Making financial sense of telco cloud

Executive summary

This paper examines various calculations of the total cost of ownership (TCO) for service providers' networks and telco clouds, with a specific emphasis on 5G Core/RAN and future edge service advancements.

We delve into the TCO benefits that service providers can anticipate by using Red Hat solutions—particularly a unified cloud application platform. Numerous research and models conducted by industry analysts have indicated substantial TCO savings of unified, horizontal architectures versus more isolated, vertical cloud architectures, ranging from 30% to over 40%. These savings primarily stem from operational expenditure (OpEx) reductions achieved through resource sharing, improved productivity, and automation implementation.

These studies provide a snapshot of specific scenarios that heavily rely on customer and industry data sources to provide practical guidance for inputs and assumptions. However, a multitude of additional cost-saving opportunities are available to service providers, extending beyond the conventional usage of telco cloud.

A telecommunications (telco) platform cannot be optimized for low TCO once and subsequently left unattended. With that in mind, Red Hat is developing an open, horizontal telco cloud platform that serves as the foundation for continuous TCO optimization. This platform presents opportunities for improvement in various contributing areas and functionalities, allowing service providers to optimize their TCO at their preferred pace.

Highlights

- The TCO savings of a unified telco cloud platform range from 30% to 40% or more, stemming primarily from OpEx reduction.
- Automation plays a critical role.
- Service providers can realize a 35% TCO advantage with Red Hat versus DIY cloud approaches.
- Tested partner solutions and blueprints lower integration costs.

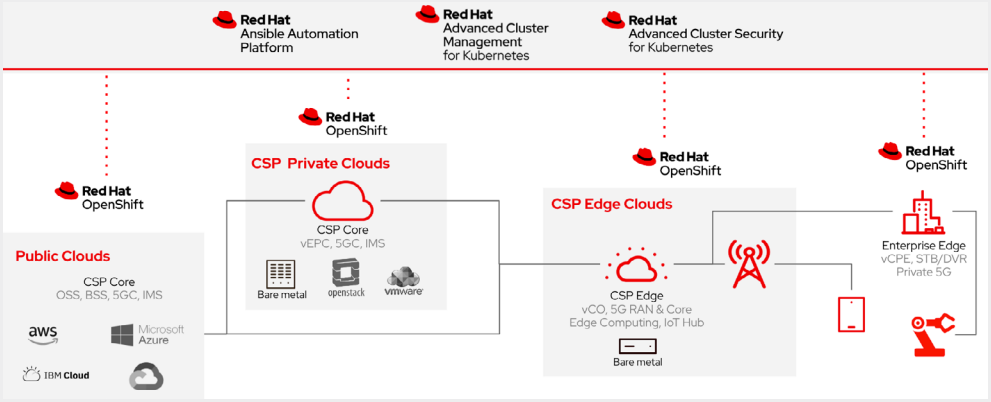

Figure 1. Red Hat OpenShift flexibility and consistent operational model

General observations as technology is progressing

Controlling and reducing costs has long been a major objective for every service provider. While various models have been developed to provide guidance on potential savings from implementing new technologies—like virtualization, 4G, 5G, and cloud—the true realized savings can vary due to several factors that differ from one service provider to another and include:

- The decision to maintain a mix of application types during network transformation, leading to the coexistence of technologies, such as virtual network functions (VNFs) and cloud-native network functions (CNFs).
- The amount of technical debt and the need to retain some legacy applications as is, when migrating them to a new cloud platform is not feasible.
- The lack of necessary skill sets and a culture conducive to process improvement and inertia in adopting the latest tools and methodologies.
- The existence of multiple platforms to maintain vendor diversity and to support legacy systems. The operational complexity, maintenance costs, security risks, and efficiency of these platforms are determined by how well they are operated.

New technologies have been shown to decrease costs

To minimize OpEx, capital expenditures (CapEx), and TCO for networks and telco clouds, new technologies are being employed in various ways. Technologies are designed to help service providers lower their CapEx and OpEx; reduce power consumption and CO2 emissions; meet their environmental, social governance[1] (ESG) objectives; and to create a unified, automated, agile, and scalable platform for delivering existing (e.g., LTE) and new 5G services.

Red Hat has been at the forefront of helping service providers achieve their goals and objectives for many years. A few examples of cost-reduction opportunities yielding a lower TCO include:

- **Virtualization of network functions in the mobile packet core.** This has demonstrated significant savings over traditional, purpose-built platforms. TCO savings opportunities of more than 60% in a 5-year period are achievable through equal reductions in CapEx and OpEx, primarily due to:
  - Simplified planning and engineering efforts.
  - Fewer software licenses to purchase and renew.
  - Lower costs of hardening the solution due to a reduction in isolated architectures and increased automation.
  - Reduced costs of onboarding new hardware and software.
- **Advancements in 4G mobile core (Virtual Evolved Packet Core [vEPC] and virtualized IP Multimedia Subsystem [vIMS]),** which have led to additional savings, particularly in lowering OpEx. The key savings are attributed to using an elastic, horizontal cloud as a shared operational environment for service deployments.

1 *Red Hat whitepaper. "Sustainable service providers," 16 Nov. 2022.*

The value of a cloud-native application platform

Radio access network (RAN)

The industry's current focus is on further reducing TCO by deploying cloud-native 5G Core and RAN technologies on horizontal cloud platforms. Comparisons between vRAN and traditional RAN deployment models have shown a more than 40%[2] lower TCO with the former over a 5-year period, along with significant CapEx savings of about 50% and OpEx savings of 40%. The research indicates that traditional RAN requires higher CapEx due to the need for dedicated baseband equipment at each site. Conversely, vRAN significantly lowers OpEx through reduced site rentals, maintenance costs, fiber leases, and power and cooling requirements.

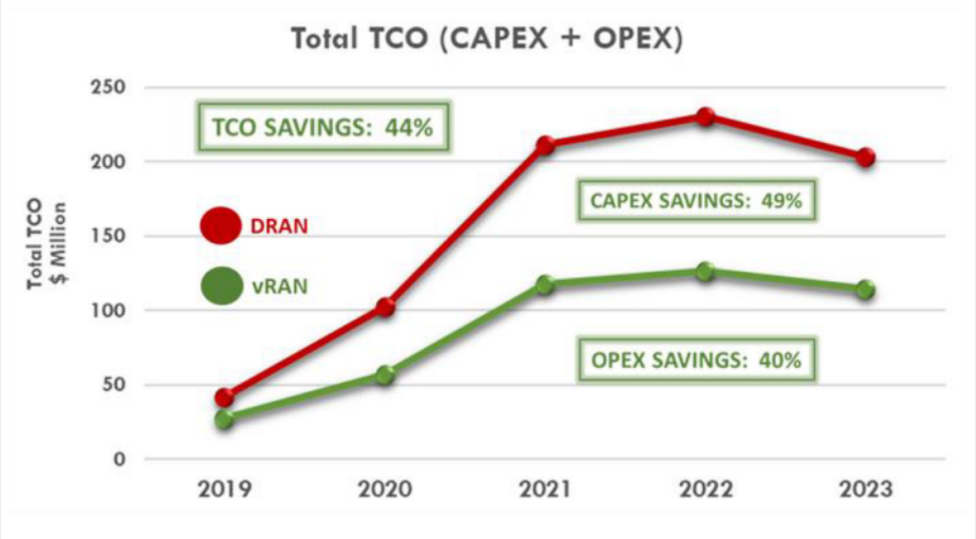

Figure 2. Economic advantages of using vRAN configurations in 4G deployments[2]

5G Core networks

New 5G Core networks are built on cloud-native architectures and can be deployed in various cloud environments, including private, public, hybrid, or multicloud setups. These modern architectures hold tremendous potential for cost reduction, particularly within the cloud platform itself. In the past, service providers would undertake the task of building and deploying their own clouds using open source or alternative software. However, this DIY approach entails significant effort, resource allocation, and time, requiring substantial investment. To mitigate these challenges, service providers now have the option to deploy fully supported, open source solutions provided by Red Hat. Relying upon customer and industry data and its own economic analyses, Red Hat has found that using its supported, open source solutions for telco cloud deployments as an alternative to DIY approaches yields an average TCO advantage of 35%.[3]

2 *ACG Research. "Economic advantages of virtualizing the RAN in mobile operators' infrastructures," 2019.*

3 *ACG Research. "The economic benefits of the Dell Telecom Infrastructure Blocks in a 5G Core network deployment," 2023.*

As service providers aim to deploy new virtual containerized network functions in distributed locations, the vertical vendor stack poses both operational and economic challenges. These providers seek to boost revenue through innovative new 5G services, necessitating a horizontal, cloud-native network capable of deploying and managing CNFs, VNFs, and other applications across a unified cloud platform from the core to the edge without constraints. Calculations based on 5G Core network models have demonstrated the potential to achieve a more than 30% lower TCO over a 5-year period, consisting of more than a 10% CapEx reduction and above a 40% OpEx reduction.

By taking advantage of a cloud-native, container-based solution, servers can be shared, thereby increasing server utilization. While individual vendor applications may function independently, they can reside on a shared application platform, leading to significant savings. This directly reduces CapEx by necessitating fewer servers and subsequently lowering overall operational costs. Each eliminated server results in decreased installation costs, reduced power consumption, a smaller physical footprint, fewer annual licenses, and more.

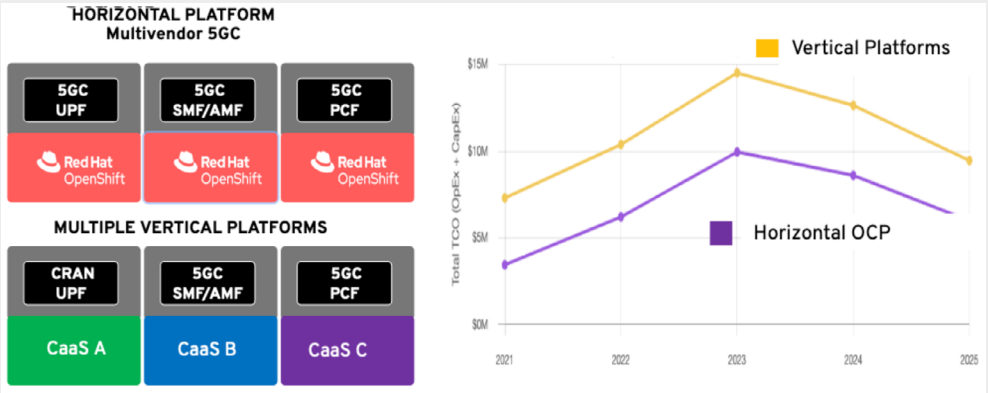

Figure 3. Multivendor 5G Core integrated, horizontal platform vs. vertical stack model

Moreover, overall OpEx is diminished due to the high level of automation achievable not only during initial operations but also throughout the ongoing life cycle, including Day 1 and especially Day 2 operations.

Key factors influencing TCO outcomes

A more unified or common cloud platform enhances operational efficiencies, accelerates time to market, improves productivity, and capitalizes on an efficient automation, orchestration, and telemetry framework. TCO models heavily rely on underlying assumptions, and the industry's discussions consistently show similar results of 30%-40% or more TCO savings, primarily in OpEx reduction. The actual cost savings achieved depend on the capabilities of the chosen technologies and the readiness and willingness of the service provider to maximize their utilization. The following key factors impact the outcomes of financial models:

- **Consolidation, migration, and infrastructure sharing:** The level of consolidation, migration, and efforts to share resources reduce the need for infrastructure assets and silos, leading to lower CapEx and OpEx.
- **Automation:** Automation and the speed to deploy automation plays a critical role in lowering OpEx and increasing resource utilization, further reducing both CapEx and related OpEx.
- **Network functions virtualization (NFV) architecture consistency:** The majority of NFV reference architecture remains the same when using a common cloud platform for the transition to cloud-native 5G Core and RAN. This architectural consistency allows increased efficiency when deploying and operating a collection of purposeful multivendor applications on a shared platform.
- **Simplified evolution path to cloud-native:** A simplified evolution path to cloud-native reduces overall costs, such as a greenfield CNF deployment for 5G Core, a brownfield multitenant deployment for EPC and 5G Core, and a brownfield CNF deployment for IMS.
- **Shortened validation and deployment cycles:** Cloud-native processes and methodologies result in faster time to market and better returns on investment (ROI) due to shortened validation and deployment cycles.
- **Multitenancy capabilities:** Providing multitenancy with the same vendor (e.g., telephony application server [TAS] and Call Session Control Function [CSCF]) allows for server consolidation, resulting in cost savings.
- **Comprehensive global partner ecosystems on business and engineering level:** A well-established partner ecosystem can deliver validated and certified solutions on a horizontal platform, reducing integration, deployment, and operational costs.
- **Detailed reference architectures and blueprints:** Preintegrated and tested partner solutions, accompanied by detailed reference architectures and blueprints, help lower integration costs.

Considering these factors in a target architecture can result in significant cost reductions across integration, deployment, and ongoing operational aspects.

Where can you go with Red Hat from here?

Red Hat has developed an open, horizontal telco cloud platform that serves as the foundation for ongoing TCO optimization across various areas and functionalities. Some key areas to lower OpEx and CapEx include:

- Multivendor, preintegrated solution stacks that simplify and expedite deployments and ongoing operations, reducing risks and time to market.
- Telco-grade[4] reliability to ensure high availability and reliability, meeting the demanding requirements of telco services.
- Maximizing automation capabilities throughout the platform, including partner solutions, to streamline operations from Day 0 to Day 2 and enhance overall efficiency.
- Built-in security measures from the beginning, with continuous maintenance and improvement, addressing the critical aspect of ensuring robust security in telco environments.

4 *Red Hat overview. "Redefining carrier grade for service providers," 17 Nov. 2022.*

- A consistent operational experience across the entire network, from edge to core, and smooth integration with major public cloud providers.
- Deployment and operation of virtual machines (VMs) and containers on the same platform, which is conducive to flexibility and agility in workload management.
- Out-of-the-box application development platform, empowering developers to create applications more efficiently and effectively.
- High-quality support services to promptly address any issues and ensure optimal network performance.
- Training and services to transfer skills and help organizations adapt and embrace the telco cloud platform quickly.

"We're seeing convergence in the marketplace in terms of a lot of our customers wanting to leverage the telco cloud into their OSS, BSS, and IT-based environments. In addition to that, migrating those environments to the edge and into the MEC environments as well as also into the enterprise space with 5G private, slicing, and other sorts of technologies, we think that having a common platform enables our customers to move fast and move confidently into where they need to go and how they need to scale, and we think that this is a great opportunity and a nonexclusive opportunity for us to do that."

Darrell Jordan-Smith
SVP for Telecommunications, Media, and Entertainment (TME) and edge at Red Hat

Unlocking additional savings from a horizontal telco cloud

The diverse TCO calculations conducted across numerous scenarios have consistently demonstrated the crucial role of the underlying foundation and platform. This foundation lets service providers transition from a mere connectivity business to a platform business, unlocking the potential to monetize the value of 5G. It empowers developers to harness the capabilities of a 5G system—encompassing network functions, multiaccess edge computing (MEC), and IT—to create innovative and dynamic service experiences.

Implementing an efficient, high-performing platform helps service providers achieve:[5]

- 32% greater efficiency in infrastructure teams.
- 81% reduction in unplanned downtime.
- 16% lower 3-year cost of operations.

Service providers using a unified application platform and tools can realize:[6]

- 20% higher DevOps and development team productivity.
- Approximately 3 times more new features.
- 29% faster application development cycles.

Moreover, service providers who simplify their processes through automation can experience:[7]

- 30% increased efficiency in infrastructure teams.
- 29% improved efficiency in network infrastructure teams.
- 39% more applications developed per year.
- 30% enhanced efficiency in security teams.

5 *IDC White Paper, sponsored by Red Hat. "The business value of Red Hat solutions versus non-paid open source alternatives." Document #US50423523, March 2023.*

6 *IDC Executive Summary, sponsored by Red Hat. "The business value of Red Hat OpenShift." Document #US47539121, March 2021.*

7 *IDC Executive Summary, sponsored by Red Hat. "The business value of Red Hat Ansible Automation Platform." Document #US47989320, October 2021.*

Telco clouds are shifting toward more efficient and agile container-based architectures, replacing less efficient virtual machines.[8] These clouds are now also being used to run operations support systems (OSS), business support systems (BSS), and IT workloads, expanding their functionality and extending beyond private clouds to hybrid and multicloud environments. This expansion of telco cloud capabilities unlocks additional TCO savings opportunities beyond the 5G Core and RAN components.

The additional benefits of a Red Hat-based, horizontal telco cloud include:

- **Faster time to market.**
  - A study conducted by Nokia[9] revealed that 50% of participants were likely to switch providers to get 5G if their own provider did not offer it in the next 12 months, and more than half would be willing to pay more.
- **Extensive security measures.**
  - IBM's 2022 Cost of a Data Breach Report[10] found the average cost of a data breach reached a record US$4.35 million in 2022.
- **A foundation for environmental sustainability.**
  - Ericsson[11] demonstrated average energy efficiency improvements of up to 20% through dynamic power management.

Red Hat horizontal telco cloud

Red Hat® OpenShift® offers more than just Kubernetes. It combines 25% Kubernetes, 25% cluster services, and 50% application development platform. This comprehensive solution provides an array of platform services, including service mesh, continuous integration and continuous deployment, support for various programming languages and runtimes, data analytics, artificial intelligence (AI) capabilities, developer command line interface (CLI), plug-ins, and Backstage. Using this unified cloud platform allows service providers to establish an intelligent, programmable, and automated cloud-native 5G platform that can be deployed on any cloud infrastructure. It harnesses the performance potential of different silicon technologies (such as Intel and ARM) and OEMs (such as Dell and HPE) while also offering architectural flexibility for RAN, private wireless, enterprise edge, and MEC applications.

Furthermore, all of these capabilities are delivered with carrier-grade performance, ensuring the reliability, scalability, and resilience required by telco service providers.

8 *"What is telco cloud?," Red Hat, 28 Feb. 2023.*

9 *Nokia. "5G report: The value of 5G services and the opportunity for CSPs," 2020.*

10 *IBM report. "Cost of a data breach report 2023," accessed August 2023.*

11 *Intel blog. "The power of ecosystem collaboration to reach sustainability goals," 22 May 2023.*

About Red Hat

Red Hat helps customers standardize across environments, develop cloud-native applications, and integrate, automate, secure, and manage complex environments with award-winning support, training, and consulting services.

facebook.com/redhatinc
@RedHat
linkedin.com/company/red-hat

North America
1 888 REDHAT1
www.redhat.com

Europe, Middle East, and Africa
00800 7334 2835
europe@redhat.com

Asia Pacific
+65 6490 4200
apac@redhat.com

Latin America
+54 11 4329 7300
info-latam@redhat.com

redhat.com
#469161_0823