



NetEnclave – Secure sensitive data and host applications in a disguised fashion with controlled access and non-traceable connectivity

EXECUTIVE SUMMARY – THE PROBLEM WE SOLVE

Cloud computing is the latest phase of information technology innovation. It is an evolution that provides infrastructure, software, and communication networks as a service. Cloud computing changes the dynamic of static, user-owned, technology into a metered use and outsourced model. Commercial cloud providers provide shared, low cost, and technologically evolving capabilities on a “pay as you go” basis. Most consumers, including the U.S. Government, are attracted to this cost effective, state of the art capability that can flexibly evolve as technology continues to advance.

The primary impediment to migration to the cloud has been the concern over security. Most organizations have requirements to protect their most sensitive, mission-critical data through the implementation of isolated enclaves that have gone through rigorous security review processes and are then placed completely within their control.

With the shift towards cloud computing, there is a need for capabilities to allow organizations to establish isolated networks within a cloud, and network enclaves that can securely bridge between clouds, and between legacy data holdings and a cloud presence. To meet these needs, as well as provide dynamic deployment and provisioning capabilities, NetAbstraction developed NetEnclave.

NetEnclave is a suite of technologies to provide advanced protection and data isolation, within and across private clouds and hybrid data designs.

NetAbstraction’s patented network design is unique in the market place. Based on the philosophy: *“if they can’t find you, they can’t attack you”™*, NetAbstraction lowers your cyber attack profile and traceability.

As a cloud-based Privacy as a Service offering, NetAbstraction’s focus is on protecting your physical network and communications infrastructure, keeping you safe from threats that arise from using commercial network providers (the information grid or “Internet”). NetAbstraction provides a secure, dispersed, Software Defined Network (SDN) on top of commercial provider’s infrastructure. This shields you from vulnerabilities within commercial infrastructure, making the NetAbstraction network impenetrable to malicious actors. And NetAbstraction does all of this while meeting or exceeding carrier-class performance.

NetAbstraction’s extensive expertise is rooted within the Intelligence Community. Our backgrounds are in: offensive and defensive cyber; protection of user identities; and innovative engineering, implementing networks to support clandestine communications. Building from a deep understanding of the current state-of-the-art technologies, we innovate and provide the next generation of privacy, identity protection, and security capabilities.

We understand, first hand, the challenges our customers face when meeting today’s cyber and privacy needs.

NETABSTRACTION OVERVIEW

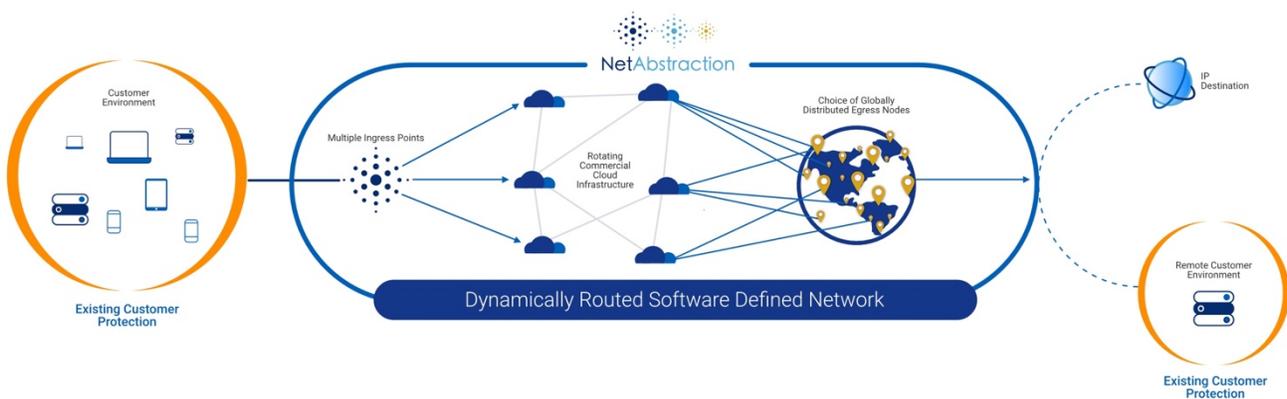
NetAbstraction is a carrier class Privacy as a Service that protects your identity and provides additional security for your communications on the Internet. NetAbstraction’s patented design obscures and varies network pathways while protecting customer identities and systems via implementation of SDN virtualization across multiple cloud providers. NetAbstraction

provides secure, varied, and non-apparent network connectivity, a range of identity management and persona attribution options to alter or reduce the cyber attack profile, and system designs to help control customer information held within commercial cloud provider databases. In addition, NetAbstraction augments the multi-layered security capabilities provided by the commercial cloud providers, to include implementing dynamic security policies to help ensure that malicious traffic is not allowed to enter the network.

Some specific benefits provided by the NetAbstraction network implementation:

- ✦ We disguise your network communications pathways – if they can't find you, they can't target you!
- ✦ We dynamically shift your network – it is hard to identify or hit a moving target. We shift our customers' communications on a regular basis or dynamically in response to a perceived cyber threat.
- ✦ We use a new tunneling protocol that is misidentified as normal TCP traffic, enabling the tunnels to hide, (become lost), within the traffic of the commercial provider networks.
- ✦ We use multiple providers/technologies and geographic locations to disperse and layer your points of possible attack.
- ✦ By controlling the routing through our network, we are able to protect our customer's identity and location, optimize the path and improve overall performance.
- ✦ We protect your identity by providing alternate subscriber information, which is exposed in commercial providers' databases.
- ✦ We logically isolate each customers' communications on top of our physical infrastructure, hiding the customer network topology from any external scrutiny.
- ✦ By creating a virtualized network, we decouple the logical network from the commercial provider's physical network. The logical decoupling of virtual servers from the physical network reduces the opportunity for attackers to reach resources connected to the network. It also isolates the logical network from vulnerabilities inherent in the physical network infrastructure.
- ✦ We regularly rotate and exchange the infrastructure that we use to establish our physical infrastructure.

NetAbstraction Overview



Cloud infrastructure is acquired using identity management domain expertise NetAbstraction leadership gained through our background in the Intelligence Community. We are cloud agnostic and always implement our network communications pathways across at least two different cloud provider networks.

We add an additional layer of virtualization in the acquired infrastructure using containers. We then deploy the components of our SDN software to create the Software Defined Network Layer 2 overlay across the commercial providers' Layer 3 fabric.

We automate the tunneling and provisioning of the network to dynamically shift and adjust communications pathways on the fly, in real-time, without impacting our customer's communications.

Our patented ability to control the network routing protects our customers' identities and locations, enhances performance, and creates isolated channels of communications.

The NetAbstraction network is based on VMware's NSX product is a distributed software suite that creates scalable, fully featured, virtual networks that are completely decoupled and independent from the physical network.

Security Features

NetAbstraction augments the security capabilities of commercial cloud providers by:

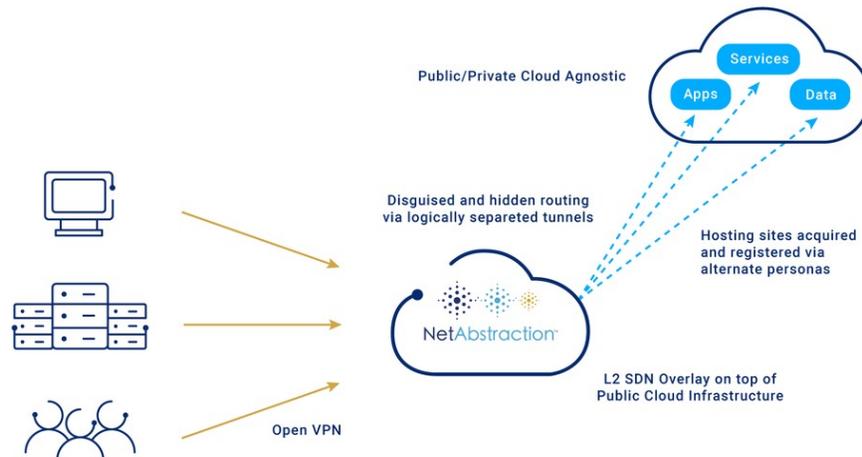
- ⊛ Dynamically shifting the network on the fly, without impacting our customer's communications;
- ⊛ Rotating and replacing the commercial cloud infrastructure and identities on a frequent basis;
- ⊛ Implementing independently controlled end-to-end logically separated tunnels for each of our customers as well as end-to-end encryption, as required;
- ⊛ Adding an additional layer of virtualization within the commercial cloud providers' infrastructure to provide an independent layer of protection for our servers;
- ⊛ Use of a new tunneling protocol that is misidentified as normal TCP traffic enabling the tunnels to hide, (become lost), within the traffic of the commercial provider networks.
- ⊛ Implementing SDN virtualization to decouple the logical network from the physical network. Advantages include:
 - ⊛ SDN allows us to efficiently manage the complexity of establishing and maintaining the network supporting the NetAbstraction service. Our patented design establishes a logical Layer 2 network across the physical infrastructure and the ability to quickly (in real time) shift the network to mitigate any threats.
 - ⊛ The logical decoupling of virtual servers from the physical network reduces the opportunity to attack resources connected to the network. It also protects the overall network from exploitation by a malicious actor. Because network virtualization decouples the logical network space from the physical, the actual network topology is also hidden from the end-points. Thus, attack efforts cannot take advantage of weaknesses of the physical network to further attacks, such as overloading a choke point or evade network security devices.

NETENCLAVE

NetAbstraction's NetEnclave is an integrated solution based on commercial and proprietary software that provides enhanced security capabilities in order to isolate customer activities within any cloud framework, across other commercial clouds, and/or legacy networks as needed. NetEnclave allows users to dynamically create dedicated networks and assign data storage within the commercial cloud and isolates customers from malicious software, insider threats, and hostile entities. Key features include:

- ⊛ Discreet acquisition of cloud infrastructure lowers an organizations' footprint in provider databases;
- ⊛ Additional layers of virtualization and security in cloud hosting environments;
- ⊛ Obfuscated connectivity to protected hosting environments;

NetEnclave – Isolated Protected Hosting



NetEnclave augments the security capabilities provided by cloud providers by:

- ✦ Provisioning of an additional layer of virtualization (abstraction) within the commercial cloud provider's infrastructure to provide increased protection for the NetEnclave virtual servers.
- ✦ Establishing centralized securities policies that are configured, pushed to and enforced across each virtual network.

NetEnclave enables the ability to:

- ✦ Dynamically place any workload anywhere -- Within or between datacenters. Virtual Machines (VMs) can be in multiple L3 domains and still be on the same virtual network (same broadcast domain, L2 adjacency). NetEnclave enables our customers to work seamlessly across any/all clouds.
- ✦ Efficiently manage physical and virtual workloads -- Connect both managed physical servers and VMs in the cloud to the same virtual network.
- ✦ Provide multi-tenancy with full isolation -- Create thousands of fully isolated enclaves and virtual networks, with no VLANs.
- ✦ Provide dynamic security for cloud deployments – Security policies are centrally configured, pushed to and enforced at the edge, and remain intact even as network topology changes and VMs move.
- ✦ Provide simplified administration -- Centralized, programmatic control of network service provisioning.

ABOUT US



NetAbstraction™

NetAbstraction, Inc. is an Internet and cyber security firm that offers services that lower your organization's systems "visibility" as a target on the Internet. Our management comes from backgrounds working for the federal government, enabling capabilities to support several Intelligence Community missions.

With substantial experience in offensive cyber operations and in designing, creating, and implementing non-traditional, non-attributable, telecommunications networks, we have a deep understanding of the current state of the art technologies. We are innovating and providing the next generation of privacy and identity protection capabilities while understanding, first hand, the challenges our customers face when meeting today's cyber and privacy needs.

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