

LAB AS A SERVICE

FOR NETWORKING LABS

STREAMLINING AND
EMPOWERING AGILE
DEVELOPMENT



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Introduction:

Why Lab as a Service for Networking Labs?

Many organizations have determined the keys to competitiveness now require simultaneously accelerating release cycles and increasing quality. They've also learned achieving these goals is a tough challenge. It requires a retooling of processes and infrastructure to develop and test continuously. Hence they're reengineering their entire approach to product and service delivery using Agile development.

Agile emphasizes close collaboration between business stakeholders, the development team, and QA and moving testing earlier. Agile implementation is even more complex for networking solutions due to the complexity of the testing environment—especially with the advent of 5G.

Shrinking development cycles require shorter, more frequent continuous testing. To keep pace consumption of testing resources is being overhauled. Lab as a Service provides the agility and flexibility needed to allow a wide variety of consumers to participate in the continuous testing process.

This ebook discusses the four aspects that most contribute to LaaS deployment success. They are:

- Lab and resource consolidation
- Process streamlining
- LaaS tool selection and integration
- LaaS for virtual and hybrid technologies

LaaS Benefits

- Reduced CapEx & OpEx
- Increased productivity
- Increased resource utilization



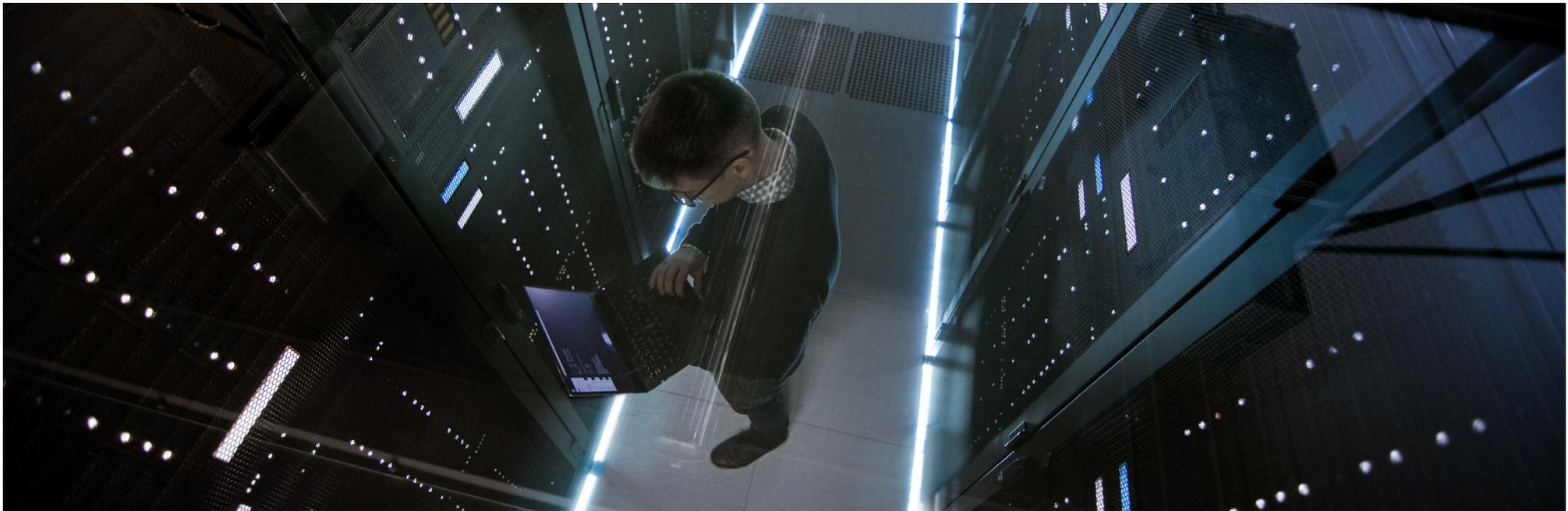
Chapter 1: LaaS Applications and Users

Lab as a Service (LaaS) delivers the lab resources required by Development, QA, Support and other teams on an on-demand basis. LaaS is proven to reduce CapEx and increase lab user efficiency. Spirent delivers Lab as a Service with Spirent Velocity.

Lab as a Service (LaaS) also empowers Agile development by enabling lab resources to be consumed in an efficient and automated fashion while keeping pace with continuous testing. Furthermore, since continuous testing (CT) requires development teams to be empowered with the same understanding as QA has of the end customers' use cases and operational environments, this information has to be captured in an easily consumable form for automatic, streamlined test environment reproduction.

Typical LaaS users include software developers, QA engineers, post-sales customer support representatives and/or pre-sales technical solutions professionals. Therefore, the lab experience must be tunable to satisfy each specific user class' needs.

Other considerations must reflect senior management's objectives. For example, if CapEx savings are paramount, shared resources would be configured with layer 1 switching to maximize overall utilization. Alternatively, if time-to-market is the paramount goal the lab could be organized with resource pools per team.

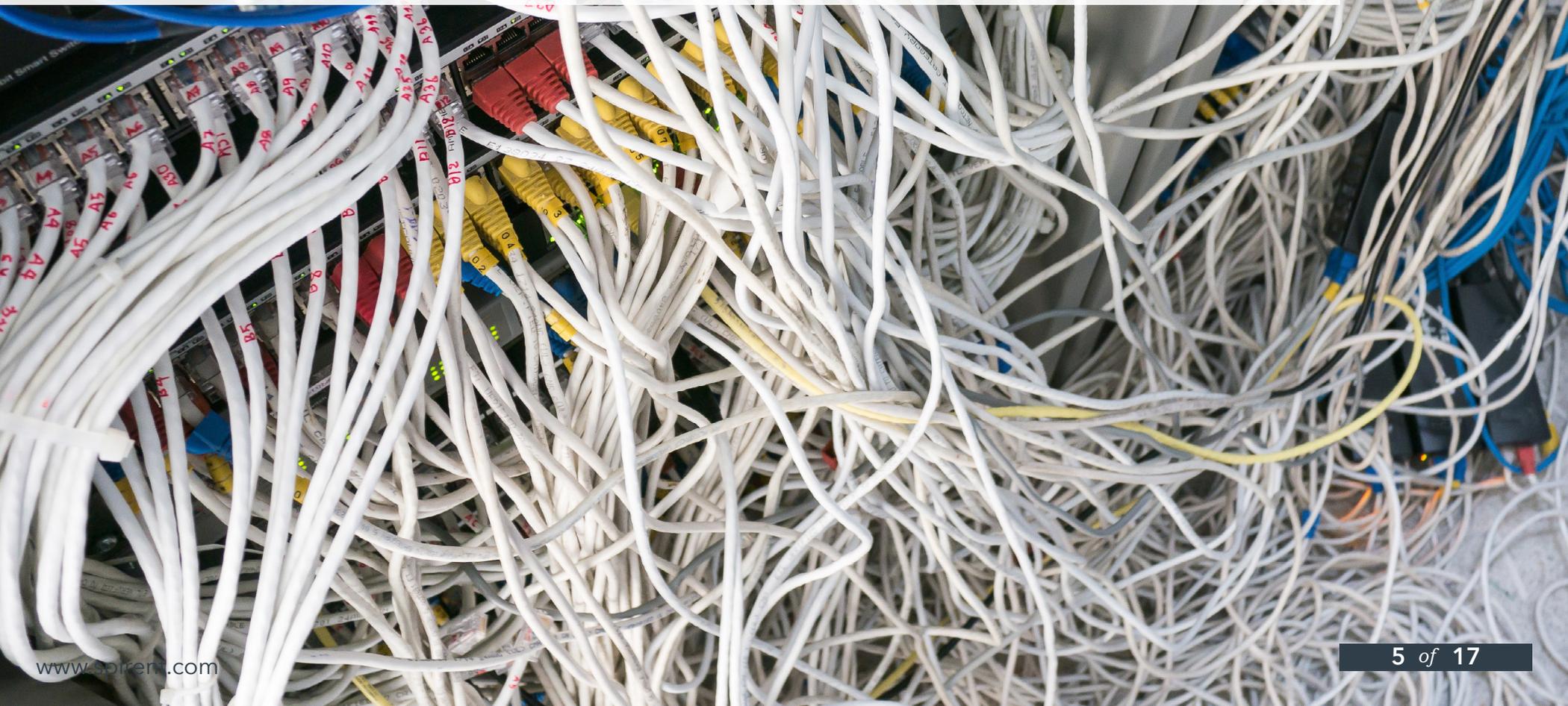


Chapter 2: Traditional Lab Background

Labs were traditionally created to serve a single team such as development, QA, sales, customer support or operations. Each lab had its own infrastructure, tools, test environments, and support staff, with the efficiency of each lab primarily dependent on the budget allocated.

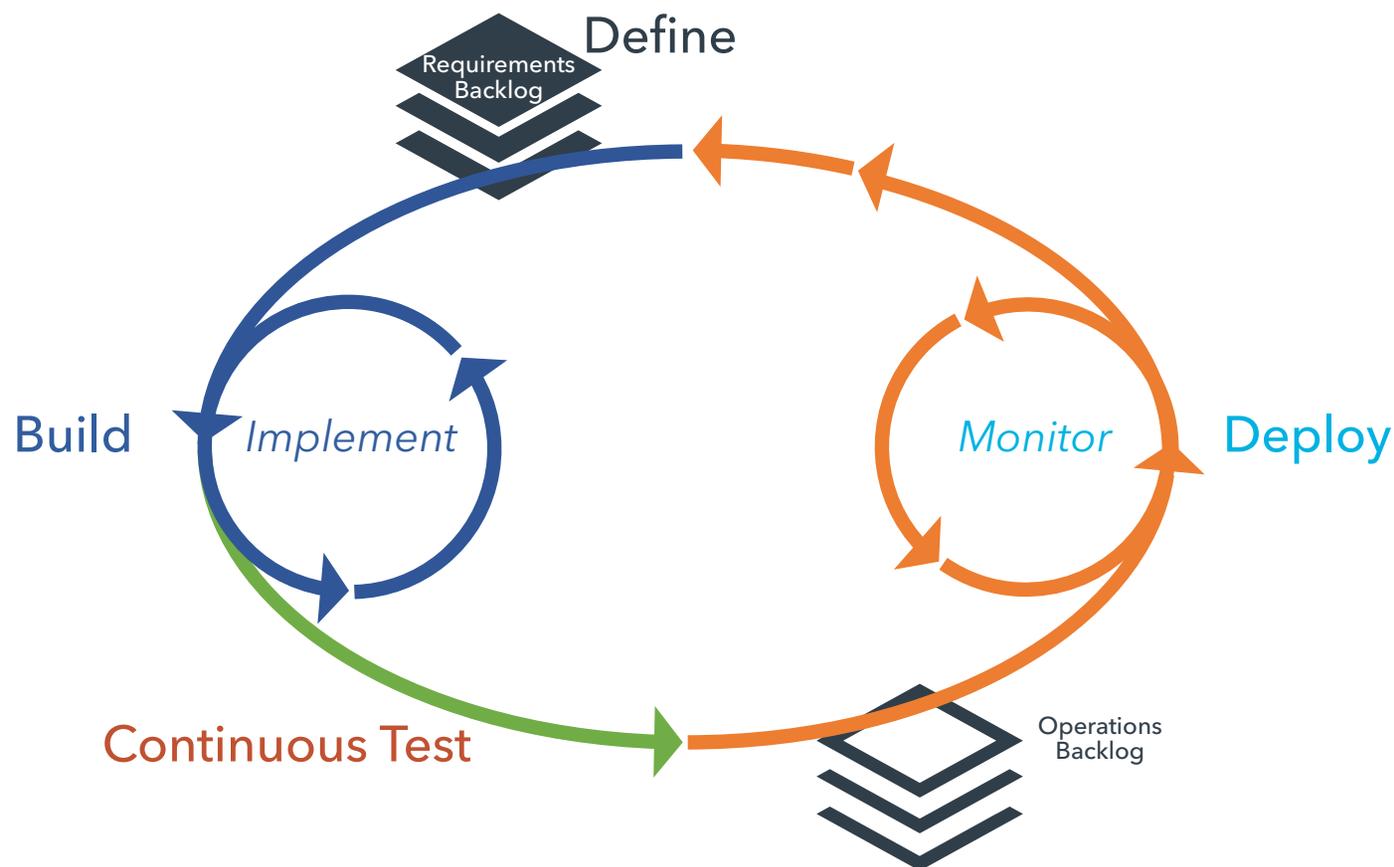
The success of any given lab was determined principally by the people running it since processes were manual.

The result was that most of these labs were not well coordinated, nor were they sufficient to meet peak demands. Engineers “hogged” resources for fear those resources wouldn’t be available when they were needed. Obviously that practice negatively impacted utilization. Even more detrimentally, such labs were not structured to share resources or to optimize technology usage. Consequently, such organizations experienced low return on invested capital. Once senior management determined they could no longer afford to ignore these inefficiencies, they’ve moved to institute new models.



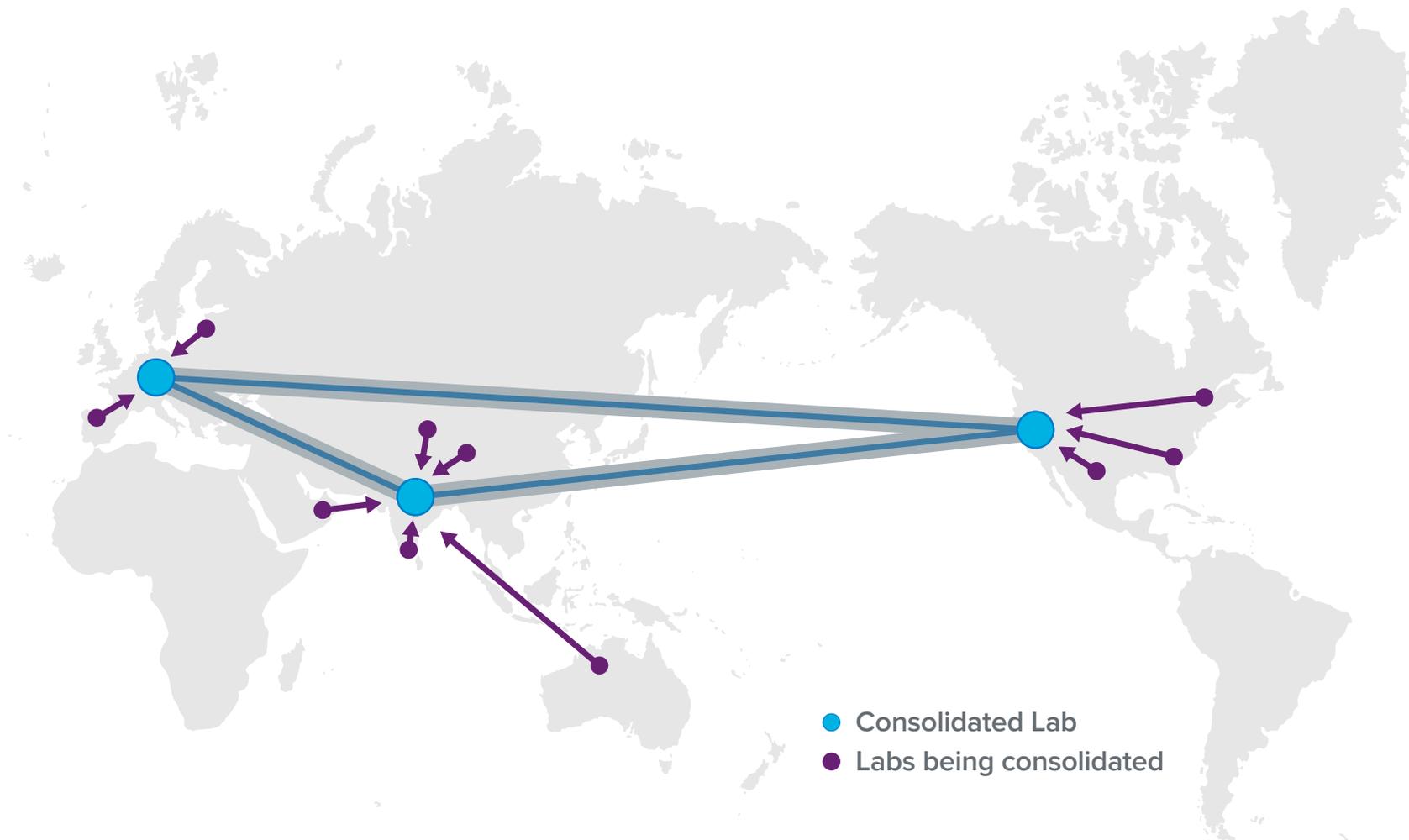
Chapter 3: Lab and Resource Consolidation

Inefficient capital utilization combined with today's fast-paced Agile environments are forcing team structure and processes to rapidly evolve. Consequently, network labs are being forced to evolve as well. To keep pace organizations have adopted DevOps to improve build, test and deployment efficiency. This provides enhanced process visibility, shorter and controlled development and delivery cycles, while simultaneously reducing costs and improving quality. Read on to learn how your organization can take advantage of lab, resource, and process consolidation to grow your business.



When your organization decides to optimize its multiple, isolated, special-purpose labs, the obvious conclusion is to consolidate. On the positive side consolidation creates opportunities for efficiency gains and cost reduction. However, it also creates new challenges for the managers and users of the lab.

Lab consolidation can involve relocation of assets to a common facility, but this is not necessarily the case. The regional location of the lab is based on economic considerations such as regional costs for power and real estate as well as development clusters synergies. While resources move, typically the consumers of the consolidated lab remain in place. This creates a need for reliable, remote worldwide 24x7 lab accessibility.





Several benefits arise from federating resources into larger, consolidated labs:

- CapEx reductions through greater utilization of expensive resources—resources can be used 24x7 around the globe
- Better quality—by combining resources that were once segregated, it enables more complex, real-world environments to be tested
- OpEx reductions through savings in facilities—power and cooling costs as well as floor space

Chapter 4: Streamlining Lab Operations

Lab consolidation allows organizations to operate more efficiently. It also enhances the lab administrators jobs. Instead of manually tracking resources, they apply their skills to better managing resources, ensuring test requirements are met and getting software releases to market faster. In fact, consolidated lab managers commonly report increases in job satisfaction and promotions, often saving their companies millions of dollars annually. However, the benefits of consolidation only accrue if the processes and technologies used to manage the lab address the associated challenges caused by consolidation. They must be able to deliver:

- Remote access for lab consumers
- 24x7 support including “always available” resource expectations
- Tracking and maintaining the much expanded volume of equipment

Lab as a Service (LaaS) solutions offer the best and most efficient way to accomplish the goals of lab consolidation while addressing the challenges created by larger-scale lab infrastructures.



Chapter 5: LaaS Tools Enable Consolidation

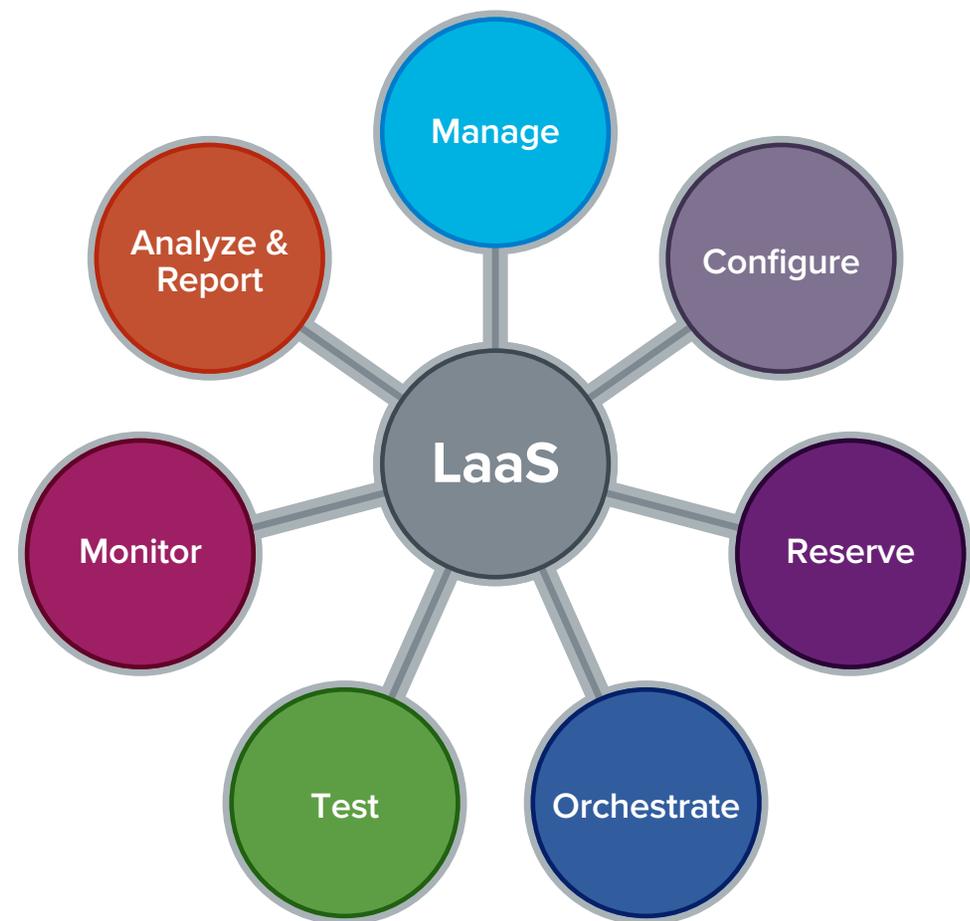
LaaS tooling provides the services needed by both lab administrators and consumers. These services are delivered securely via remote access.

At the core of a LaaS solution is the ability to automatically deliver the set of resources required to do a test or full regression, properly networked together, and with the necessary configurations on each device. Furthermore, it needs to do so for physical, virtual and hybrid sets of resources.

Since LaaS systems typically serves both human initiated and programmatically generated requests (e.g., from build systems such as Jenkins) it must support both a browser-based view and a REST API.

Developers may refer to this environment as a “sandbox”, QA engineers may call it a “testbed”, DevOps managers may refer to it as a “test line” and a network administrator may call it a “topology”. Regardless of the label, the common attributes are:

- Includes one or more resources, configured and interconnected per the user’s specifications
- Environments built dynamically on demand
- Resources must be discoverable and reservable
- Predictable with reliable repeatability



Components of a LaaS environment



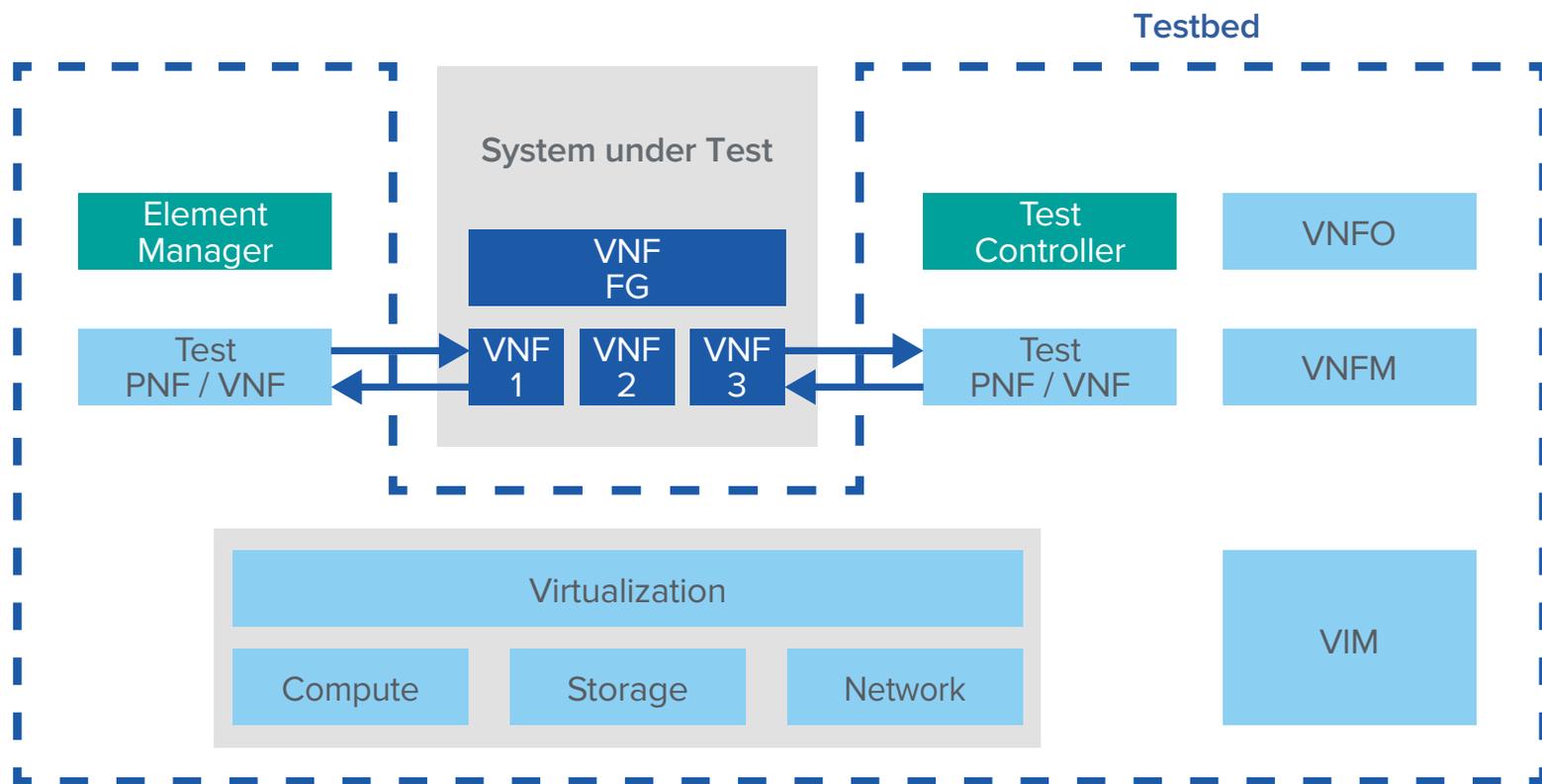
Users control the LaaS system via its Graphical User Interface (GUI). Automation initiated tasks operate via a REST API.

Once a test environment is defined it will be added to the topology catalog making it available for all users to reserve. Reservations will be accepted as long as the required assets are available for the duration of the reservation request. Should there be conflicts, the user will be presented with a set of options to accomplish their task.

All reservations and contentions are recorded for analysis and action. This gives management the information required to evaluate resource demand relative to supply and to rebalance as needed.

Chapter 6: LaaS for Virtual and Cloud Technologies

Adoption of virtual technologies and Software Defined Networking (SDN) is a major trend. Hence, virtualization of the lab is a natural consequence. Application-level components are being virtualized and operated in the form of private, public or hybrid cloud architectures. This includes the devices or services under test as well as the associated test tools.



Orchestrating a virtual testbed requires instantiation of virtual devices on top of the virtualization infrastructure. Adding further complication are combined physical and virtual environments, known as Hybrid.



Many Advantages of Virtualizing Labs:

- Operating system, application stacks and configuration data can be saved and restored upon demand
- Physical infrastructure may be used for any application
- Network service changes can be implemented using virtual switches
- Administrative procedures can be standardized based upon user permissions
- Environments (aka topologies) are easy to replicate
- Easy to back-up and restore environments and topologies
- Entire systems may be version managed
- Straightforward to orchestrate entire environments

Conclusion:

Lab as a Service (LaaS) is the Key to Modernized Lab Experience

LaaS is crucial to the success of large-scale, consolidated labs. It is required to enable the administrators to manage the lab and for users to effectively consume lab resources.



Modern Lab as a Service offers a wide range of advantages for lab users, administrators, and executives.

Process Automation—tasks required within the lab should be as fully automated as possible. For example, LaaS can automate the physical connections between devices using a layer 1 switch.

Configuration Automation—setting up and tearing down device configurations can (and should) be fully automated by LaaS. This frees users to focus on their job versus being experts at DUT configuration. It also ensures subsequent equipment users will always have a known good starting point.

Virtual Orchestration—creating and destroying virtual environments can be fully automated along with the physical devices in the environment. Configuration of the VIM and the VNF is also configured by the LaaS.

Test Execution Automation—LaaS can execute tests, analyze results and report those results to the users or management all automatically.

By automating test environment standup, configuration, and test execution, LaaS provides 100% unattended efficiency for users and administrators.

By automating resource utilization reporting and trend analysis, LaaS provides management with far decision making efficacy.

Next Steps

This LaaS White Paper provides organizations now planning their first LaaS experience with a high level description of what to expect and plan for.

When you are ready Spirent will also consult with your organization to provide a comprehensive solution blue print. That would include any or all of the various considerations, best practices and benefits that accrue to LaaS implementations. Contact your Spirent salesperson or systems engineer to initiate that process.

For additional information:

Spirent Lab as a Service

<https://www.spirent.com/Solutions/Lab-as-a-Service>

Spirent Test as a Service

<http://www.spirent.com/Solutions/test-as-a-service>

Spirent Velocity

http://www.spirent.com/~media/Datasheets/Broadband/PAB/CLEAR/Spirent_Velocity_datasheet.pdf

Spirent

www.spirent.com

About Spirent Communications

Spirent Communications (LSE: SPT) is a global leader with deep expertise and decades of experience in testing, assurance, analytics and security, serving developers, service providers, and enterprise networks.

We help bring clarity to increasingly complex technological and business challenges.

Spirent's customers have made a promise to their customers to deliver superior performance. Spirent assures that those promises are fulfilled.

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