tenable network security

# Continuous Monitoring for the New IT Landscape

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# Introduction

Recent breaches have targeted a fatal flaw in the way organizations have approached security over the last two decades. While the focus has been on investing in multiple preventive security technologies—centralized authentication, desktop virus prevention, automated patching, next generation firewalls, sandboxes for zero-day malware, and security event management—adversaries have taken advantage of blind spots that have widened as the IT landscape has evolved. The recent breaches occurred not because of unknown weaknesses in the defensive technologies. They occurred because of gaps in coverage, due to the fact that the defensive technologies were not aligned with any security policy or business practices.

For example:

- In 2011, when the term "APT" was first used in the media, most organizations who were victimized didn't have 100% deployment of antivirus agents on their desktops.
- The Target data breach, resulting from inappropriate network connections between the corporation's air conditioning systems and its credit card systems, went unnoticed even after years of compliance with Payment Card Industry Data Security Standards.
- Organizations struggled to effectively patch the HeartBleed vulnerability because their vulnerability management programs were focused on applying operating system patches and not taking an application view that included infrastructure vulnerabilities.
- In 2014, Code Spaces lost control of their entire Amazon Web Services infrastructure to hostile attackers.

In each of these cases, defensive technologies were in place, but they were not aligned with the core functions of the network they were protecting. Buying defensive security products alone does not make you secure. Security comes from deploying these products as part of a comprehensive security strategy, designed to minimize your risk.

Fortunately, the concept of continuous monitoring—defined by NIST as "maintaining ongoing awareness of information security, vulnerabilities, and threats to support organizational risk management decisions" — provides this alignment. A continuous monitoring program leverages automation to ensure your entire security program is working together as designed. This includes performing an assessment of all real-time security defenses, such as antivirus and intrusion detection systems, as well as slower activities, such as patch management.

Tenable Network Security recognized many years ago that continuous automated testing of a network's defenses against a security policy is the best method to monitor the health and assurance of your network. We wrote our first paper on this topic, "Real Time Compliance Monitoring," in 2004. We also recognized that performing this type of monitoring at scale, including mobile users and cloud based applications, requires new forms of technologies.

Over the past decade, Tenable has invested and created new types of sensors that allow for the automatic discovery and security assessment of networks that span traditional IT systems, mobile users, virtual networks, and cloud-based applications. We've also pioneered how to take this data and leverage big data analytics to automatically report your network's compliance to a security policy.

# The New IT Landscape

Before we discuss the specifics of a continuous monitoring program, it's important to acknowledge that the concept of a network has changed significantly over the past decade. Mobile users, virtual machines, and cloud-based applications are now major pillars of the IT infrastructure.

Modern network security strategy has evolved into placing data into various "silos" and then limiting access to the silos to specific users who need it. A silo is dominated by a single application or service. For example, a Human Resource department places their data in applications run locally such as Oracle's PeopleSoft or online at services such as ADP.

Silos of data can exist on traditional on-premises equipment, or are deployed on someone else's infrastructure such as Amazon AWS or RackSpace or are offered entirely as a cloud based application, such as SalesForce.

Microsoft Exchange is a typical example of this type of service. You can run Exchange locally on your network, you can run it on someone else's infrastructure, and you can also buy Exchange email as a service directly through Microsoft's Office365 suite.

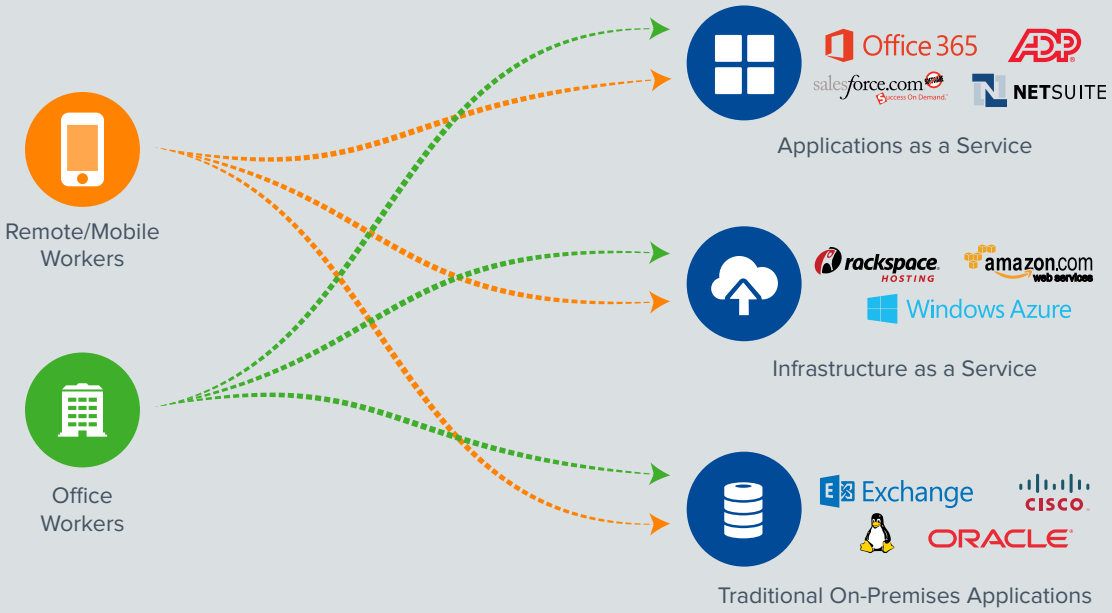
Three different tiers of data silos should be considered for continuous monitoring:

- Application as a Service (AaaS) – Salesforce, ADP, Office365
- Infrastructure as a Service (IaaS) – Amazon, RackSpace
- On-Premises Applications – Applications on bare metal or virtualized

Network users fall into two categories: on-premises inside your traditional network or outside of your network.

Tenable recognizes that users may leverage traditional laptops and mobile devices. We also recognize that many organizations allow their users to access personal applications such as Dropbox, Facebook, and LinkedIn. Each user's access to an organization's various silos of data must be monitored, audited, and secured continuously, regardless of the technology that is in use.

**The following diagram shows how these various types of users and silos relate to each other.**




This model addresses the weaknesses or gaps in your security program. And it's working. Organizations that have implemented continuous monitoring are more than twice as likely to be satisfied with their vulnerability management approach compared to those who use periodic scanning, according to a 2014 study by Forrester Research commissioned by Tenable.

Tenable has worked with many organizations who have wanted to expand their periodic vulnerability management programs to continuous monitoring. A review of this model demonstrated to these organizations that there were vast portions of their network they hadn't considered monitoring since they did not realize their actual network data flow.

This model is also useful to prioritize users based on which applications they use. For example, with the recent Internet Explorer zero-day vulnerability, organizations had no idea which users used different silos or which users connected to Internet applications on a regular basis and therefore could not prioritize which systems to patch first.

## Gaps in the New IT Landscape

As companies adopt the new IT landscape, they are able to realize efficiencies of a dynamic and agile organization. However they also introduce visibility and security gaps that leave the organization open to vulnerabilities, exploits, and breaches. We can enumerate the specific weaknesses by analyzing the model pictured above.

Home and mobile users interacting with corporate resources pose various risks to the organization, whether they are using corporate on-premises applications and data, resources deployed on third party IaaS frameworks, or cloud applications that are developed and deployed by third parties in their entirety. Similarly office workers who are present at corporate offices utilize on-premises resources in addition to applications developed in-house but deployed on IaaS platforms, as well as cloud applications. While there are specific differences in the security gaps for each of these scenarios, the overarching problem is one of lack of security coverage, and hence, lack of visibility.

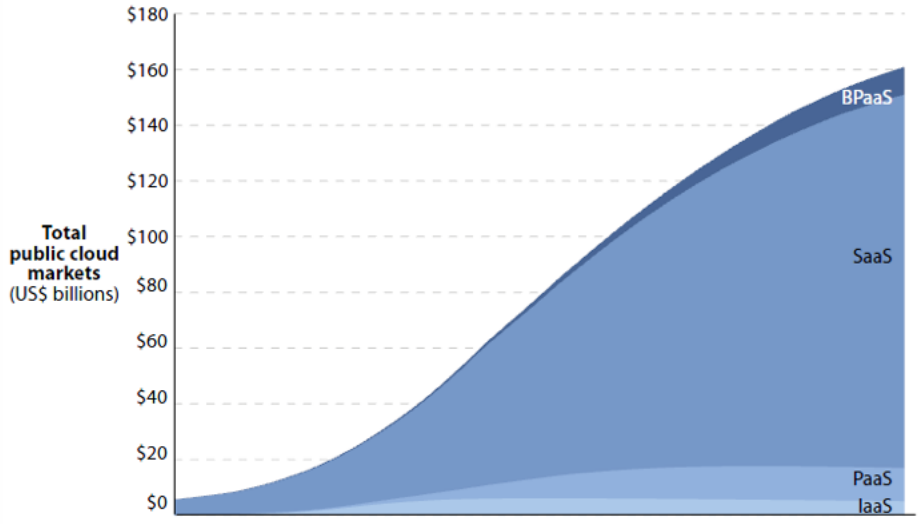
Office workers accessing on-premises applications are faced with the problems of phishing emails, botnets, malware already present on devices, privilege abuse, and out of date AV, patch, and software versions. These gaps are created because of the siloes mentioned earlier. However in this simplest scenario, no one is monitoring or assessing the individual security software products deployed in the enterprise. Mobile users accessing on-premises resources and applications are also at risk, but in addition to the threats mentioned they must also be monitored for secure end-to-end authentication and communication while accessing the corporate resources. Home and mobile users also face WIFI hacks, man-in-the-middle attacks, and mobile malware.

Office, home, and mobile users may also have to utilize packaged and custom applications that are deployed in IaaS environments. MS Exchange or the organization's own custom application, for example, can be run in a hosted environment like RackSpace or AWS etc. This scenario not only exposes these users to the gaps mentioned earlier for on-premises applications, but also introduces additional risk based on the hosted environment. IaaS providers typically enable the platform to deploy the enterprise's application, but give little information or access to monitor the underlying infrastructure. The organization is also at risk if "neighboring" environments in the IaaS provider's datacenter are infected and end up crossing over to the enterprise's applications and users. In this case the assessment and monitoring capabilities must extend to cover the known applications and users as well as typically unknown neighboring environments and network communications.

Cloud applications are becoming increasingly prevalent in enterprise environments. In fact the adoption of cloud infrastructures and SaaS applications has been exponential already, and as can be seen in the following graph, will continue to see explosive growth over the next several years.

**Figure 3** Forecast: Global Public Cloud Market Size, 2011 To 2020

The spreadsheet detailing this forecast is available online.




| | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| BPaaS ($) | 0.15 | 0.23 | 0.35 | 0.53 | 0.80 | 1.26 | 1.95 | 2.93 | 4.28 | 6.00 | 7.66 | 9.08 | 10.02 |
| SaaS ($) | 5.56 | 8.09 | 13.40 | 21.21 | 33.09 | 47.22 | 63.19 | 78.43 | 92.75 | 105.49 | 116.39 | 125.52 | 132.57 |
| PaaS ($) | 0.05 | 0.12 | 0.31 | 0.82 | 2.08 | 4.38 | 7.39 | 9.80 | 11.26 | 11.94 | 12.15 | 12.10 | 11.91 |
| IaaS ($) | 0.06 | 0.24 | 1.02 | 2.94 | 4.99 | 5.75 | 5.89 | 5.82 | 5.65 | 5.45 | 5.23 | 5.01 | 4.78 |

58161 Source: Forrester Research, Inc.

These introduce the greatest lack of visibility for home, mobile, and office users. The application is not only hosted entirely on third party servers, but is also built as a completely "black box" environment – an application that does not interact or report to the customer-corporation's IT or security resources. Many times the cloud application is actually instrumented for performance and security monitoring, but only the most basic information like uptime and other SLA-related metrics are shared with customers. In this scenario the customer's security and IT staff can only gain visibility and monitoring by accessing tightly embedded APIs or other data access/integration mechanisms that the cloud application provider chooses to allow.

As enterprises try to operate with more agility and efficiency, giving remote workers access to resources that were traditionally only deployed on-premises and only accessible from the office, they must ensure that the new IT paradigms they adopt do not compromise the security posture of the organization. Adopting a truly continuous monitoring solution is the only way to improve organizational effectiveness and reduce costs without compromising enterprise security.

## Tenable's Continuous Monitoring Solution

Continuous network monitoring is the process an organization uses to automate the measurement of risk with their entire network. The process continuously discovers, assesses, and then reports every component of the network against a security policy.

Tenable provides continuous network monitoring to identify vulnerabilities, reduce risk, and ensure compliance. Our family of products includes SecurityCenter Continuous View and Nessus. SecurityCenter Continuous View (CV) allows for the most comprehensive and integrated view of network health. Nessus is the global standard in detecting and assessing network data.

SecurityCenter CV can monitor activity and identify risk in each of the five areas of the new IT landscape. It can also track the dependencies between them so you can identify who your users are and which silos of data and applications are in use.

## Unique Sensors and Analytics

Tenable provides a unique combination of detection, reporting, and pattern recognition utilizing industry recognized algorithms and models. Tenable sensors include vulnerability scanners, system agents, network sniffers, and log analyzers.

Our sensors discover 100% of your infrastructure, regardless of whether it includes AaaS, IaaS, or traditional on-premises hardware or virtualized applications. Our sensors discover all of your users, regardless of whether they are on-premises or remote workers.

Our sensors also perform assessments of the components of your network and your user and application activity. These include traditional vulnerability assessments, configuration analysis, malware detection, and anomaly detection. They also include the detection of malware and malicious insider activity through a wide variety of indicators and algorithms.

Big data analytics are leveraged by SecurityCenter CV to analyze and report the telemetry gathered by our sensors in near-real time. The telemetry of user activity, system health, network activity, application activity and threat detection provides critical data to any incident response process.

SecurityCenter CV can be used for comprehensive and automatic reporting of your network's compliance with complex standards such as PCI, CyberScope, and FISMA, as well as newer continuous monitoring standards such as the Council on CyberSecurity's 20 Critical Controls or the Securities and Exchange Commission's new Risk Alert guide.

SecurityCenter CV's analytics can also report gaps in security coverage, such as web servers running without web application firewalls, or desktops surfing the Internet without proper antivirus and malware defenses.

SecurityCenter CV can also leverage the telemetry from the various sensors to automatically profile and compute which of your local and remote users accesses each of your data silos, including direct access to the Internet. This means that local and mobile users can be classified based on which data silos they've been observed interacting with. Knowing which silos a user accesses also enables you to prioritize defenses for users that leverage multiple or more risky applications.

## Deep Integration with Existing Security Systems

SecurityCenter CV has tight integration and API extensibility with SIEMs, malware defenses, patch management tools, mobile security solutions, firewalls, and virtualization systems.

Each of Tenable's sensors have extensive abilities to perform automatic discovery of the device and then assess the device for vulnerabilities, malware, and configuration issues.

SecurityCenter CV also has more integration with existing security infrastructure than any other solution. Some of our integration includes:

- **Patch Management:** The ability to assess the effectiveness of existing patch management tools, such as IBM's Tivoli Endpoint Manager, by identifying systems not currently managed, or that have not been fully remediated.
- **Mobile Devices:** The ability to combine mobile user and device security information from MDMs, such as Mobile Iron, with vulnerabilities from the rest of your network to provide a comprehensive view of all user devices.
- **Desktop Malware Defenses:** The ability to assess the effectiveness of all leading antivirus solutions, including reporting on numbers of agents deployed, how current their signatures are, and independently detecting malicious software and zero-day malware with Tenable's sophisticated set of compromise indicators and behaviors.
- **Network Malware Defenses and Indicators of Compromise:** The ability to audit the deployments of modern next generation sandboxes such as FireEye, firewalls such as Palo Alto, and indicator sharing services such as ThreatConnect.
- **SIEM and Log Analysis:** The ability to mine SIEM and log data to demonstrate effective security. For example, if the network policy is to collect NetFlow data on all internal systems, SecurityCenter CV can report known systems without NetFlow records. Similar assessments for authentication, firewall, network access control, and other policies are supported.
- **Cloud Services:** Automatic discovery of IaaS and AaaS through network and system analysis. SecurityCenter CV sensors identify users accessing cloud based services such as SalesForce and also Internet based user applications such as Dropbox.

Tenable's world-renowned research team is constantly adding new integration with security products and solutions. SecurityCenter CV also has APIs to add data and export data as well as a wide variety of integration points to offer customized log parsing, network traffic parsing, and customer configuration tests of systems, network devices, and cloud based applications.

## Scalability for Tomorrow's Network

SecurityCenter CV scales to meet future demands to monitor virtualized systems, cloud services, and the proliferation of devices.

Tenable's sensors are ideal to detect compliance gaps and threats for virtualized applications. They audit the underlying hypervisors, virtual infrastructure, and virtualized applications. They can also identify unknown virtualized infrastructure as well as unknown virtualized applications otherwise known as "virtual sprawl".

Tenable was the first vendor to assess instances of Amazon Web Services (AWS). Our AWS auditing technology detects security issues that typically aren't even checked by traditional IT security systems since they aren't on the local network. These types of exploits were used to attack a company named Code Spaces who lost complete control over its AWS infrastructure. Tenable is also actively developing security and configuration audits for a wide variety of cloud applications such as SalesForce, DropBox, NetSuite, and ADP.

SecurityCenter CV's sensors can also identify all cloud-based applications in use on a network. This includes basic checks that identify devices that do or do not communicate with the Internet and very discreet checks to identify devices and users that communicate with Facebook, SalesForce, NetSuite, ADP, and hundreds of other business critical, file sharing, and social networking sites.

Finally, as the explosive growth in the number of networked devices continues, Tenable's research team is at the forefront of this industry in our ability to classify and detect these new devices. SecurityCenter CV sensors can detect a wide variety of industrial control systems, mobile devices, and systems using the IPv6 protocol.

SecurityCenter CV can perform this sort of monitoring across very large networks. Our largest customers measure their device counts in millions of units. As your network grows, SecurityCenter CV can grow with it.

## More Supported Technologies than Any Other Vendor

SecurityCenter CV discovers, assesses, and monitors more technologies than any other vendor including, but not limited to, operating systems, network devices, hypervisors, databases, tablets, phones, web servers, and critical infrastructure.

SecurityCenter CV performs system level patch, configuration, log analysis, application monitoring, and malware auditing for all major operating systems including all flavors of Windows, all flavors of Apple OS X, Red Hat Linux, eleven other Linux variants, Solaris, FreeBSD, AIX, IBM iSeries, and HP-UX.

Network assessments are supported on Cisco, Juniper, Palo Alto, Adtran, Check Point, Extreme, Huawei, Dell, SonicWall, Brocade, FireEye, Fortinet, and HP ProCurve. Network assessments can be performed with the device's configuration file in an offline mode or with direct access to the device.

Network telemetry is supported by Tenable's network sensors and through support for Net Flow collection.

Hypervisor audits are supported for VMware, Amazon, and Citrix Xen.

Database assessments support includes Oracle, MySQL, Microsoft SQL, MongoDB, DB2, Postgres, Informix, MariaDB, and Sybase. Database activity monitoring is also supported through network protocol analysis and audit logs.

SecurityCenter CV detects a wide variety of mobile phone and devices including all forms of Apple iOS, Android, Windows, and Blackberry mobile phones.

SecurityCenter CV discovers all web server protocols, including SSL, and the vulnerabilities associated with web servers and web application testing as well as specific configuration audits for Apache and IIS web servers.

SecurityCenter CV performs log normalization from hundreds of unique data sources. Regardless of whether you are sending logs from your SIEM or log data store, or sending them directly to SecurityCenter CV, they will be recognized and mined for vulnerabilities, user identification, and asset discovery.

Finally, SecurityCenter CV automatically discovers all nodes on the network that communicate or perform critical management of power, air conditioning, physical security, and other "industrial" controls.

Many of our assessments include vulnerability checks, the ability to support custom configuration audits and pre-made and certified audits for compliance standards and vendor best practices.

## Peace of Mind

More organizations use Tenable to monitor their network than any other vendor. Because of this deployment, we see security issues and new compliance standards well before our competitors. We routinely deliver detections for the latest zero-day vulnerabilities and analytics to track compliance with the latest standards every day.

SecurityCenter CV's proactive continuous monitoring identifies your biggest risk across the entire enterprise. Tenable's unique sensors and analytics enable you to assess how well your security program is doing across your local and remote users, as well as your local and cloud applications. In today's environment, your biggest unknown risk is the one that can get your company compromised and have your executive management at the center of media attention.

SecurityCenter CV allows you to respond to advanced threats, zero-day vulnerabilities, and new forms of regulatory compliance.

Tenable recognizes that every organization is under attack from advanced threats. Our continuous monitoring approach, with malware and insider threat detection, ensures your defenses are properly deployed to cover network data flows that you may not realize are in place. And if there is a breach, SecurityCenter CV enables your organization to respond based on the most accurate and comprehensive set of security data for your network available.

SecurityCenter's unique sensors identify vulnerabilities at scale across your entire infrastructure. Not only does this help identify the vulnerabilities being reported in the media, such as Heartbleed, it also enables you to test the effectiveness of your entire patch management program.

Tenable provides the ability to automate reporting against more types of compliance standards than any other vendor. With your network deployed with our unique sensors, testing for a new compliance standard is just a matter of choosing new analytics that are automatically uploaded into SecurityCenter CV every day by our team of data scientists.

## Conclusion

Tenable wants to help you stay secure and we believe that the best way to do this is to monitor your entire set of network defenses continuously to look for gaps that can be exploited.

Our team of experts can have SecurityCenter CV and its sensors deployed on your network in less time than it takes to deploy a typical SIEM or network security solution. More importantly, upon deployment, you will immediately be able to find business critical security issues from across your entire network.

To evaluate SecurityCenter CV or to get more information, please contact us at sales@tenable.com.

## About Tenable Network Security

Tenable Network Security provides continuous network monitoring to identify vulnerabilities, reduce risk and ensure compliance. Our family of products includes SecurityCenter Continuous View™, which provides the most comprehensive and integrated view of network health, and Nessus®, the global standard in detecting and assessing network data. Tenable is relied upon by more than 24,000 organizations, including the entire U.S. Department of Defense and many of the world's largest companies and governments. For more information, please visit tenable.com.