Real-Time Communications
Without Boundaries

Beyond the Border:

Differentiating IPX Services with Ribbon

White Paper

Contents

Introduction

Real-time communications traffic has been growing exponentially in recent years, as both enterprises and consumers increase their adoption of IP services. To keep pace with the demand, both fixed and mobile service providers are steadily migrating their core networks from TDM to IP. Examples can be found in enterprises that are transitioning from legacy PBXs to IP PBXs. Organizations are also connecting to service provider networks with SIP trunks to transport both voice and data over a single IP connection. In addition, mobile operators that are deploying LTE must use IP in their core network, both for voice and data. Finally, popular Over-The-Top (OTT) services, such as Skype, are driving a surge in VoIP traffic.

As a result, SS7, Diameter, and VoIP traffic will continue its rapid growth, both in fixed and mobile networks, for the next years.

This across-the-board migration to IP has put the focus on IP Interconnect networks, and the forums that are defining the IP Interconnect architecture. The most prominent among these is the GSMA IP eXchange (IPX) project.

IPX Overview

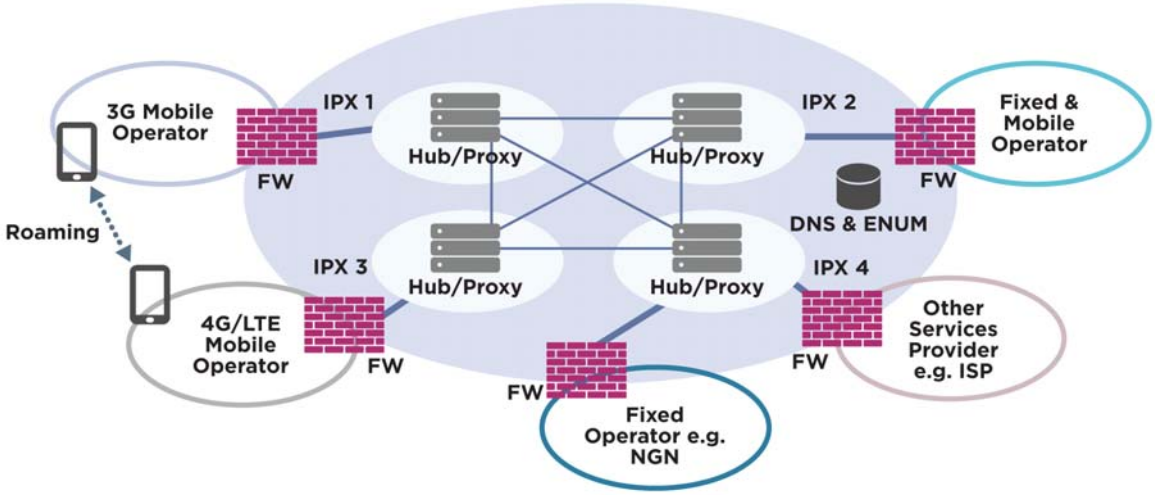

Figure 1. IPX Connectivity

IPX provides interconnection between mobile, fixed, MVNOs, Internet Service Providers (ISPs), and other IPX Providers, as shown in Figure 1 above. The key features of the IPX service are that (a) it offers guaranteed Quality of Service to service providers, and (b) itenables cascading payments whereby a service provider receives a single invoice from the IPX service for all incoming and outgoing traffic. IPX reduces the number of bilateral and roaming agreements that a service provider has to enter into. Instead, the service provider has a single commercial agreement with an IPX Provider.

There are three common IPX interconnect models, as depicted below:

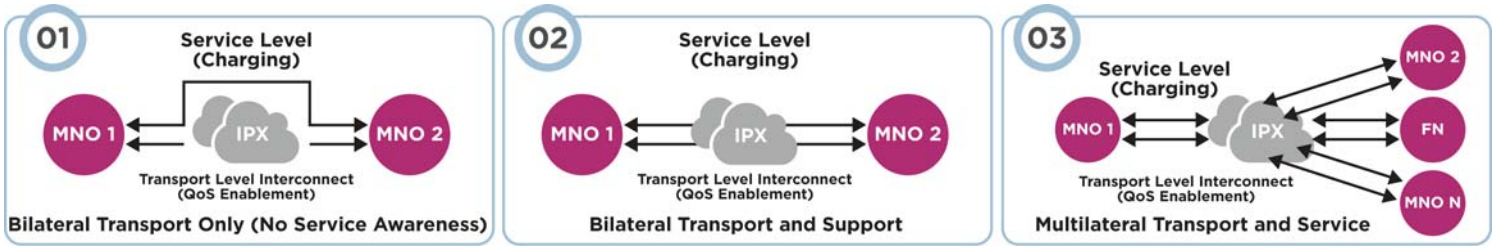

Figure 2. IPX Interconnect Models

Model #3 is the most advanced model, and the one that most IPX Providers are focused on.

Business requirements for IPX include (a) service interoperability, (b) customer protection/security, (c) flexible pricing/charging models, and (d) conformance to Service Level Agreements (SLAs) for supported services.

IPX divides the Interconnect into two distinct layers: the IP Layer and the Service-Aware Layer. The key to operating IP interconnect between service provider networks successfully is the Service-Aware multilateral interconnect mode of IPX.

IPX is critical for enabling end-to-end Rich Communication Suite (RCS) services between service providers, because interoperability is key to the successful, widespread adoption of RCS or any other mass-market service. Email, Social Networking, IM, Presence, HD Voice, Video Conferencing, Video Share, File Share, and Multimedia Collaboration must work seamlessly across multiple operators to stimulate mass adoption.

Service-aware IPX can play an important role in driving interoperability between service provider networks by transparently processing or interworking these services when needed. Further, IPX can add valuable functionality for interworking some variations in signaling, media, or version of the implemented standards. While service providers focus on implementing and deploying services, an IPX Provider (IPX-P) ensures that interconnect points are enabled, tested, and activated—and then provides interworking of services as needed. Following this model, each service provider works with a single IPX-P while each IPX Provider works with multiple service providers. This allows services to interoperate faster across heterogeneous (fixed/mobile/cable) networks. For example, a smartphone from one mobile operator can communicate/interact through an IPX network with an integrated access device that is supplied by a cable operator on the other side of the globe.

IPX also serves as a catalyst for expanding the addressable market for OTT services, which have grown exponentially in VoIP minutes as a result of applications such as Skype. To help connect OTT VoIP users on different networks, the IPX also provides useful interworking functions, such as transcoding from a landline HD codec to AMR-WB for a GSM handset across the globe, or enabling connectivity between a proprietary OTT VoIP user and a Public Switched Telephone Network (PSTN) user.

As the critical interconnection between different networks, a comprehensive IPX implementation must support the following features:

- Security – Denial of Service (DoS) protection
- ACL
- Policing and encryption
- Quality of Service (QoS) – TOS bit marking of packets
- CAC – Call admission based on an agreed SLA
- Signaling Interworking for SS7 to Diameter
- Hosted Security services using Diameter Edge Agent (DEA) and Signaling Firewall
- Billing and Settlements – Generation of CDRs and infrastructure for settlements
- Interoperability Tools – SIP Message Manipulation (SMM)
- SIP or media profiles

IPX Value-Added Features

In addition to these basic border features, IPX Providers can accelerate adoption of IP Interconnect among several heterogeneous VoIP islands by providing some session-aware, value-added services. These services can be divided into three broad categories: 1) signaling/transport/service interworking, 2) media transcoding, and 3) centralized routing and policy.

BICC Support – Many legacy Mobile Switching Centers (MSCs) that are currently deployed do not support SIP-I but do support BICC over IP. An IPX can support BICC to SIP-I interconnectivity, which enables the large pool of mobile operators with legacy MSCs to interwork with IP networks.

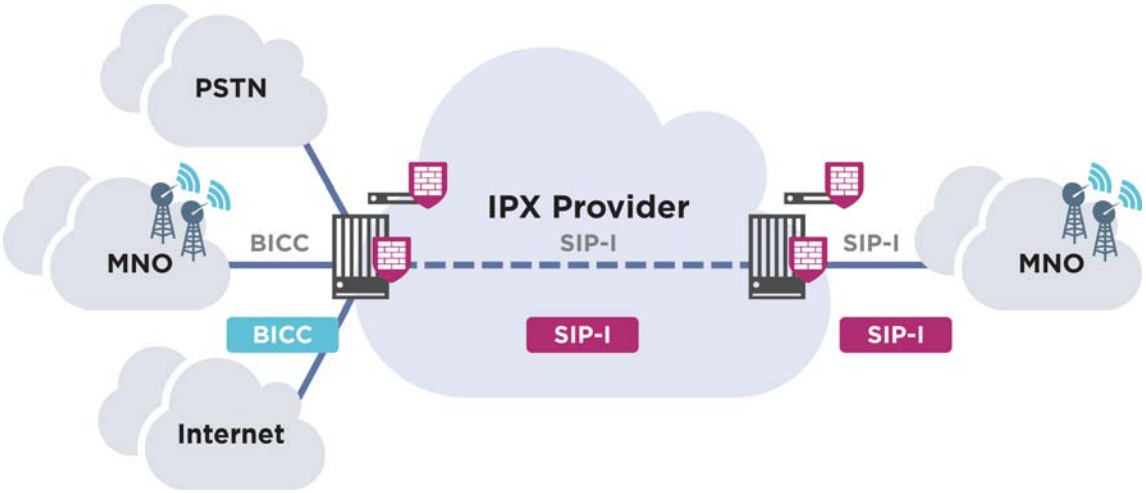

Figure 3. BICC Interworking

SIP-I to SIP-I Interworking – SIP-I is the signaling protocol of choice for carrier interconnect, and is defined by the International Telecommunication Union (ITU) in Q.1912.5 profile C. When carrying international calls, however, switches may include various international flavors of ISUP in SIP-I. The IPX must be able to interwork these variations of ISUP and deliver the desired version of ISUP to each peer.

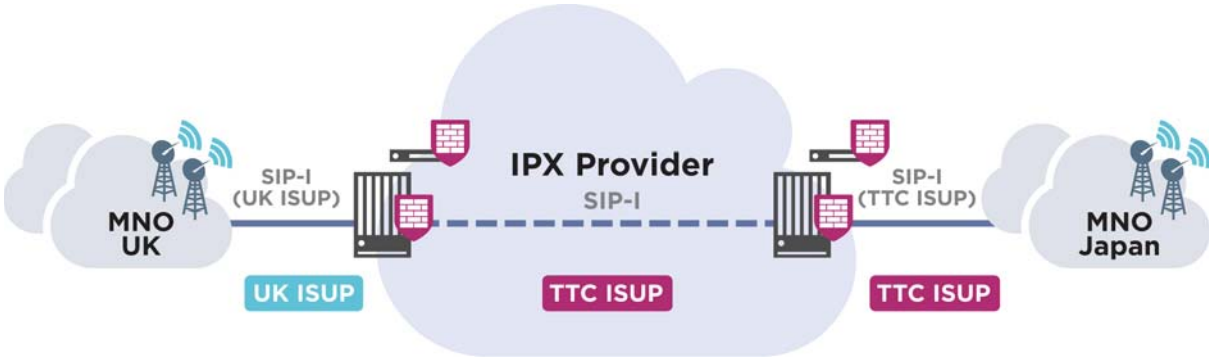

Figure 4. SIP-I Interworking

Transcoding – By transcoding from one form of HD codec to another form of HD codec (example: SILK to 722.2) or from one wireless codec to another (example: AMR to EVRC), the IPX can interconnect heterogeneous networks. Video codec transcoding or transrating is an extension of this IPX capability.

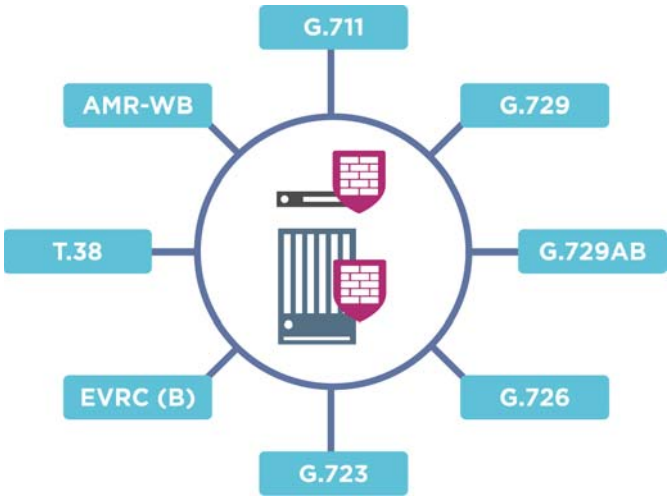

Figure 5. Media Transcoding

Transport Interworking – IPX should interwork various network and transport layers for enabling traffic between multiple peers, including UDP/TCP/SCTP, IPv4/IPv6, TLS/IPsec, RTP/RTSP, and so on.

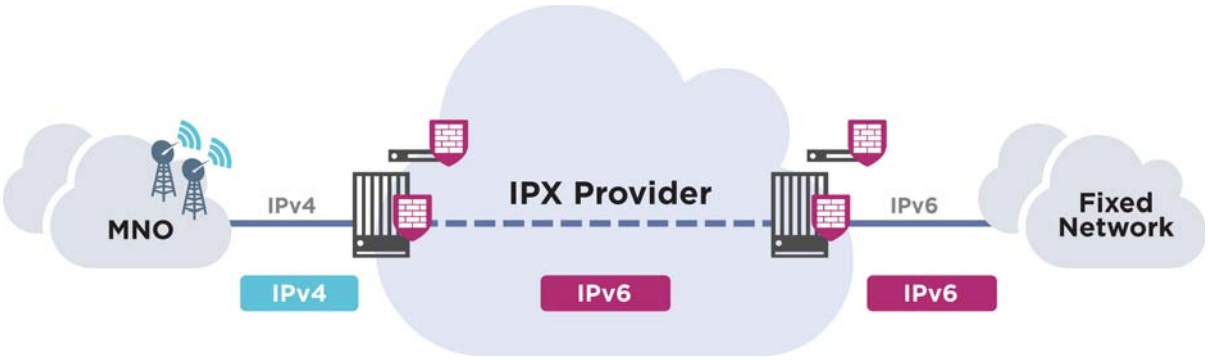

Figure 6. Transport Interworking

ENUM Enablement – ENUM started many years ago in IETF as a public translation database of end-user service addresses. More recently, it has become a technique for improving inter-carrier routing. The GSMA Pathfinder is an example of such usage. IPX-Ps can deploy a centralized routing engine using ENUM, which lets the members of the IPX-P federation populate their address information into the routing engine through standardized interfaces. Using this technology enables IPX Providers to add new members quickly and provide an easy way of integrating their new routes into the federation.

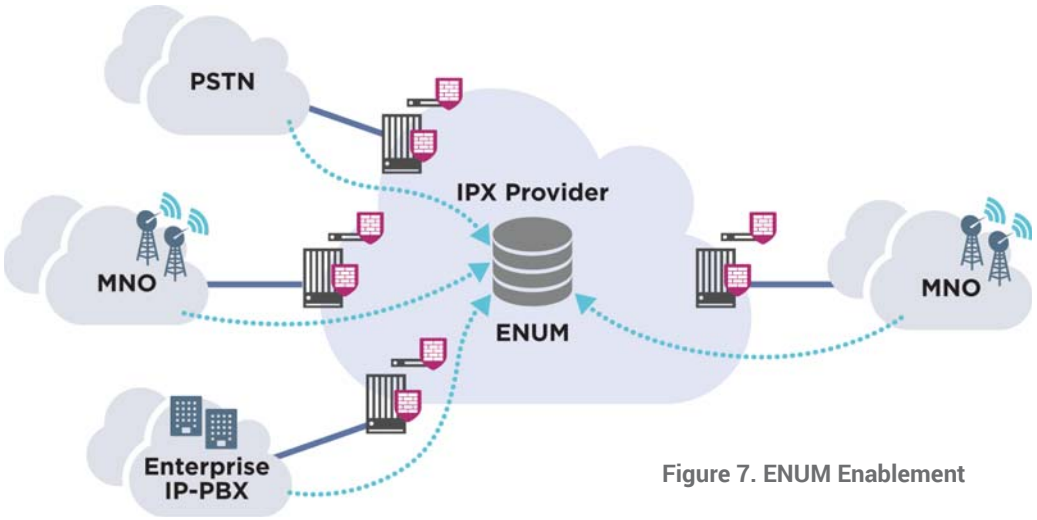

Figure 7. ENUM Enablement

Centralized Network Routing and Policy – The IPX network needs a centralized router and policy engine that provides one centralized routing database for all interconnection points. The IPX-P should be able to route traffic efficiently using the most economically suitable route based on the QoS and pricing agreements with all peers. The centralized routing and policy engine should be able to use a variety of SIP parameters and headers, as well as the information from the ENUM database, to route the traffic for various services.

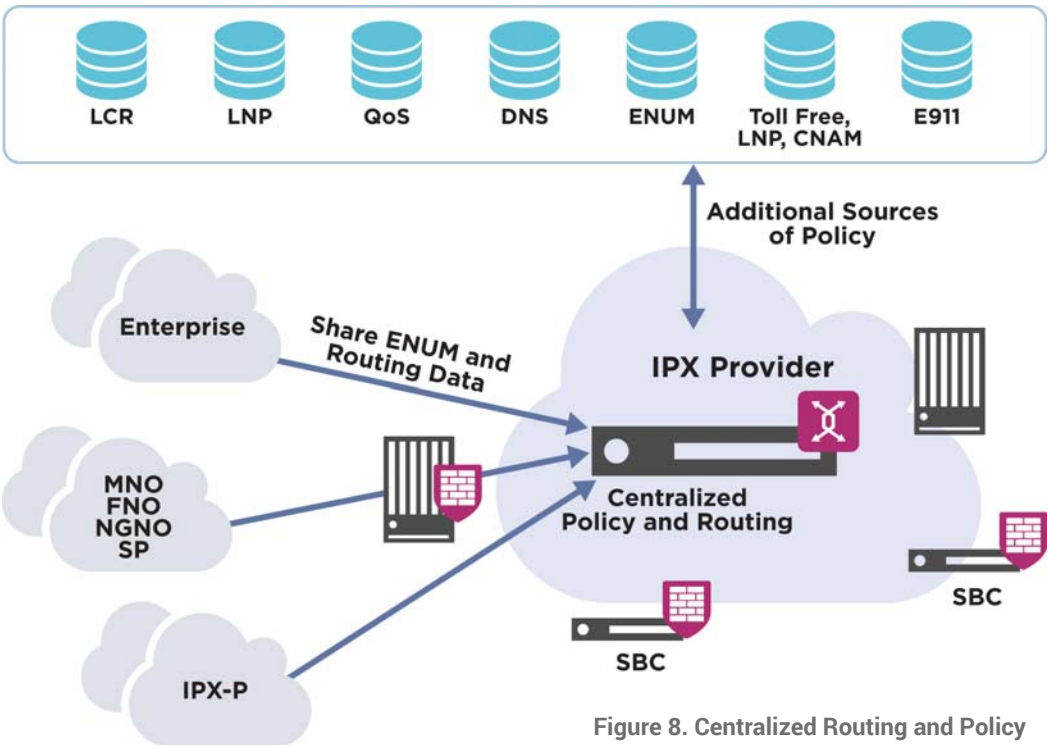

Figure 8. Centralized Routing and Policy

Enabling Hosted Services – The strategic position of IPX allows it to provide hosted services to service providers that interconnect with it. IMS/RCS is an example of such a hosted IPX service. Other examples include hosted DEA – Diameter Edge Agent and Signaling Firewall. These services either replace or augment service and security infrastructure deployed by operators. Operators have the option to use Host services or local services or both.

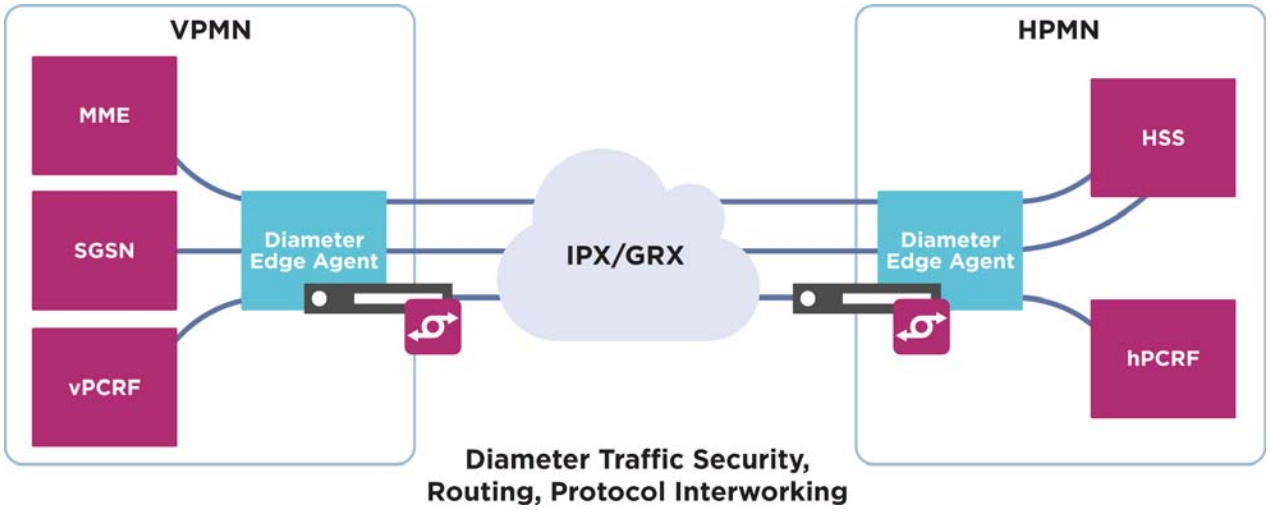

Figure 9. Diameter Edge Agent

Signaling Interworking – SS7 to Diameter interworking is used to support roaming between LTE and 2G/3G networks by supporting interworking between Diameter and SS7 Mobile Application Part (MAP). Diameter interworking is used to normal and interoperate between differing Diameter protocol implementations. This requirement is quite common within a multi-vender network or between networks of different service providers.

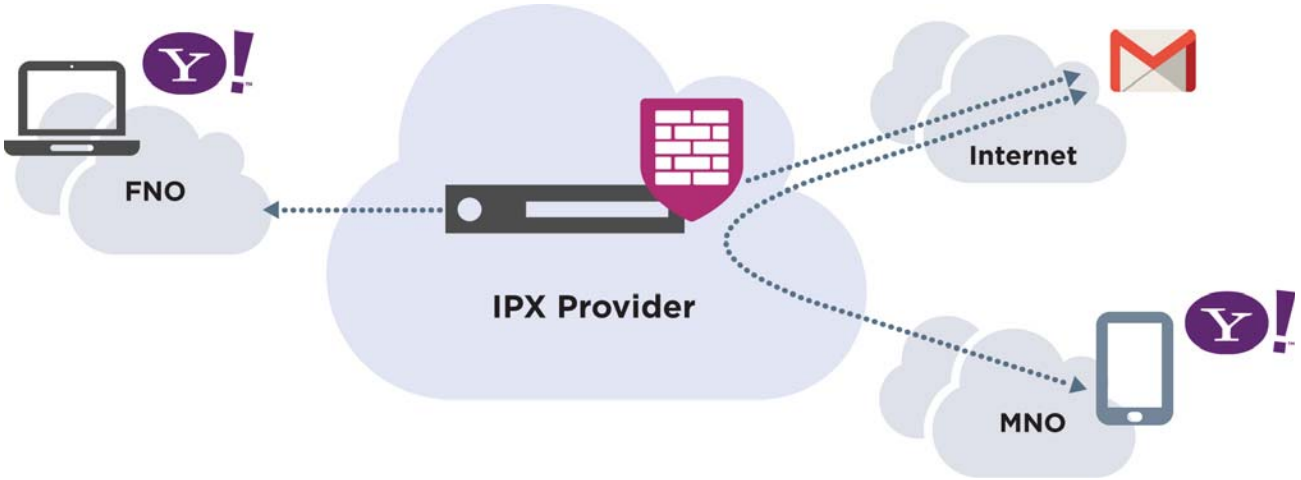

Figure 10. Services Interworking

Services Interworking – The IXP Provider can act as a gateway and provide interworking between incompatible services. This is particularly useful for services such as Messaging where there is a proliferation of services (Yahoo Messenger, AOL, RCS, etc.) that do not interoperate with each other. The IXP Provider is well positioned in the network to provide the necessary interworking between these services.

Ribbon IPX Solution

Ribbon Communications is a leading provider of IPX solutions for interconnect providers. Ribbon's flagship security products—SBC, DSC, GSX, and PSX—form the Ribbon IPX solution. The SBC products are complemented by Ribbon's network analytics, which actively monitors the customer quality of experience, and the PSX centralized routing and policy server that supports DNS/ENUM-based routing. The DSC provides STP and Diameter Edge Agent (DEA) signaling interworking and border security.

The Ribbon IPX solution supports basic IPX features, such as:

- Security: DoS, encryption, media policing, signaling security
- Quality of Service: Signaling/media packet marking, proactive measuring of QoS parameters
- Call Admission Control and SLA
- Accounting/billing
- Interoperability tools: SIP Message Manipulation

In addition, the Ribbon IPX solution provides value-added functions beyond the basic IPX features:

- Interworking: Signaling, transport, media (transcoding), services
- Services roaming
- ENUM enablement
- Centralized routing and policy
- Signaling interworking
- Hosted services, including security

Summary

As all fixed and mobile networks migrate to IP to support the proliferation of IP applications, services, and devices, the role of IP Interconnect is quickly growing beyond basic border control. An IPX Provider can leverage its capabilities for value-added signaling interworking, media transcoding, routing, and addressing to support its customers' service velocity, business growth, and service usage across disparate networks worldwide.

About Ribbon Communications

Ribbon is a company with two decades of leadership in real-time communications. Built on world class technology and intellectual property, Ribbon delivers intelligent, secure, embedded real-time communications for today's world. The company transforms fixed, mobile and enterprise networks from legacy environments to secure IP and cloud-based architectures, enabling highly productive communications for consumers and businesses. With locations in 28 countries around the globe, Ribbon's innovative, market-leading portfolio empowers service providers and enterprises with rapid service creation in a fully virtualized environment. The company's Kandy Communications Platform as a Service (CPaaS) delivers a comprehensive set of advanced embedded communications capabilities that enables this transformation.

To learn more visit RibbonCommunications.com