

Simplifying Service Provider Mobile Core Networks

Cisco Cloud Services Stack for Mobility is a complete mobile core solution

Introduction

Communication service providers (CSPs) today continue to struggle when designing and operationalizing the complex solutions presented by new virtualized and cloud-based technologies. Mobile network technology relies on cloud-based solutions that carry the promise of more flexible service architectures.

However, unlike the “single box” physical appliances of the past, Telco Cloud infrastructure is difficult to implement and carries many hidden costs, particularly when CSPs are mixing and matching devices and building unique stacks of their own in Do It Yourself (DIY) fashion. This hodge-podge of individual products adds risk, slows down time to market, and increases both upfront costs and those accrued over time.

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Communication service providers (CSPs) are under continuous pressure to increase network capacity as they seek to keep their mobile customers happy while making a successful transition to NextGen mobile architectures. They want to know the best way to accomplish this both quickly and easily.

It's one thing to do your research, order your products, and have seven or eight devices show up in your loading bay. But it's quite another thing to design, integrate, and test all these components to achieve a working, carrier-grade packet core network.

In response, Cisco introduced a predesigned, pre-validated, and pre-characterized packet core solution for mobile core implementations. Cisco Cloud Services Stack for Mobility is an exciting solution for CSPs because it offers the building block to get to market quickly and easily without the struggle of integrating and testing many different products into a fully operational system. This solution is made specifically for CSPs who are rethinking their custom stack and those who seek to expand capacity on their mobile networks.

Harnessing the Telco Cloud

Mobile infrastructure development is enabled by Network Function Virtualizations (NFV) and Service Provider Private Cloud. This is also called Telco Cloud – a unified operational environment designed to achieve the benefits of a CSP infrastructure such that each new service and application can leverage the platform investment and simplified operational processes. It is the hardware and software infrastructure supporting flexible and efficient deployment of the applications that CSPs use to manage and deliver those services.

Cisco Cloud Services Stack for Mobility utilizes key industry-standard capabilities, fully featured mobile packet core software, and our extensive experience designing, leveraging, and troubleshooting issues for a faster rollout of new services and improved long-term total cost of ownership (TCO). Customers also benefit from Cisco Solution Support that centralizes technical support across all hardware and software, helping resolve issues faster than product support.

Our solution gives CSPs best-in-class components (both hardware and software), a pre-validated Cisco design blueprint for mobile deployments, and the option to onboard and integrate third-party Virtual Network Functions (VNFs) into your service architecture. It also offers pod deployment automation, large scale “hyperconverged” and smaller scale “micro-pod” variants with functional/scalable performance, and system-level security penetration testing.

Some may wonder what's new in this package since Cisco has always offered these components and services. What makes it unique is how we've put this solution together. It is specifically designed to save CSPs the time and extra costs of systems testing, integration, and support. In this paper we

compare Telco Cloud to Cisco Cloud Services Stack for Mobility and discuss some of the benefits of letting us build the technology stack for you.

Promise verses reality of NFV and Telco Cloud

Over the past several years, the Management and Organization Working Group of the European Telecommunications Standard Institute (ETSI MANO) has defined a standard for building network functions virtualization infrastructure (NFVI) networks. It divides the architecture into three major blocks: virtual infrastructure manager (VIM), VNF manager, and NFV orchestrator. The VIM is a specific part of the MANO framework that controls and manages the NFVI compute, storage, and network resources. The goal of the original ETSI NFVI standards was to make it easier for CSPs to combine different components from various telecommunications equipment manufacturers into a functioning network.

Many CSPs jumped in with both feet to develop NFVI-based networks using best-in-class (and often disparate) technology stacks. They were lured by the

promise of plug-and-play simplicity offering ease of use, cost efficiency, and scalability. Unfortunately, these promises did not always deliver for vendors, often due to the sheer complexity of it. A full network requires dozens or hundreds of NFVs running on multiple hardware types and automated/orchestrated by a variety of software systems, and the permutations for all these components quickly grow astronomical. While some CSPs successfully built Telco Clouds, the projects nevertheless required advanced skillsets and large budgets, and this bar proved too high for many providers.

Some providers also struggled to define, integrate, and regression test best-of-breed custom stacks which led to higher integration costs, interoperability issues, and increased security risk. For example, debugging becomes much more complicated and components must be both maintained and tested in the CSPs' dedicated labs. These challenges often led to delayed product introductions, and in some cases complete project cancelations. Even with successfully deployed programs, the increased complexity resulted in escalated long-term costs. Cobbling together DIY stacks can also become a hinderance to your roadmap. Take a closer look at some of the costs and challenges in Figure 1 below.

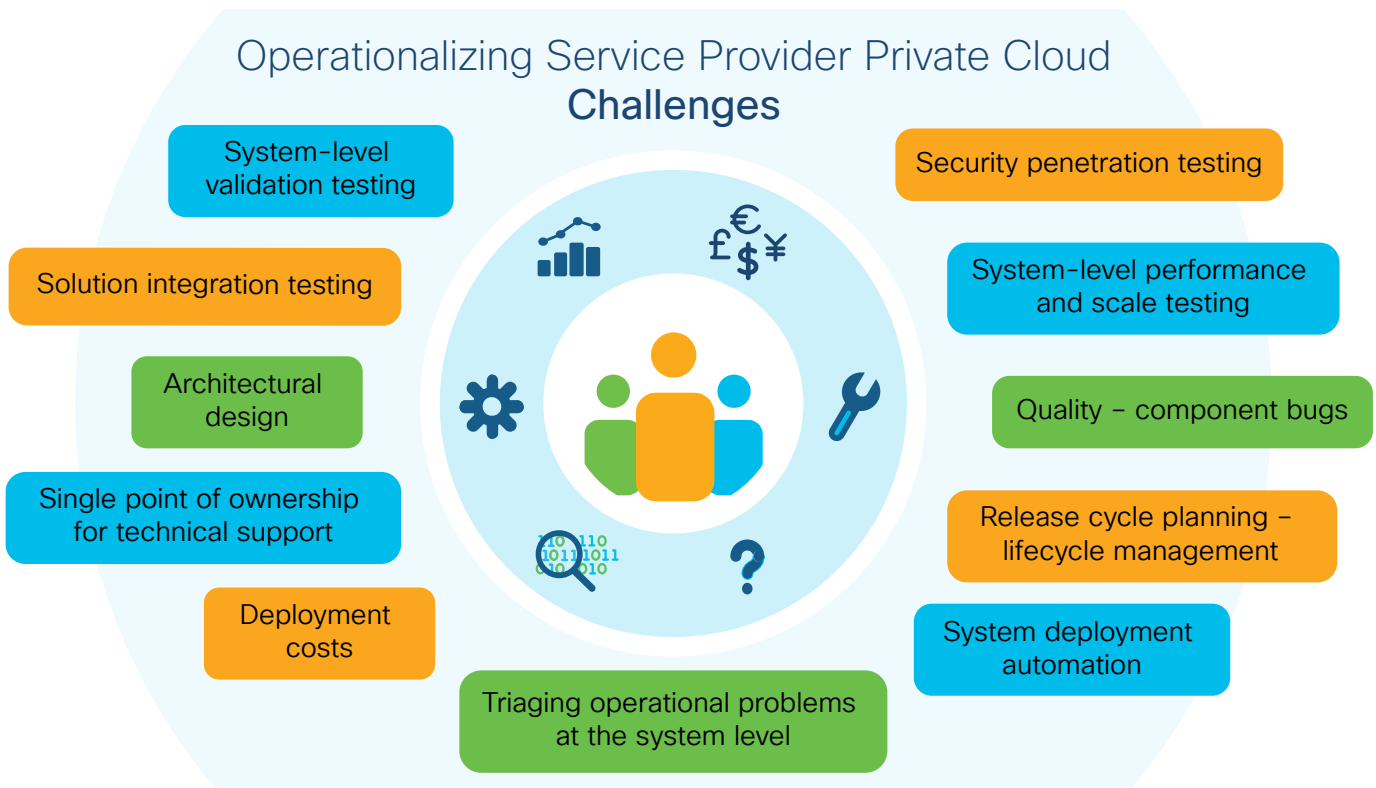


Figure 1. Challenges of Telco Cloud that Cisco Cloud Services Stack for Mobility addresses

Only with Cisco Cloud Services Stack for Mobility		
	Cisco Cloud Services Stack for Mobility	Custom Stack DIY
Reference Architecture Documented	✓	✗
Architectural/System Level Functional Testing	✓	✗
Architectural/System Security PEN Testing	✓	✗
Architectural/System Level Scale & Performance Testing	✓	✗
System Deployment Automation	✓	✗
Lifecycle Management/System Level Planned Roadmap	✓	✗
Cost Effective Upgrade Releases & Upgrade Migrations	✓	✗
Cost Reduced System Level Deployment Services	✓	✗
Solution Support -triage across entire stack, single PoC	✓	✗
Accelerated TAC Response - TAC Engineers trained, have tools	✓	✗

Figure 2. Cisco Cloud Services Stack for Mobility vs. custom stacks

A less obvious detractor of Telco Cloud is the subsequent post-procurement costs that CSPs are required to budget for. These range from design and integration costs to security, performance, and scale testing, which can be quite extensive. In a DIY custom stack, the CSP is required to either resource the tasks themselves or pay a third-party systems integrator to deliver on the tasks. Cisco performs these activities in Cloud Services Stack for Mobility as part of the overall solution development and includes them as “no cost” options in the overall solution, so the CSP doesn’t need to budget in advance for these fundamental project tasks.

Learning from experience

Cisco has delivered major mobile deployments at CSPs around the world in recent years. Some of these success stories include:

- T-Mobile (USA): The world’s largest virtualized network
- Rakuten (Japan): Our most aggressive greenfield 5G-ready cloud platform
- Vodafone Idea (India): One of the most automated deployments ever rolled out
- 5G RuralFirst (United Kingdom): One of the world’s most ambitious rural 5G trials

We learned a great deal about NFVI and how to deliver a successful outcome over the course of these and other challenging deployments. We leveraged these transformational engagements and knowledge gained

from experience to craft a unique solution. Cisco Cloud Services Stack for Mobility takes our hard-won product learning and deployment experiences from these very demanding environments and packages it in a ready-to-buy, ready-to-deploy solution. It allows CSPs to speed up their time to market with reliability, low risk, and cost effectiveness.

Solution overview

Designed by the team at Cisco Customer Experience (CX), our Cisco Cloud Services Stack for Mobility solution offers a horizontal, carrier-grade NFVI platform that is pre-integrated with multiple network functions and pre-validated through extensive testing. It is embedded with automation, assurance, and hardened security to help reduce integration costs and overall networking complexity. Cisco Cloud Services Stack for Mobility is based upon our 36 years of experience as a leader in technological innovation and development, best practices, services expertise, and networking insights. Our experts have engaged with some of the world’s leading telecom companies such as T-Mobile and Rakuten. Our solution is also fully supported through a primary point of contact with Cisco Solution Support, your always-on hotline for questions and answers covering the whole stack and not just piece parts.

Below we’ll take a more detailed look at some of the benefits offered by Cisco Cloud Services Stack for Mobility, as shown above in Figure 2 and below in Figure 3, and why they’re important to this solution.

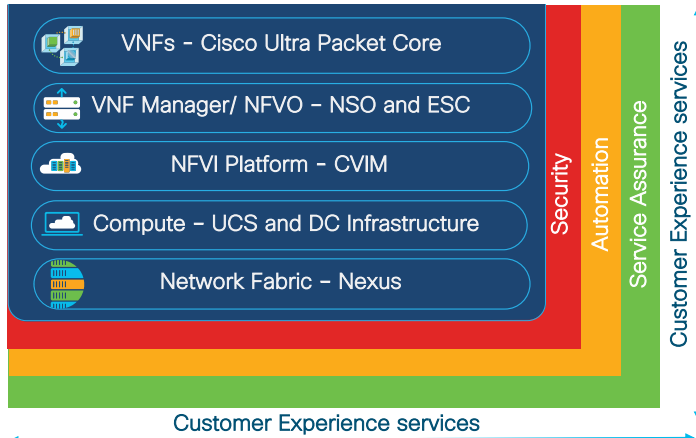


Figure 3. Cisco Cloud Services Stack for Mobility – Best-in-class components

- Cisco’s market-leading Ultra Packet Core (UPC) combines all packet core services into one solution and is deployed in the world’s largest and most challenging mobile networks. The UPC is the industry’s most complete, fully virtualized and evolved packet core designed to capture new and untapped revenue opportunities, most notably with machine-to-machine connections such as Internet of Things (IoT) devices. It supports packet core services and small-cell networks in a single solution. UPC provides these network functions as virtualized services, so you can scale capacity and introduce new services much faster and more cost-effectively than ever before.
- Cisco Virtual Infrastructure Manager (CVIM) is a carrier-grade virtualization platform based on Red Hat, a leading provider of open-source solutions for cloud, virtualization, storage, Linux, and middleware technologies. The CVIM acts as an orchestrator to deploy a virtualized operating system, allocating resources across the compute to run the packet core. It utilizes OpenStack, so it is an open-source platform already familiar to most mobile operators. However, because OpenStack requires extensive time to install, we automated and simplified the entire process. CVIM is designed to make deployment and lifecycle management a fully automated, self-validating, and easy task for the operations team. As CVIM is based on the open-source OpenStack platform, cost is minimal while still providing an open platform with no vendor lock-in. Another key advantage of CVIM is that it’s carrier grade out of the box, with triple redundant controllers and a distributed storage backend. Security is built in by default with Security-Enhanced Linux (SELinux) on all CVIM servers. All services (both OpenStack and CVIM management

plane processes) are containerized, a host-based firewall is used pervasively throughout the deployment, and network segmentation along with many other hardening aspects are applied automatically. Finally, Cisco has invested in adding value to the base OpenStack to ensure challenging areas, including upgrades, have well designed solutions.

- Cisco Network Services Orchestrator (NSO) is an award-winning automation and orchestration (also known as provisioning) product. Its primary purpose is configuring the network.
- VNF Manager with Cisco Elastic Services Controller (ESC) are the components used for automation and lifecycle management, particularly starting and stopping the VNFs.
- A sophisticated hardware platform based upon Cisco Unified Computing System (UCS) and Cisco Nexus data center fabric is included in the package. Our Nexus 9000 Series data center switches utilize Application Centric Infrastructure (ACI), a software layer providing network automation, which allows you to connect all the instances of the packet core and move them around in the data center as needed.
- We offer globally available professional services expertise with reduced price and risk services, enabled by Cisco’s investments in reference architecture design, deployment automation, and pre-validation testing.
- Optional High or Dedicated Touch Technical Support (HTTS, DTTS)
- Optional Solution Validation Services for ongoing testing, design, and validation capabilities

Additional service provider benefits

- Avoid expensive VIM Enterprise Agreements (or “taxes”)
- Accelerate implementation and innovation of mobility services by standardizing the infrastructure, leveraging economies of scale, and avoiding the challenges of unique DIY stacks
- Speed deployment of the market-leading UPC solution, based on carrier-grade Cisco VIM, Cisco UCS servers, Cisco NSO, and embedded security
- Reduce design and procurement complexity through a pre-tested and pre-validated horizontal, carrier-grade NFVI platform for Telco Cloud/NFVI, based on years of

Automation in Deployment

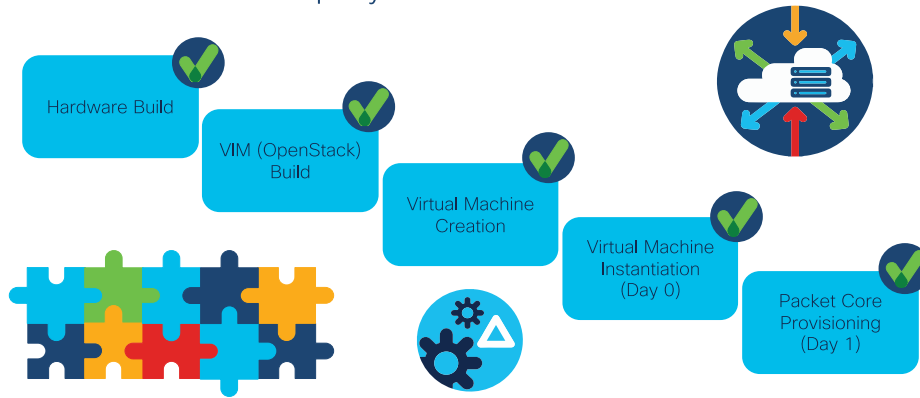


Figure 4: Cisco Cloud Services Stack for Mobility automation

experience

- Lower integration costs by leveraging Cisco’s investment in pre-design and pre-validation testing of best-in-class stack components
- Solve complex issues faster by providing one single point of contact for all technical support issues across multiple stack components
- Leverage our investment and experience in security penetration testing of this stack, together with large scale performance and scale validation, saving CSPs significant investment

More about automation

In the current release we include automation to make deployment easier for the CSP. This ensures rapid rollout of pods of the Cisco Cloud Services Stack for Mobility and is valuable for both small scale and large-scale rollouts.

Why is technology standardization so critical?

Since the NFV architecture was formalized by ETSI, CSPs have been mixing and matching different components from different manufacturers to build their own custom technology stacks. Unfortunately, this creates integration lifecycle management problems, as we discussed earlier, in all stages of the design, deployment, and operations lifecycle as illustrated in the picture below.

Looking across our global installed base of virtualized packet core deployments, we’ve found that the more standardized a set of hardware and software components, the greater the reduction in complexity and resulting problems. Combining the right solution engineering with Cisco methodology and automation capabilities enables us to validate and secure the stack for easier deployment and more predictable outcomes. We can also focus testing on a smaller set of

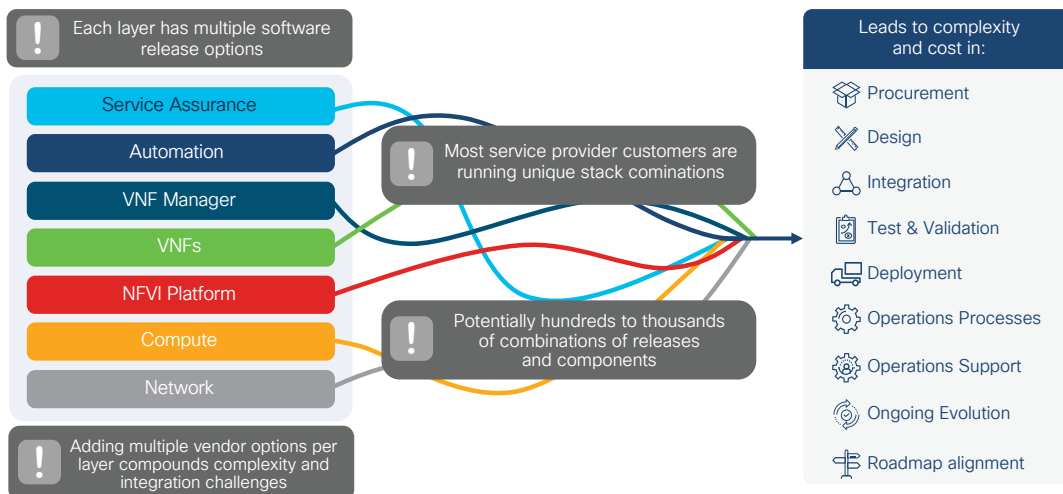


Figure 5: How complexity and integration costs compound in the virtualized world

Learn more

Get more details about the technical capabilities of [this solution](#).

permutations and combinations to deliver quicker, more reliable results.

We designed Cisco Cloud Services Stack for Mobility from our direct experience using a Cisco best practices design blueprint. We combined our market-leading Cisco UPC, CVIM, UCS, and Cisco Nexus data center fabric into a single, out-of-the-box solution which is automated using Cisco NSO. This solution has undergone extensive system-level testing of functionality, scale, performance, and security penetration. The focus on standardization and complexity reduction can deliver big benefits. We have engineered the solution to drive down costs by 20-40 percent compared to full custom-stack deployments.

We've also invested heavily in driving down both deployment costs and timeframes of our professional services offers. Our investment in pre-validation testing and deployment automation is central to achieving optimized professional services delivery – and our Cisco Customer Experience professional services organization stands ready across the globe to help your project delivery. The expertise and track record of our technology consultants and solutions architects, which Cisco has scaled globally, is coupled with the investment to simplify and drive cost out of deployment. These investments will reduce risk and help drive towards on-time project delivery for the most aggressive rollouts.

Finally, the Cisco Cloud Services Stack for Mobility includes Cisco Solution Support which offers a primary technical support point of contact across all components of the stack. This results in up to 44 percent faster resolution times for complex issues compared to single-product support – with no need to play the frustrating “vendor blame game” that is so common in current generation Telco Cloud deployments.

Conclusion

There are plenty of valid reasons why CSPs designed unique technology stacks in the past. Some will no doubt continue to try. But we believe the future lies in standardization and simplification. Our solution is designed to address the fundamental challenges of building NFVI-based mobile networks, so CSPs get to market faster, with lower risk and less cost. Cisco Cloud Services Stack for Mobility helps overcome the challenges of Telco Cloud design, testing, and operations of today's mobile networks.