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WHITE PAPER

Session Border Controllers: Helping keep enterprise networks safe

TABLE OF CONTENTS

To benefit from the latest communication and collaboration solutions, businesses are increasingly turning to Session Initiation Protocol (SIP) based networks.

Whether it's to lower costs in the enterprise or the contact center or to take advantage of the latest multimedia messaging, conferencing and unified communications (UC) applications, SIP has emerged as the industry standard.

Flexible and cost-effective, SIP trunks make a great deal of business sense to deploy because your organization can use a converged connection for all communication with sessions routed over your carrier's IP backbone.

Yet, as with any technology, SIP trunking requires some education to derive the maximum benefit and it pays to understand this capability, especially with respect to security and deployment considerations. Fortunately, with the right solution the necessary security can be enabled and deployment challenges resolved.

This paper will look at the business case for deploying SIP trunks, the requirements for securing them and the features needed in a SIP trunk security solution.

Starting Points

IP technology has radically transformed enterprise communications. Historically separate infrastructures were needed to carry different types of traffic, but now one network can handle it all, yielding significant economies of scale. At the same time, new features and functions are enabled, bringing unprecedented flexibility and convenience to the daily tasks of the enterprise and increasing employee productivity.

SIP trunking, which uses the SIP standard to establish a connection between the public network and your enterprise's SIP-compatible communications solution is also changing the way businesses and organizations communicate.

The benefits of SIP trunking are many. It eliminates the need for costly time-division multiplexing trunks and gateways and introduces innovative capabilities to direct and manage communications. For unified communications, SIP trunks deliver expandable bandwidth that enables a new generation of rich media services including: high-fidelity voice, high-definition video, Presence and Instant Messaging (IM) and sophisticated conferencing and collaboration.

With SIP, traffic is not limited by the strict time slot capacity of time-division multiplexing trunks and call capacity can be scaled easily. Bandwidth can be allocated dynamically based on the application mix or number of sessions to help ensure optimal performance of applications in use.

A Different Frame of Mind

Just as VoIP originally enabled voice convergence with your enterprise local area network (LAN), SIP trunking enables voice convergence externally over the Wide Area Network (WAN)/Internet. And for that reason, it requires a change in the way your enterprise should think about your network solutions.

In the past voice networks were dedicated, isolated and self-contained. SIP trunks create an interface with public networks (e.g., the Internet or a service provider network) that extend beyond your enterprise's borders. Because your communications network is no longer isolated and self contained, demarcation points must be well defined, privacy of communications ensured and fine-grained control applied to enforce call routing and security policies.

The Four Essentials

Security is a fundamental prerequisite to an enterprise-grade Session Initiation Protocol trunk, yet it is all too often overlooked. Any comprehensive security solution for Session Initiation Protocol trunking must provide:

- **Enablement:** facilitation of seamless and secure enterprise communications with high quality of service;
- **Control:** effective management of users and their access to services, features and functions, ensuring that the system and its resources are utilized in keeping with business needs, user requirements and security policies;
- **Protection:** end-to-end assurance against signaling and media vulnerabilities;

- **Demarcation:** clear line of defense and termination for Session Initiation Protocol trunks within the enterprise.

The object is to allow companies to derive the greatest benefit from their SIP solutions, unimpeded, while ensuring the overall integrity of the network and its traffic, providing a substantial return on investment.

The Business Case for SIP Trunks

SIP trunks present a compelling business case to enterprises for a number of reasons. The capital cost is lower than that of traditional Public Switched Telephone Network connectivity because there is no need to own lines or Time-division multiplexing equipment (which also has the longer-term advantage of lower maintenance costs). SIP trunks can also support a greater number of lines than conventional T1 / PRI connections. And they may deliver local, toll-free, domestic and international long distance service at a much lower cost than is possible in a Time-division multiplexing-based Public Switched Telephone Network scenario.

As an example, consider a large enterprise of 2,500 employees with an over subscription rate of 10:1 (10 users to 1 SIP Session) and an estimated long-distance tariff for traditional long distance calling of $0.04 per minute. If 250 simultaneous voice calls must be supported at any given time using Time-division multiplexing, it would be necessary to deploy 11 primary rate interface connections over T1 lines to meet the demands. And if a Time-division multiplexing gateway does not already exist, one would have to be deployed at a significant capital cost.

The same organization with the same needs could deploy Session Initiation Protocol trunks to support 250 simultaneous Voice over Internet Protocol calls in a Session Initiation Protocol trunk scenario. The session border controller in the network demilitarized zone can be either an industry standard carrier Session Border Controller or a purpose built Avaya Session Border Controller for Enterprise. In either case the long-distance cost could potentially be as much as half that of the Public Switched Telephone Network scenario.

It's not surprising then that enterprises are moving to SIP trunks to shed the cost of Public Switched Telephone Network trunks and gateways. Increasingly, instead of simply swapping out one infrastructure for the other and using SIP trunking as a means of enabling same-old voice services, more and more enterprises are realizing SIP trunks also support real-time unified communications applications, which provides the potential to increase the productivity of their workforces. In large part, one of the most important decision to make when moving to SIP trunks is in selecting the type of appliance to be used for the enterprise demarcation point.

New Possibilities, New Challenges

The fundamental components of the SIP trunk architecture on the enterprise side include:

- A communications server to process enterprise communications functions
- User devices connected to the internal network
- Border elements that create a 'demilitarized zone' between the internal network and the service provider's SIP network.

Key functions required within a conventional SIP trunk architecture include: topology hiding, Quality of Service reporting, SIP routing, high availability and threat protection.

One of the challenges associated with SIP trunking today is that there can be many flavors of SIP. Though it is standardized, the standards allow room for flexibility and interpretation. Consequently, a communications server or firewall may be SIP-compliant on paper and still incapable of communicating effectively with other SIP devices. And there are call servers that claim SIP interoperability that really possess fairly basic capabilities. They may be able to direct traffic to specific SIP addresses, but lack the finer functionality to perform more advanced communications features. Interoperability is hardly guaranteed, inside the network or outside of it, in the service provider domain. These issues can generally be addressed by purchasing the right equipment and asking the right questions about its capabilities.

The right questions to ask:

- Does it perform NAT Transversal and Topology Hiding?
- Does it do SIP Normalization?
- Does it maintain SIP-NAT bindings?
- Does it perform access control?
- It is protocol repair capable?

Security

Imagine if your network is attacked. The numerous servers running complex applications could be used to propagate attacks, impairing the trunk and causing denials of service. Implementing an Avaya Session Border Controller for Enterprise that is interoperable with virtually all variations of SIP and has sufficient intelligence to facilitate the secure interactions with a variety devices can solve the problem. Avaya Session Border Controller for Enterprise is designed to solve deployment

issues, help prevent attacks and deliver value to the enterprise. It helps you meet the requirements of enablement, control, protection, demarcation and return on investment.

Enablement and Protection: Interlinked

Network Address Translation (NAT) traversal is an important security requirement and is the process by which IP address information is modified inside of IP header messages. Because IP traffic is routed by headers, devices need to be able to look into packets and read the embedded addressing information. Traditional firewalls can't do this. Consequently, to permit external traffic to enter the network, service providers often require the enterprise to "open up" the firewall in ways that compromise security, reduce network control at the application layer, and prohibit the effective implementation of routing policies for SIP-based traffic.

Given the plethora of threats facing networks today, such openness is unacceptable. Changes to the firewall will open holes for attacks from external sources such as hackers, malicious users and spammers. According to the Communication Fraud Control Association, the body that monitors communication fraud, the crime of 'Phreaking' (hacking into a PBX and using it to route calls) results in global annual losses of around US$40 Billion.[1] Other common attacks include Denial of Service/ Distributed Denial of Service, message floods and fuzzing, stealth Denial of Service, and spoofing attacks. A Denial of Service attack can be used to flood a device with spoofed requests that overwhelm the device's protocol stack and disables it. A low volume variation on this kind of attack can cause VoIP phones to ring continuously. Other threats such as call hijacking, fraud and eavesdropping are also perils, and must be secured against with encryption and authentication. If the signalling and media traffic used for communications is not secured, packets can be captured and conversations reconstructed.

In addition to protecting its network against attacks, your enterprise must have control over all aspects of its voice, video and data communications. This includes allowing or denying specific signaling, media and applications, and applying specific routing or security policies.

Deploying a Session Initiation Protocol Trunk Securely and Effectively

As mentioned previously, a Session Border Controller communicating via SIP to the communications server, facilitates essential functions such as routing and Network Address Translation traversal, and provides security capabilities such as threat

[1] The Communications Fraud Association 2015 Global Telecom Fraud Survey

mitigation, access control, and policy enforcement while helping the enterprise maintain privacy. In other words, it enables and helps control and protect enterprise communications traffic.

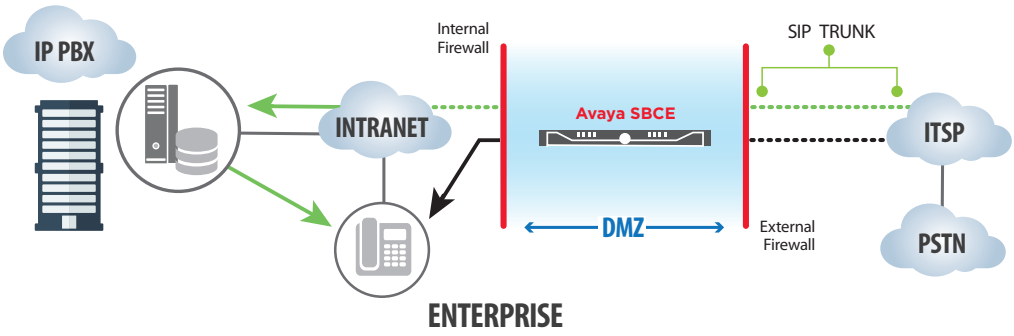
Your SIP trunk security device should provide for all of the following to ensure the four requirements of enablement, control, protection and demarcation are met:

- **VoIP threat mitigation:** comprehensive SIP and media protection
- **VoIP policy compliance:** fine-grained policy enforcement
- **More secure access:** firewall/Network Address Translation traversal and encrypted signaling and media proxy (Transport Layer Security and Secure Real-time Transport Protocol)
- **Demarcation:** clear line of defense and termination for Session Initiation Protocol trunks within the enterprise

The Destination: SIP-Enabled Unified Communications

SIP trunking provides a highly economical and versatile communications solution for enterprises eager to capitalize on the benefits of IP networks for both voice and data. Implementing a SIP trunk solution requires a shift in perspective; from conventional notions of what the network perimeter is to the kinds of functions required for security. The edges of the network are no longer "hard": all manner of traffic flows in and out. SIP-enabled communications must meet the full range of enterprise requirements and protect against signaling and media vulnerabilities, as well as handle demarcation and peering issues at the network edge.

A comprehensive SIP trunk solution will include an Avaya Session Border Controller for Enterprise deployed between the network's internal and external firewalls because it can help perform the necessary functions for enablement, control and protection of SIP communications.



Summary

Avaya Session Border Controller for Enterprise offers one of the industry's best real-time application-layer protections against toll fraud and other VoIP/unified communications threats allowing enterprises to enjoy the benefits of SIP trunks.

The Avaya Session Border Controller for Enterprise helps enable safe SIP trunks for enterprises by:

- Creating a demarcation point for your enterprise and enforcing fine-grained security policies.
- Mitigating the risk of successful attacks by blocking them at the enterprise perimeter.
- Performing firewall/Network Address Translation traversal to simplify the deployment of SIP trunks.
- Easily upgrading to advanced functionality for any device over any network.

Built on a real-time platform and based on the ground breaking vulnerability research, the Avaya Session Border Controller for Enterprise helps provide an up-to-date protection solution to counter communications threats.

Learn More

To learn more and to obtain additional information such as white papers and case studies about Avaya Session Border Controller for Enterprise please contact your Avaya Account Manager or Authorized Partner or visit us at **www.avaya.com/usa/product/avaya-aura**

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