

What is an Enterprise Session Border Controller?

Protecting and Controlling Real-Time Communications

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“There is no denying that the world is moving to IP, and SIP has become the de facto solution of choice for those businesses for IP-PBX and UC connections.”

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SENIOR RESEARCH DIRECTOR

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INTRODUCTION

Enterprise communications is in a state of transformation. Businesses are replacing conventional private branch exchange (PBX) systems with Voice over IP (VoIP) and Unified Communications (UC) solutions and cloud-based services to improve collaboration and productivity, as well as to contain capital and operating expenses. Today's mobile information professionals are no longer tethered to the office phone system—they can conduct business and interact with colleagues and customers from any place, at any time.

As IT organizations make the transition to VoIP and UC, they must implement new systems and practices to safeguard IT infrastructure, secure communications, and preserve the high service levels users have come to expect from the corporate phone system and the public telephone network. The Enterprise Session Border Controller (E-SBC) is specifically designed to overcome the complex security, interoperability, and service quality challenges IT teams encounter when implementing VoIP, UC, and contact center modernization initiatives.

Operating at the session layer, E-SBCs connect the enterprise communications infrastructure to the public internet, private IP networks, and one or more Session Initiation Protocol (SIP) trunk service providers. They terminate and re-originate each communications session, enabling the E-SBC to manage and control traffic, apply enterprise policies, and provide the cornerstone for a secure, efficient UC solution.

REDEFINING ENTERPRISE COMMUNICATIONS

Rapid advances in unified communications and the growing focus on improving customer experiences in contact centers are fundamentally reshaping business communications. The era of the office telephone system is coming to an end. Enterprise communications is transitioning from time-division multiplexing (TDM) to IP, from the premise to the cloud, and from voice to multimodal communications.

A number of business, cultural, and technology trends are driving the transformation of enterprise communications and impacting IT planners:

- **Unified communications.** Traditional telephone calls are giving way to rich multimedia, multiparty interactions that combine voice, video, chat, presence and Web collaboration. Enterprises are leveraging rapidly evolving HD video conferencing and telepresence systems to conduct meetings remotely and deploying unified communications (UC) solutions to boost productivity and collaboration for their mobile workers. A demonstrated track record of ongoing support for these evolving solutions, such as for Microsoft's Lync to Skype for Business, to Teams offerings, is critical.
- **Customer experience initiatives.** The quality of the customer experience has emerged as a new dimension of competition across business and consumer industries. Recognizing the contact center is the pivot point for many experiences, enterprises are modernizing their contact center infrastructure and investing in omni-channel communications tools to help improve experiences, including Web chat, voice, video and email communications.

- **Emerging cloud services.** A growing variety of cloud-based solutions— video conferencing services, customer relationship management systems, and contact center services—will enable IT organizations to eliminate capital equipment cost and complexity, accelerate service deployment, and focus on business innovation rather than underlying telecommunications infrastructure.
- **Communication APIs.** Many enterprises are embedding communications functions—voice, video, chat—directly into business processes and line-of-business applications. Using communications APIs, they can intelligently orchestrate real-time communications sessions with presence information and business rules. This helps reduce process inefficiencies and improves decision making, employee productivity, and customer service.

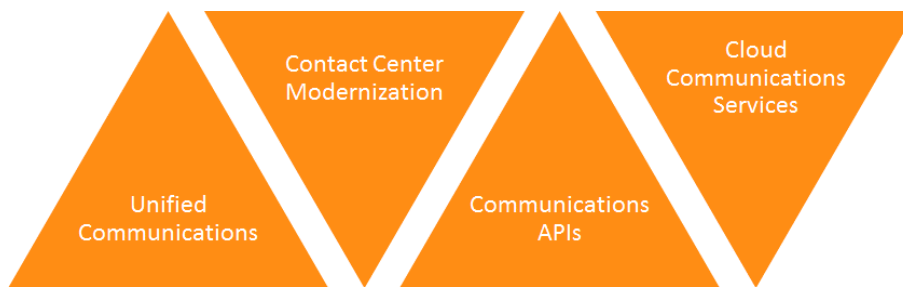


Figure 1. Business, cultural, and technology trends are transforming enterprise communications.

Session Initiation Protocol has emerged as the predominant signaling protocol for IP communications. Many service providers now offer SIP trunking solutions, which provide cost-effective and flexible alternatives to conventional T1/E1 primary rate interface (PRI) circuits. Supported in a wide range of communications platforms (UC servers, IP PBXs, and video conferencing servers) and endpoints (desk phones, smartphones, and tablets), the SIP standard can help IT organizations reduce expenses, eliminate vendor lock-in, and enjoy greater choice when provisioning end-users.

E-SBCS PROTECT AND CONTROL IP COMMUNICATIONS

Extending real-time IP communications across network borders introduces a variety of security, interoperability, and service quality challenges. Conventional IP networking devices—routers, firewalls, traffic shapers—are not designed to handle real-time communications and do not address the unique security vulnerabilities, interoperability issues, or service quality concerns introduced by different VoIP, IP-PBX, and UC systems.

Typically deployed at the border between trusted and untrusted networks, E-SBCs operate at the session layer, processing traffic that uses real-time communications protocols, primarily Session Initiation Protocol. Importantly, E-SBCs completely terminate and re-originate each communications session, which enables the E-SBC to inspect traffic and apply granular control and policies. Businesses use E-SBCs to connect and control the traffic flowing through the enterprise real-time communications infrastructure to the public internet, other private IP networks, and to one or more SIP trunk service providers. Through SIP trunks, E-SBCs manage and control communication with the public telephone network and cloud-hosted services. The E-SBC can also interconnect premise-based systems, including legacy PBXs, UC systems (e.g. Microsoft Teams), and contact center environments.

As enterprises migrate to IP communications they must find new ways to efficiently manage IT assets and safeguard communications, all while continuing to deliver the quality service levels that users have come to expect from the corporate phone system and public telephone network. E-SBCs are specifically designed to mitigate the complex

security, interoperability, and service quality issues IT organizations often encounter when implementing VoIP, video and UC initiatives and extending real-time IP communications across network borders.

Table 1: Specific functions performed by E-SBCs

Session Function	Description
Protocol manipulation	For interoperability between premise-based systems and SIP trunk services, as well as multivendor systems
Protocol interworking	For example, SIP to H.323 interworking
Robust security	Through deep packet inspection
Encryption interworking	Go from encrypted to in-the-clear communications or encrypted Secure Real-time Transport Protocol (SRTP) to Internet Protocol Security (IPsec)
Session prioritization, classification and rate limiting	For Quality of Service, emergency calling (911), service-level agreement (SLA) assurance
Session routing	For failover, least cost routing, load balancing
Codec translation or renegotiation	For bandwidth optimization
Session replication	For centralized call recording or compliance

E-SBCS DO MORE THAN FIREWALLS

It is important to understand the fundamental differences between an E-SBC, which is designed to manage and control real-time voice and video communications sessions, and a conventional security product like a firewall, which is intended primarily to block or allow data communications connections.

IP communications sessions are composed of signaling information (data used to set up and control sessions) and media streams (digitized voice and video). Signaling information and media streams flow under the direction of different IP protocols and move over separate paths.

SIP is used to establish and manage sessions. Real-time Transport Protocol (RTP) is used to deliver the associated audio and video streams. SIP servers (there are various types) are responsible for enabling sessions between two or more parties.

Most IP firewalls are designed for data applications (web browsing, email, client-server business applications, etc.), which are tolerant of delay. When they process RTP packets, they can introduce delay and jitter that degrade the quality of the voice or video service. In contrast, an E-SBC is designed to process media packets with a minimum amount of delay and jitter.

There are significant differences in the way the devices handle signaling, too. Firewalls offer only basic support for SIP. They provide Access Control Lists, which can be configured to permit or reject SIP traffic based on the

addressing information contained in the SIP signaling messages. Firewalls cannot actively manipulate nor control real-time IP communications sessions in the way an E-SBC can.

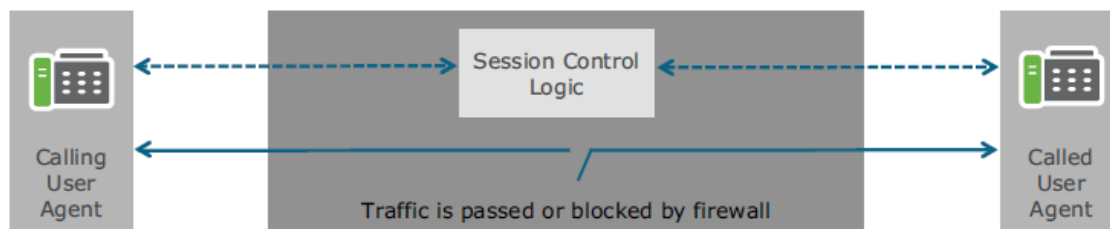


Figure 2. Most IP firewalls offer only basic support for SIP

The difference lies in the underlying architecture. In SIP parlance, a SIP firewall is implemented as a SIP Proxy Server, which is responsible for relaying and controlling SIP signaling information but is not actively involved in the RTP media path (the audio and video streams).

An E-SBC, on the other hand, is implemented as a back-to-back user agent (B2BUA), which actively processes both the signaling and media paths. A B2BUA terminates a session from one SIP entity (a calling party) and establishes a distinct session with another SIP entity (a called party). This enables an E-SBC to inspect and manipulate the contents of the entire session to enforce security policies and efficiently manage enterprise communications.

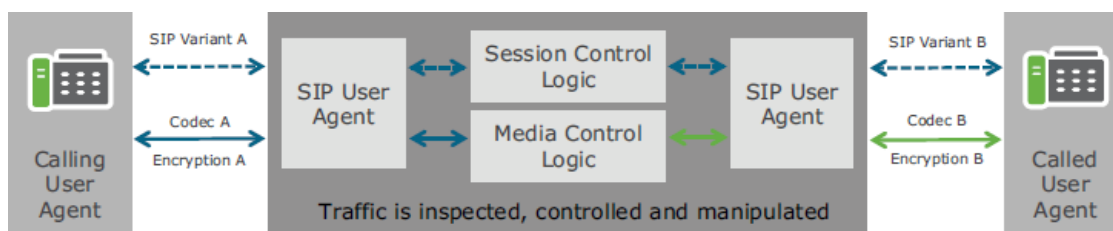


Figure 3. An E-SBC acts as a SIP back-to-back user agent

Unlike a firewall, an E-SBC maintains session state and controls and manipulates SIP signaling plus associated RTP media streams. For example, an E-SBC keeps pinholes open for the duration of a communication session, whereas a firewall will close and reopen a pinhole using different port numbers, which can disrupt a session.

BUILDING A FOUNDATION FOR SCALABLE, SECURE COMMUNICATIONS

IT organizations often run into interoperability and interworking issues when extending real-time IP communications across network borders. SIP specifications are designed to be highly flexible; they give engineers a variety of implementation choices and offer many optional features and functions. As a result, it is not uncommon for different vendors (and service providers) to introduce solutions that are fully SIP-compliant, yet difficult to make work together. Interoperability challenges can complicate VoIP and UC projects, lead to cost overruns, and drain limited IT resources.

E-SBCs allow you to build an enterprise UC architecture that can scale and accommodate new functions and systems, while maintaining control and securing your communications. With the capability to maintain session state and manipulate RTP media streams as well as SIP signaling, the E-SBC can apply dynamic trust levels based on

observed end-point behavior. The E-SBC can execute more comprehensive, granular security controls encompassing a wide variety of communications networks.

Installed at the edge of the enterprise network as a physical appliance or virtualized software, the E-SBC functions as a distinct demarcation point for external services (SIP trunking services, hosted services, cloud-based services, and so on). The E-SBC delineates the enterprise network from the service provider network, provides a distinct security perimeter, and makes it easier to isolate and troubleshoot problems.

In addition, by consolidating all real-time communications traffic, the E-SBC provides a central control point for classifying and prioritizing diverse traffic types—voice, video, UC—prior to service provider hand-off. As such the E-SBC serves as a central point for service-level agreement (SLA) monitoring and prioritizes and allocates limited bandwidth resource across all types of applications. Building a secure, comprehensive communications infrastructure that can accommodate different existing systems, legacy applications, and emerging IP-based functionality is no mean feat. Furthermore, satisfying increasing security and regulatory requirements with limited IT resources presents an even greater challenge to the IT manager.

BENEFITS OF A TRUE, ENTERPRISE SBC

Greater IP Network Security

E-SBCs provide IP network-specific security capabilities to protect against denial-of-service attacks and other malicious threats such as man-in-the-middle attacks. E-SBCs also provide IP address and topology concealment features to safeguard privacy and confidentiality, encryption capabilities to prevent eavesdropping and impersonation, and access control to prevent fraud and service theft.

Platform for Interoperability

E-SBCs provide extensive protocol normalization functions that mitigate multivendor interoperability and multiprotocol interworking issues. E-SBCs also provide comprehensive Network Address Translation (NAT) and firewall traversal features for extending VoIP and UC sessions across network boundaries in a seamless manner. E-SBC interoperability capabilities help IT organizations increase agility, while keeping implementation and support costs in check.

Increased Service Quality and Availability

Given end-users' service expectations, IP communications networks must deliver PSTN-like availability and service quality. Best-of-breed E-SBCs protect against service overloads by balancing loads across trunks and rerouting sessions to circumvent equipment and network problems. They also provide Quality of Service (QoS) marking, virtual LAN (VLAN) mapping, and admission control capabilities that enable network administrators to set service levels and manage service quality.

Cost Management and Avoidance

E-SBCs help IT organizations manage costs by consolidating network infrastructure to make more efficient use of network resources as communication needs increase. They support session control features to route calls across trunks and service providers (least cost routing) as well as codec renegotiation and translation capabilities to optimize wide area network (WAN) bandwidth.

Regulatory Compliance

Established methods and procedures for securing, controlling, and recording circuit-switched TDM calls are not easily extended to packet-based IP communications. E-SBCs help organizations maintain the confidentiality and integrity of customer interactions across a range of industries, including retail, healthcare and financial services.

They enable efficient, centralized call recording architectures that can dramatically reduce the cost of recording in contact centers and other applications.

Many organizations throughout the world are required to support emergency calls (911 calls). E-SBCs provide a range of features to ensure emergency calls are properly handled and prioritized.

CONCLUSION

Unified communications solutions, mobile devices and cloud communications services are ushering in a new era of enterprise communications where one-on-one phone calls give way to rich multimedia, multiparty experiences. By replacing and augmenting legacy TDM voice networks with converged IP networks that deliver voice, video, and data over a common infrastructure, IT organizations can eliminate inefficiencies, contain equipment and operations expenses, and improve customer experiences.

E-SBCs provide a fundamental building block for secure, scalable enterprise UC architectures. They can extend existing investments as well as integrate new, multimodal communication systems. E-SBCs enable businesses to realize all the benefits of interactive IP communications—greater productivity, improved collaboration, increased customer satisfaction, lower costs—without compromising security, reliability, or service quality.

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