

Airwall

A revolution in secure networking



Airwall™ makes ‘things’ on a network invisible and protects against cyber-attacks. Airwall is a comprehensive solution that is exceptionally effective at protecting critical physical infrastructure, while still allowing secure remote access.

Overview

Securing a company’s distributed network is incredibly expensive and difficult to scale. Attacks and breaches present massive risks to your company’s reputation. Managing your company’s IoT deployments and network access demands is only getting more complex as time goes on.

Today’s solutions tell you: (1) visibility is security, (2) attacks are when, not if, and (3) connect first and secure later. They say you need more firewalls, VPNs, VLANs, ACLs, SSH keys, etc., but that you’re never really secure.

There’s a steaming heap of the world’s economy and welfare literally hanging in the balance.¹ Stop believing the lies.

We've found an infinitely better way to keep it all safe.

Airwall enables secure access and total invisibility at any scale, across any network.

Airwall secures every endpoint in your network, with true micro-segmentation and secure remote access. You can secure your local datacenter and your global infrastructure.

Airwall works with your existing network investments, so no need for rip-and-replace or forklift upgrades. Network-based attacks are a thing of the past and managing your network is no longer complex or costly.

Airwall delivers defense-in-depth

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|--|--|---|
| 1 Zero-Trust Network Access (ZTNA) | 2 Software-Defined Network (SDN) | 3 Software-Defined Perimeter (SDP) |
| 4 Multi-Factor Authentication (MFA) | 5 Micro-segmentation for Every Endpoint | 6 Lateral Movement Eliminated |

What is Airwall?

Airwall is a virtual air-gap solution that ensures your devices are completely invisible. It eliminates lateral movement from bad actors across your network. Airwall uses Host Identity Protocol (HIP)² to secure network communication between devices, enabling micro-segmentation and remote access at scale on any network.

Most networks are configured to use IP addresses to identify and locate devices in the network. The security policies and access controls for this type of networking are IP based.

When you network with Airwall, in contrast, devices are assigned a cryptographic identity as the sole criteria for network communications. By default, devices only communicate through the encrypted identity framework. This means devices don't even show up on a pen-test scan.

Rather than finding a metaphorical 'locked door,' there is no door to even knock on. From the perspective of a pen tester or bad actor, the network is essentially invisible. The architecture also makes Airwall incredibly easy to deploy and install because it uses the existing network. We simply deliver a different type of message.

Your network with Airwall

Airwall enables your organization to create a secure, private, easy-to-manage, mobile Internet. You can define one or more overlays, with each overlay made up of virtual trust segments, and each Airwall Edge Service possessing its own unique 2048-bit Cryptographic ID (CID) following the HIP RFCs. The result is a solution with military-grade encryption that can span nearly any device, network, or environment.

Airwall is set up using an intuitive, visual, and point-and-click management and orchestration engine. Unlike traditional IP networking and SDN approaches, Airwall requires little to no modification of the underlying network or security infrastructure. It provides a simple, policy-based configuration of devices or groups of devices that are explicitly trusted based on whitelisting. This trust, based on unique CIDs,³ determines what systems or machines can initiate and establish communication before any data is exchanged.

Secure Networking Across OSI Stack

OSI Model	Airwall Gateway	Airwall Agents / Servers
Physical – Layer 1	√	√
Data Link – Layer 2	√	√
Network – Layer 3	√	√
Transport – Layer 4	√	√
Application – Layer 7	√	√

An Airwall Solution can span multiple existing VLANs, subnets, and cross networking boundaries – across data centers, public clouds, campus networks, remote locations, and even unmanaged networks. You can connect or disconnect in seconds without disturbing the existing networking and security infrastructure.

Airwall enables a unified secure networking architecture that reduces complexity and creates consistent application of policy across all connected systems and devices. This trust-based enforcement model is easily verified for compliance purposes.

By creating operational efficiencies, Airwall significantly reduces configuration errors and the resulting lateral attack vectors. Network and resource provisioning are simplified and can now be done in minutes.⁴

- + Devices are natively invisible to hacker reconnaissance, and protected against DDOS, MiTM attacks, IP spoofing, and other types of network and transport layer attacks.
- + Set policies across hundreds or even thousands of devices with a few clicks – reduce complexity and overhead as you manage your network.
- + Secure connection with devices in remote field locations with limited connectivity, to factories, offices, datacenters, and mobile devices.
- + Deploy with any major cloud service and across any mainstream server, desktop, or mobile operating system; as well as in front of any networked device.
- + No need to replace existing infrastructure or add more staff; far less expensive to manage and maintain than either firewalls or VPNs.

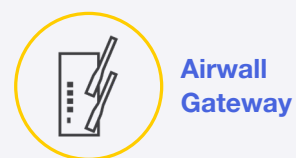
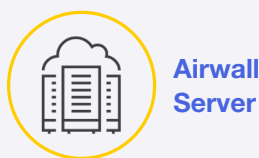
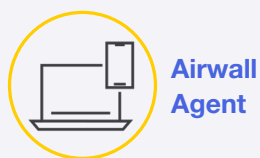
Airwall Solution components

Building an Airwall Overlay requires that you deploy two or more Airwall Edge Services in a hub-and-spoke topology, mesh, or both. Every endpoint in an Airwall Overlay knows the IP-layer state of its peers, and every peer maintains identity-based routing tables. Airwall’s policy-based approach⁵ helps any edge service establish the most direct route to a resource within an overlay.

Airwall Edge Services (Gateways, Agents, and Servers) provide invisibility, secure connectivity, identity-based routing, and IP mobility.⁶ They enforce Airwall Conductor’s provisioning, de-provisioning, and revocation of trust for any managed IP resource. Using cryptographic identity, Airwall Edge Services enable the mobility and migration of an IP resource anywhere within the Airwall Overlay, without requiring changes to the existing networking or security infrastructure. This decoupling overcomes many of the addressing, routing, mobility, and failover challenges associated with traditional IP networking and SDN technologies.⁷

Our approach makes it easy to deploy and extend a unified, trust-based, and encrypted network. This ease of deployment enables micro, macro, and cross-region segmentation, as well as global IP mobility. Deploying and maintaining intra-cloud (region to region), cloud-to-cloud, and cloud-to-data center cryptographic, trust-based communications becomes simple, verifiable, and secure.

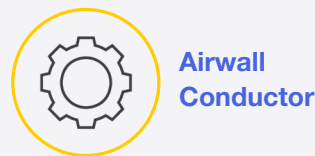
1 Protect your ‘things’



2 Connect your ‘things’



3 Manage your ‘things’



Protect your ‘things’



**Airwall
Agent**

Airwall Agents are applications installed on devices (Windows, macOS, iOS, iPadOS, and Android) that enable zero-trust network access (ZTNA) from anywhere in the world. By default, all communications are encrypted end-to-end and multi-factor authenticated (MFA), enforcing a software-defined perimeter (SDP) at the distributed edge.

Easily integrate user authentication with device-based authentication, overcoming much of the complexity associated with extending directory services to include device-based trust. Explicitly allow or deny any device to securely connect to a network, and also easily segment access by defining resources that a device or group of devices can access. Devices no longer have the session constraints of legacy VPNs and are not restricted by the number of concurrent client-to-resource encrypted sessions.

Deployment Options:

Windows

7/8/10 (32/64-bit)

macOS

10.14 & above

iOS/iPadOS

12.0 & above

Android

6.0 & Above



**Airwall
Server**

Airwall Servers support Windows Server and Linux, and behave much like Airwall Agents. They effectively make servers invisible and only allow communication with authenticated and authorized endpoints (ZTNA). Air-gap servers from unauthorized communication with a software-defined perimeter (SDP).

Deployment Options:

Windows Server

2008 R2
2012 R2
2016

Linux

CentOS 6.9 and 7
Ubuntu 16.04
Fedora 25 (REHL compatible)



**Airwall
Gateway**

Airwall Gateways protect ‘things’ downstream. They are deployed in front of devices or hosts that cannot protect themselves. Examples include legacy systems and machines, or when customers are unable to install Airwall Agent or Airwall Server.

Physical Airwall Gateways have built-in Ethernet, Wi-Fi, and Cellular (2G, 3G, 4G LTE modems), as well as Serial-over IP for the most flexible link connectivity options found in the industry. These devices can fail-to-wire, Wi-Fi, and/or cellular. Configure physical devices for high availability depending on customer need. Replace existing

cellular modems, access points, VPNs, and internal firewalls for significant CapEx or OpEx savings.

Virtual and cloud Airwall Gateways function in the same manner as physical Gateways. Instantly connect, protect, segment, move, failover, and disconnect any private or public cloud-based workloads anywhere in the world. There is no longer a need to deploy and maintain separate networking and security policies for on-premises and cloud-based resources.

Deployment Options:

Cloud	Virtual	Physical	Connectivity
Amazon Web Services Microsoft Azure Google Cloud	VMware ESXi 6.0 & above, Microsoft HyperV Server 2012 R2 & Above	75 Series 110 Series 150 Series 250 Series 500 Series	Wired Cellular Wi-Fi

Connect your ‘things’



**Airwall
Relay**

Airwall Relay routes encrypted communications between all your ‘things’ across all networks. Reduce network complexity and enable complete connectivity between every endpoint, without modifying the underlying network. Wherever that endpoint is and however that endpoint is online, it can be connected.

Available in cloud, virtual, or hardware form factors, Airwall Relay allows the WAN and Internet to behave like one local broadcast domain, making WAN micro-segmentation a reality. It provides a private identity namespace that eliminates the need for expensive public IP addresses and inbound firewall rules to connect devices.

Airwall Relay is the only routing technology that doesn’t rely on Layer 3 rules, network addresses, or traditional routing protocols to securely connect and route privately addressed systems across networks. Airwall Relay relies on verifiable cryptographic identities to determine if a WAN connection is allowed, and forwards only authenticated and encrypted traffic to authorized endpoints. Reduce network complexity by eliminating connection barriers like NAT, different addressing realms, IP conflicts, and complex firewall rules.

Deployment Options:

Cloud	Virtual	Physical
Amazon Web Services Microsoft Azure Google Cloud	VMware ESXi 6.0 & above, Microsoft HyperV Server 2012 R2 & Above	500 – 1U Platform

Manage your 'things'



**Airwall
Conductor**

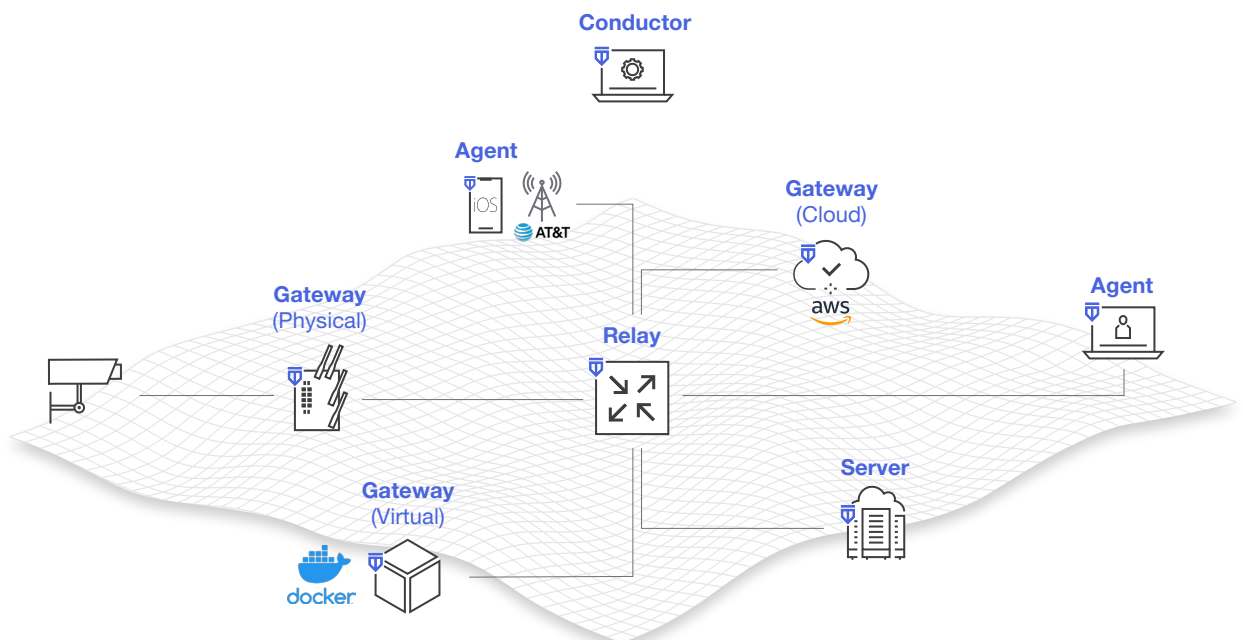
Airwall Conductor enforces visibility and access policy for all your 'things' with point-and-click simplicity. Make your 'things' invisible by creating a software-defined network (SDN) that's micro-segmented, encrypted end-to-end, and multi-factor authenticated (MFA). Define the overlay network segments and systems that protected machines are allowed to access, as well as how they connect on the LAN, WAN, and public Internet. Policy creation and management is simple and requires no advanced training.

Available in cloud, virtual, and hardware form factors, Conductor enables fast network provisioning, micro-segmentation, and secure connectivity. All of this is based on unchanging cryptographic machine identities, not network addresses that change and can be spoofed.

Intuitive network orchestration eliminates the complex, disruptive, and time-consuming provisioning steps associated with traditional IT solutions like firewalls and VPNs. Our customers deploy and revoke secure overlay network access in seconds, with little to no change to their existing network infrastructure.

Deployment Options:

Cloud	Virtual	Physical
Amazon Web Services Microsoft Azure Google Cloud	VMware ESXi 6.0 & above, Microsoft HyperV Server 2012 R2 & Above	Conductor – 1U Platform (software)



Airwall use cases

Airwall can be deployed in a variety of use cases:

- + **Critical infrastructure protection, rapid provisioning, and cost-effective remote support** – Automatically network, cloak, secure, and manage critical infrastructure such as oil and gas pipelines, electrical substations, smart meter systems, and healthcare devices from anywhere in the world. Implement this solution without the cost and complexity of attempting to deploy and maintain separate routers, firewalls, and VPNs. Because access is based on cryptographically signed, authenticated, and authorized devices, the risk resulting from the common practice of using shared administrator credentials is eliminated. Organizations can significantly reduce their cyber-risk and the productivity loss of having to send field technicians to remote locations for maintenance.
- + **Instantly provision or revoke vendor, third party, or supply chain access** – Some of the most common attack vectors today are third-party systems that are either permanently or temporarily connected to a corporate network. HVAC systems, building automation, web services, vendor technicians, PoS systems, and even guest Wi-Fi all increase an organization's attack surface. Pinholes are opened in firewalls and then frequently forgotten. Configuring temporary VPN access is laborious, slow, and cannot be easily segmented down to a specific resource. Permanent connections for things like building automation are difficult to maintain over time. Using VLANs or ACLs cannot prevent lateral movement from a bad actor. With Airwall, you can provision temporary or permanent access instantly that cannot be traversed, is immediately verifiable, and can be instantly revoked regardless of user credentials.
- + **On-demand secure network provisioning and PCI compliance** – Provision Point of Sale (PoS) systems, kiosks, or pop-up stores in seconds, then cloak, segment, and move out of scope for PCI compliance over any network. Shared and unmanaged networks become a non-issue, because Airwall prevents hackers from using temporarily or permanently connected systems on a corporate network as an attack vector. All communication is automatically AES 256 encrypted.
- + **MPLS replacement, remote office security, and instant failover** – Replace costly MPLS networks with Airwall and commercial broadband for distributed remote sites. This approach provides better security, faster provisioning, and simpler management. At each site, you can deploy an inexpensive Airwall Gateway, creating a cloaked, secure, and private corporate WAN. Adding a new link to an Airwall Overlay requires just a few clicks in Conductor. Remote office exposure to Man in the Middle (MiTM) attacks is prevented because

hackers are unable to find and fingerprint devices in order to execute attacks. And if a link fails, the Airwall Gateway immediately fails over between links, ensuring high availability.

- + **Secure and segmented user, vendor, and application access control** – Unlike traditional VPN technologies, an Agent or Server can now have many concurrently encrypted virtual trust segments (VTS) or tunnels to specific applications and services, without requiring an appliance. Building automation vendors can deploy OT systems at customer locations and provide encrypted and verifiably segmented access to those systems for faster and less expensive maintenance. They can do this without their customers fearing those systems as a potential attack vector. Vendor systems can be verifiably segmented and cannot communicate with any other system on the corporate network. You can cloak all other systems on the corporate network so they will not respond to any communication with those systems unless it is explicitly allowed. Securing internal and remote access for employees anywhere in the world becomes far more practical and cost-effective than traditional VPN and firewall technologies by eliminating failover, key management, and networking problems associated with client appliance access and mobility. Agents and Servers can now connect directly or through Gateways without opaque and complex legacy network constraints.

- + **Secure and segmented machine-to-machine communication** – Servers running Airwall Server can bind a unique ID that is only known and available to other Airwall Edge Services. This unique ID frees the application server from the constraints of the hosted network, allowing it to freely move from network segment to network segment and even to a public cloud within an Airwall Overlay, without losing its IP address. Only whitelisted devices can locate the Airwall Server's enabled service by its CID and its unique IP address.

Airwall delivers

Device invisibility and automatic AES-256 encryption tunnels

Default zero-trust model with one-click trust establishment (CID)

Network transparency, resiliency, and instant failover

Rapid provisioning, revocation, and instantly-verifiable quarantine

Secured VLAN isolation and micro, macro, and cross-boundary

Visual Trust Map to assist with proving PCI and other compliance

Transparent mobility of secured devices and services within an Airwall

Flexible deployments supporting physical, virtual, and cloud appliances

Connectivity for secure Layer 2 or Layer 3 networks across any link

Extensibility down to clients, servers, applications, and embedded hardware

Schedule a call with our experts to learn more.

experts@tempered.io | +1 206.452.5500

Appendix

Endnotes

- 1. Billions of devices without built-in cybersecurity are connecting to IT networks and are creating a massive and rapidly-growing attack surface.** Enabling the remote control of critical and physical infrastructure has created attack vectors that didn't exist when today's security solutions were being designed. The result is rapidly rising cost and complexity, with a measurable decline in protection. The original inventors of the networking technologies that became the Internet never imagined the billions of devices we use today. They introduced something that turned out to be a huge, critical assumption. The fatal flaw is that your IP address is used as both your location and identity. Every device gets an IP address. That address is used as its identity. And that address can be found. If it can be found, it can be hacked. Moreover, every device hacked can be used to hack other devices.
- 2. Host Identity Protocol (HIP) was conceived as a solution to overcome the fatal flaw in TCP/IP networking, which has made networking security the complex Rubik's Cube it is today.** The Host Identity Protocol standard (HIP RFC's 5401, 7401, 7402 and VPLS 4665) were first proposed by Robert Moskowitz in 1999, as an individual IETF submission. It has been used in production since 2006 for everything from secure field communications by the military to accelerating manufacturing operations at Boeing by securing and enabling network mobility of their tooling infrastructure. The cornerstone of HIP "is the idea of separating a host's identity from its present topological location in the internet" for the sole purpose of "enabling a secure and mobile internet." One of the most important principles is that HIP is backward and forward compatible with any IP-based network, application or resource. HIP is an open standard, but to realize the vision of "a secure and mobile internet," a new management paradigm was needed. It required scale, policy-based orchestration, and the compatibility of HIP-based services across any operating system, hypervisor, container, or hardware platform.
- 3. Using unique CIDs makes Airwall extremely resilient. Decoupling the identifier and locator functions of an IP address restores its original purpose as a resource locator.** Unlike other technologies, networking and security policy orchestration is so simple that authorized business teams could easily make their own policy changes without involving other teams or risk exposing corporate networks and other connected resources.
- 4. Network and resource provisioning are much simpler with Airwall. Failover is faster, predictable, and easily verifiable.** Dependencies on complex firewall rules, VPN policies and key management overhead, ACLs and VLAN configuration is greatly reduced. Managing a simple IP address change, migration, addition of a new network, office or kiosk, or providing temporary/controlled third-party access no longer requires significant time and expertise.
- 5. Airwall uses a policy-based approach, enforced at the device level.** This approach enables all endpoints to know and maintain knowledge of where resources within and across networks are located, and what Airwall Edge Service is in front of a single resource or many resources. Every edge service has the equivalent of a policy-based table that is instantly updated via the Conductor any time an administrator or a secure API call makes a change. The policies maintain state across edge services via Conductor, but do not require persistence, ensuring only authorized resources are in fact communicating only with others that have been explicitly allowed.
- 6. Airwall Edge Services follow the Host Identity Protocol standard.** This standard initiates trust before transport communication is established and before any data is exchanged between authorized edge services. Conductor orchestrates policies across edge services that are distributed throughout an Airwall overlay, where the Conductor maintains state but does not require persistence for edge services to function.

- 7. Airwall Edge Services adapt to your network deployment.** They effectively function as a switch, eliminating or reducing the need to maintain VPNs, complex firewall rule sets, VLAN segmentation, routing convergence and DNS for failover, and ACLs in an attempt to accomplish secure connectivity, access, availability, and segmentation. This functionality allows for a flexible deployment model that can span nearly any type of resource, location, or environment. This capability of easily extending a secure networking overlay as broadly or deeply as an organization chooses across any environment cannot be matched by any other SDN, SD-WAN, traditional networking, or security vendor.

Additional Resources

- tools.ietf.org/html/rfc7401
- tools.ietf.org/html/rfc7402
- www.cs.helsinki.fi/u/gurtov/papers/hip_survey.pdf
- www.nist.gov/system/files/documents/cyberframework/cybersecurity_framework_bsi_2015-04-08.pdf