-5: Market Share Progression for the Overall Virtualized Core; by Morphology 2021-2026 (%)

Table 6-4: Global Market for the Overall Virtualized Core; by Hosting Mode 2021-2026 (\$ million)

Figure 6-6: Market Share Progression for the Overall Virtualized Core; by Hosting Mode 2021-2026 (%)

Table 6-5: Global Market for the Overall Virtualized Core; by Region 2021-2026 (\$ million)

Figure 6-7: Market Share Progression for the Overall Virtualized Core; by Region 2021-2026 (%)

Table 6-6: Global Market for the Overall Virtualized EPC; by Region 2021-2026 (\$ million)

Figure 6-8: Market Share Progression for the Overall Virtualized EPC; by Region 2021-2026 (%)

Table 6-7: Global Market for the Overall Virtualized 5GC; by Region 2021-2026 (\$ million)

Figure 6-9: Market Share Progression for the Overall Virtualized 5GC; by Region 2021-2026 (%)

Table 6-8: Global Market for VM-based Core; by Morphology 2021-2026 (\$ million)

Figure 6-10: Market Share Progression for VM-based Core; by Morphology 2021-2026 (%)

Table 6-9: Global Market for VM-based Core; by End-User 2021-2026 (\$ million)

Figure 6-11: Market Share Progression for VM-based Core; by End-User 2021-2026 (%)

Table 6-10: Global Market for VM-based Core; by Solution Morphology 2021-2026 (\$ million)

Figure 6-12: Market Share Progression for VM-based Core; by Core Taxonomy 2021-2026 (%)

Table 6-11: Global Market for VM-based Core; by Hosting Mode 2021-2026 (\$ million)

Figure 6-13: Market Share Progression for VM-based Core; by Hosting Mode 2021-2026 (%)

Table 6-12: Global Market for VM-based Core; by Region 2021-2026 (\$ million)

Figure 6-14: Market Share Progression for VM-based Core; by Region 2021-2026 (%)

Table 6-13: Global Market for VM-based EPC, by Region 2021-2026 (\$ million)

Figure 6-15: Market Share Progression for VM-based EPC, by Region 2021-2026 (%)

Table 6-14: Global Market for VM-based 5GC, by Region 2021-2026 (\$ million)

Figure 6-16: Market Share Progression for VM-based 5GC, by Region 2021-2026 (%)

Table 6-15: Global Market for Container-based Core, by Container Morphology 2021-2026 (\$ million)

Figure 6-17: Market Share Progression for Container-based Core, by Container Morphology 2021-2026 (%)

Table 6-16: Global Market for Container-based Core; by End-User 2021-2026 (\$ million)

Figure 6-18: Market Share Progression for Container-based Core; by End-User 2021-2026 (%)

Table 6-17: Global Market for Container-based Core; by Solution Morphology 2021-2026 (\$ million)

Figure 6-19: Market Share Progression for Container-based Core; by Core Taxonomy 2021-2026 (%)

Table 6-18: Global Market for Container-based Core; by Hosting Mode 2021-2026 (\$ million)

Figure 6-20: Market Share Progression for Container-based Core; by Hosting Mode 2021-2026 (%)

Table 6-19: Global Market for Container-based Core, by Deployment Methodology 2021-2026 (\$ million)

Figure 6-21: Market Share Progression for Container-based Core, by Deployment Methodology 2021-2026 (%)

Table 6-20: Global Market for Container-based Core, by Region 2021-2026 (\$ million)

Figure 6-22: Market Share Progression for Container-based Core, by Region 2021-2026 (%)

Table 6-21: Global Market for Container-based EPC, by Region 2021-2026 (\$ million)

Figure 6-23: Market Share Progression for Container-based EPC, by Region 2021-2026 (%)

Table 6-22: Global Market for Container-based 5GC, by Region 2021-2026 (\$ million)

Figure 6-24: Market Share Progression for Container-based 5GC, by Region 2021-2026 (%)

I would like to order

Product name: Virtual Core - Gateway to the 'Real 5G'

Product link: <https://marketpublishers.com/r/VA5DB36A10E6EN.html>

Price: US\$ 4,500.00 (Single User License / Electronic Delivery)

If you want to order Corporate License or Hard Copy, please, contact our Customer Service:

info@marketpublishers.com

Payment

To pay by Credit Card (Visa, MasterCard, American Express, PayPal), please, click button on product page <https://marketpublishers.com/r/VA5DB36A10E6EN.html>

To pay by Wire Transfer, please, fill in your contact details in the form below:

First name:
Last name:
Email:
Company:
Address:
City:
Zip code:
Country:
Tel:
Fax:
Your message:

****All fields are required**

Customer signature _____

Please, note that by ordering from marketpublishers.com you are agreeing to our Terms & Conditions at <https://marketpublishers.com/docs/terms.html>

To place an order via fax simply print this form, fill in the information below and fax the completed form to +44 20 7900 3970