# Enhancing VoIP with Voice Peering

The Voice Peering Fabric is a service of Stealth Communications®.

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## Abstract

From the invention of the telegraph to the emergence of the Internet, the world has evolved and reinvented itself over and again. Technology has always created efficiencies and opportunities. Despite skepticism from some, history shows that every time there was a change for the better, investors and the public realized and followed. The drive for a better life has invariably and inevitably shifted workforces and profits across different industries. Investments were made and revenues collected directly or indirectly with the evolution. The latest trend in the technology world is voice peering, whether between carriers, enterprises or anyone joining to form this new community.

The Voice Peering Fabric ("**VPF**") was launched in October 2003 to accelerate transmission of digitized voice traffic. Built as a distributed Layer 2 Ethernet network, the VPF has solved many of the uncertainties engineers have had about both security and quality of digitized voice traffic. The VPF is a large and secure private network that enables carriers and enterprises to trade minutes as well as to distribute and acquire access to different applications that are necessary or useful for efficient communications among branch offices and with national and international business clients and partners. It is a global interconnection mechanism, a unified transport infrastructure, and a private grid for voice and telephony communication.

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# Contents

# Introduction

Voice peering is a method for the exchange of digitized voice traffic. A typical example is a company with two branch offices, linked via a data connection. When a telephone call is made from one office to another office on this connection, the call transverses the data connection without interacting with the Public Switched Telephone Network ("**PSTN**"). The phone systems at both offices are configured to categorize and route calls internally. These telephone calls do not incur any incremental per minute charges. The only cost is the cost of the data connection itself. This method is often referred to as "**toll bypass**."

For dealing with the outside world, large organizations and service providers often have complex designs involving multiple locations and multiple interfaces into the PSTN. Phone switches and systems usually require intelligent-routing capability such as Lease Cost Routing ("**LCR**") and Electronic Number Mapping ("**ENUM**"). LCR and ENUM are actual methods of voice peering. LCR allows a particular call to be routed to a particular connection based on cost, time-of-day and other parameters.  ENUM simplifies the routing of a telephone call based on the database number look-up architecture.

Controlling costs in addition to ensuring quality and security on a voice network are similar to the challenges faced in managing a data network. In this information age, business processes have accelerated in all applications, not least in the demand for efficient communications. Voice over Internet Protocol ("**VoIP**") is an important factor and a revolutionary technology supporting an organization's ability to constantly reinvent itself. VoIP requires careful planning and engineering to ensure current network infrastructures are properly utilized and potential savings realized from the new implementation.

This paper discusses the value of voice peering through the use of the Voice Peering Fabric ("**VPF**") coupled with VoIP implementations & deployment models for businesses with different backgrounds and needs. The paper will also provide a detailed introduction to the three major components of the VPF that enhance voice peering.
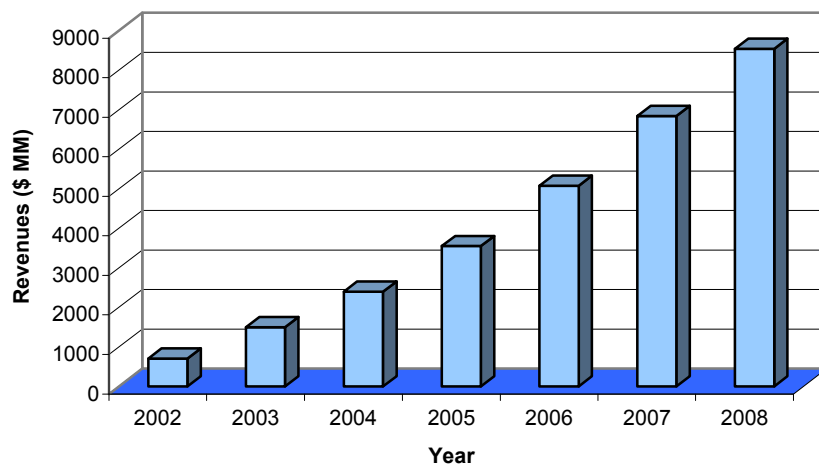
# The Growth of VoIP

VoIP: It's a method of transferring voice over an Internet Protocol ("**IP**") network, which was originally referred as IP Telephony.

IP Telephony gained popularity when Yahoo, MSN, AOL and other messaging programs imbedded voice-to-data conversion on their online chat programs. Since this implementation is over the public Internet on a desktop computer or handheld device, business entities are reluctant to employ these functions because of security and quality issues. Running VoIP over IP "**VPN**" (Virtual Private Network) or "**MPLS**" (Multiprotocol Label Switching) connections have somewhat resolved the security issue, but since some VPN sessions are over the public Internet, latency is difficult to control. Unless a physical dedicated connection is in place between branch offices, organizations with sensitive data such as those in the financial and healthcare industries may not deploy VoIP fully throughout their networks.

When Napster was launched, people were excited that digitalization allowed them to download music for free. Similarly, VoIP (which does not have the copyright issues that have been so difficult in the music area) caught many people's attention since it may significantly reduce expenses. The

**VoIP Equipment Market: Total Market Revenue Forecast (World)**
*Source: Frost & Sullivan*



fact that VoIP is here to stay is proven by the growth of sales on VoIP technologies, as well as by the efforts of traditional telephone companies (like Verizon and SBC Communications) to offer their own VoIP products. The number of choices for VoIP phones, switches and gateways in the market seem to outnumber the choices for music gadgets. VoIP technology is important not only for cost reduction but also because it has enabled the world to communicate freely over PCs, mobile devices and IP phones and to break free of the limitations inherent in wireline, circuit communications that have changed little since the days of Alexander Graham Bell. With growing adoption of VoIP in Europe and Asia, more enterprises in North America have begun to deploy new IP PBX systems, IP gateways and IP phones within their businesses.

# Defining Voice Peering

The Internet provides enterprises with improved communication, functionality and productivity with fewer resources. With the near total and universal adoption of the Internet, companies have taken steps to "localize traffic" to better control their internal communications and expenses. Given the means of keeping data traffic within a region, Internet service providers have long been "off-loading" Internet traffic at different "meet-points" around the world. In recent years, they have been able to establish more regional "meet-points" in ever smaller regions and to set-up "meet-points" for the private exchange of information among schools and universities. In the technology world, these "meet-points" are often referred to as "peering exchanges."

The same concept is being applied to voice communications. More importantly, separate direct connections are required for voice traffic due to the sensitivity of voice packets. Depending on the type of voice technology deployed by its members, today there are a few different methods of voice peering:

"**TDM Peering**": is typically a bilateral agreement between two carriers, to route telephone calls using "**TDM**" (Time-Division Multiplexing) technology, to and from the PSTN at a cost negotiated by the parties. This has been the traditional method and model in today's voice industry.

"**Bilateral VoIP Peering**": is the same as TDM Peering except instead of using TDM technology, calls are routed using VoIP technology. Major long distance carriers such as WorldCom, Sprint, and AT&T have been connecting using Bilateral VoIP Peering at different sites around the world to manage call volume and quality. In fact, billions of minutes are routed via VoIP for transport nationally and globally.

"**Multilateral VoIP Peering**": is a service within a peering exchange where all of its members agree to a set of rules for the exchange of VoIP traffic. It allows its members to send and receive telephone calls at no cost across the peering exchange.

In recent years, more VoIP networks have interconnected to exchange VoIP termination without tapping into the PSTN. Currently there are a few types of voice exchanges. Though these voice exchanges share a goal to localize traffic and bypass the PSTN -- they have their differences and limitations. Some voice exchanges connect their members by a voice switch and make their profit on commission fees; other voice exchanges are setup for the purpose of reselling voice terminations. Thus far, the VPF is the first to maintain a peering exchange that allows its members to trade minutes freely in an open marketplace while simplifying their business functions.

# The Extended Value of Voice Peering

The role of the VPF is to build a community, of businesses and service providers for the exchange of telephony services. Rather than pursuing dedicated connections and spending resources searching for partners for particular types of routes of transport, a physical connection into VPF's distributed Ethernet fabric allows an organization to interact with hundreds of businesses and service providers located around the world.

## VPF Minutes Market

Similar to stocks traded on financial market exchanges (NYSE, NASDAQ, etc.), voice traffic exchanged on a voice exchange is measured by minutes passed to each party, thus referred to as "minutes trading."

> *Traditional Minutes Trading, also known as Clearinghouses: The number and type of participants, the locations of the clearinghouses, rates and commission fees limit the growth and scale of minutes trading.  Running long-haul circuits to a mutually agreed meet-point by the parties can be expensive and un-scalable. Connections via IP VPN over the public Internet are unsecured and low quality.*

Minutes trading on the VPF is simple and secure. VPF PoP's (points of presence) are established at major fiber-dense connection points to meet businesses and service providers locally in their markets. Trading within the VPF Minutes Market provides its members:

- Direct access to multiple carriers;
- The ability to buy and sell origination (DID) and termination (DOD) services;
- The freedom to negotiate direct bilateral relationships;
- The choice of industry standard VoIP protocols and codec's;
- The opportunity to customize their LCR;
- The option of eliminating dedicated connections to each trading partner; and
- Access to VPF Minutes Market Request for Proposal ("**RFP**") Engine.

## VPF ASP Market

During consultation with our members to simplify their VoIP businesses, we found that much of their time and effort was devoted to acquiring and accessing third-party applications to support call routing/setup functions. A handful of connections were installed to access different databases; some members have dedicated people or departments to ensure the accuracy of telephone data on each telephone number. After completing surveys with members and partners, it became apparent that Application Service Providers ("**ASP**") services are a vital component to the VoIP industry.  With the FCC's ruling on E-911 in May 2005, the development for the VPF ASP Market became imperative to better service our members.

An ASP is an entity that operates applications, databases and gateway services that are telephony related.  Databases and gateway examples include:

- Toll Free Gateway ("**8XX**") – Enables providers to route toll free numbers (800, 888, etc.)
- Directory Assistance ("**411**") Service
- 911 Gateway – Maps telephone number to physical address and routes telephone call to the nearest 911 / E911 center.
- Caller Name ("**CNAM**") – Displays first and last name of a calling party.
- Local Number Portability ("**LNP**") – Enables providers to move and route telephone numbers.
- System Signaling 7 ("**SS7**") – Ability for service providers to access the SS7 network over a VPF Ethernet connection using SIGTRAN protocol.

While many of the services offered in the VPF ASP Market are geared toward service providers, businesses themselves can also utilize services such as 411, 911 and CNAM services. Benefits of the VPF ASP Market include:

- An open framework and marketplace for buyers and sellers;
- Direct bilateral relationship with the VPF ASP Partners;
- Direct and easy access to the ASP services over an existing VPF connection.

The VPF has simplified and made available a marketplace for ASP's and their customers. Their integration removes a layer of complexity and expense that too often is little more than interfacing with legacy networks and technologies.
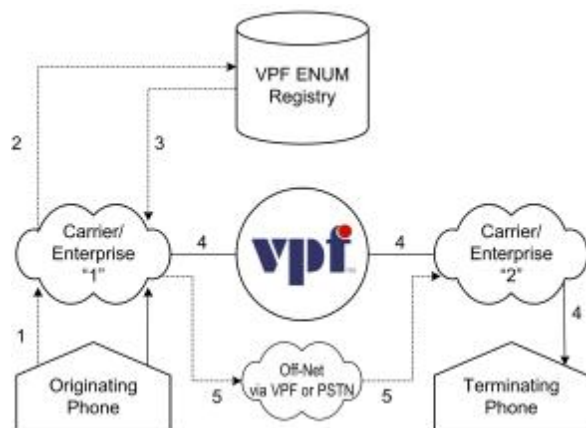
## VPF ENUM Registry

*ENUM: It is a network protocol that takes a telephone number and resolves it to an Internet address [URL], as a traditional Domain Name Server ("**DNS**") takes a URL (like [www.google.com](http://www.google.com)) and converts it into a numeric IP address. With ENUM, a telephone number is sent to the DNS server, which then replies back with the appropriate URL, if the URL/telephone number has been registered. This allows VoIP networks to send and receive telephone calls within the IP domain.*

The VPF ENUM Registry is a <u>multilateral peering</u> enabling service that allows members to send and receive telephone calls to one another directly, free of charge across the VPF. **It is toll bypass at its best.**

Call volumes on the VPF ENUM Registry has been increasing. Launched in April 2004, the registry houses over 11 million unique telephone numbers, with no charge for the registration, lookup and calls. Current members of the VPF ENUM Registry include communities of universities, telecom companies and financial institutions. As the number of telephone numbers increases on this registry, more calls will be routed within the private networks.

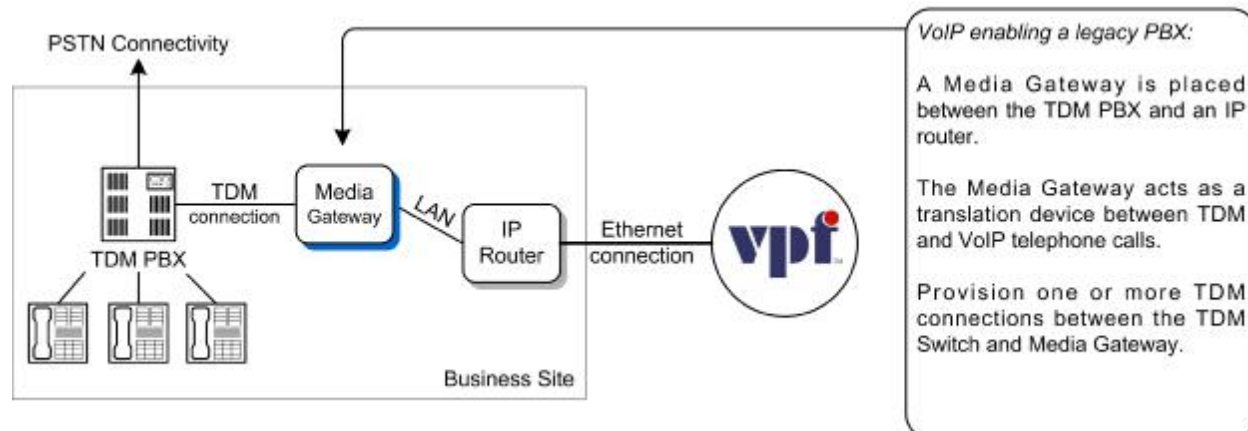### VPF ENUM Registry Call Flow Diagram



The diagram on the left illustrates a call flow when using the VPF ENUM Registry.

1. User initiates phone call
2. Query sent to ENUM Registry
3. Routing information returned
4. If true, call established between the organizations through the VPF
5. If false, call sent to user's selected VoIP Carrier via the VPF Minutes Market or PSTN
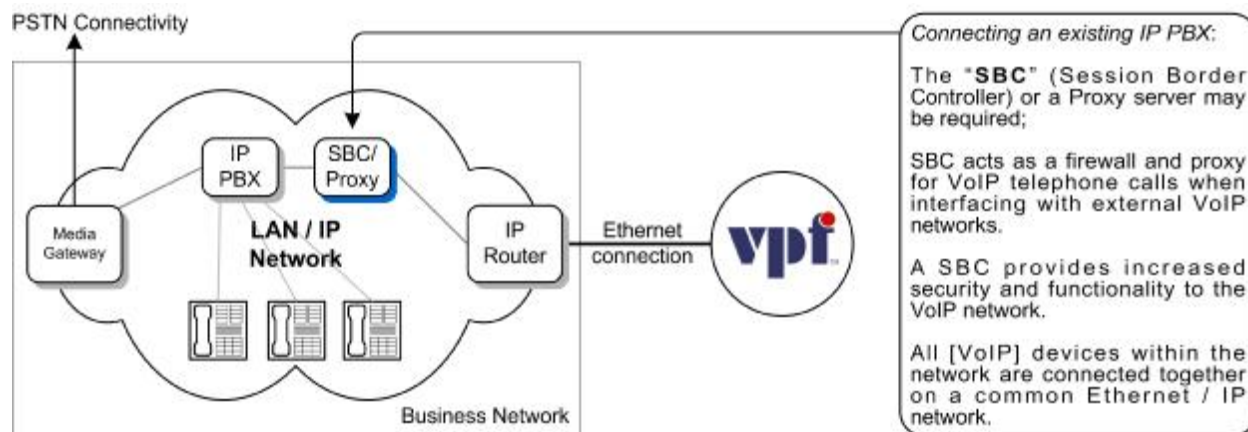
# VPF Member Implementation Models

Since the VPF telephony marketplace introduces a new method for the exchange of minutes, members connect to us with minds open to the idea of trading minutes on terms that they negotiate easily and freely and the idea that they can now access applications on the same physical connection. The VPF simplifies both business plans and network configurations. To help our members and partners benefit, and to help others, the following diagrams are implementation models that map out a simple setup for each type of businesses connected to the VPF:
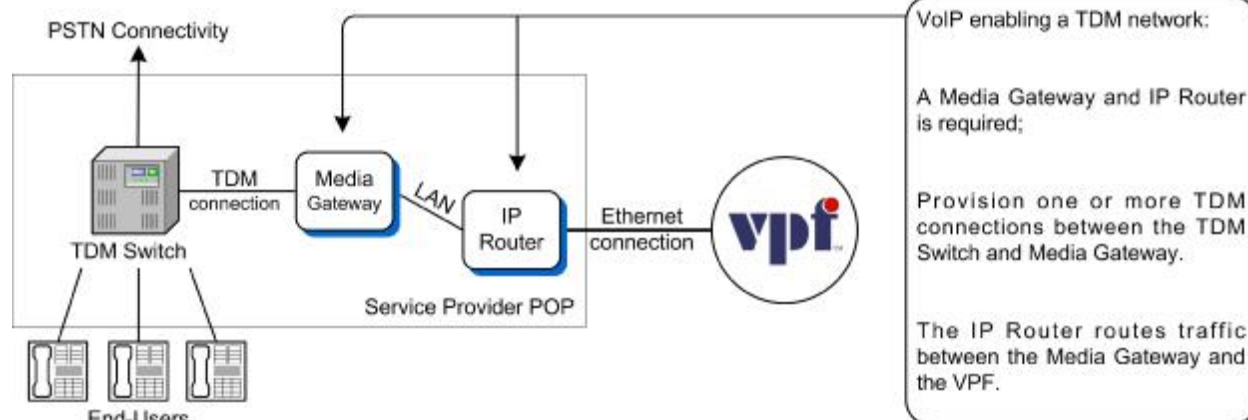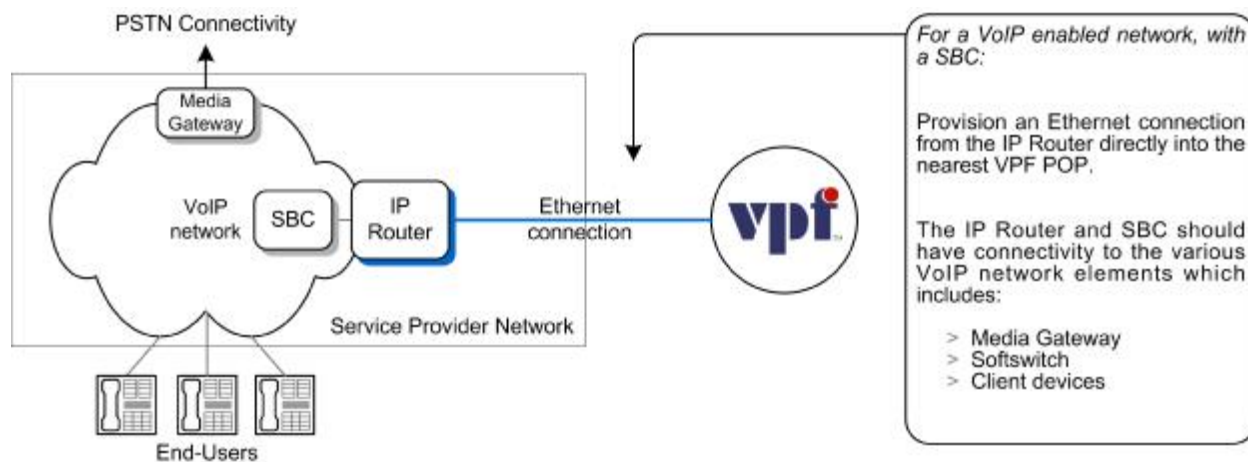
### Large Businesses: Legacy PBX



### Large Businesses: IP PBX

## Service Providers: TDM only



PSTN Connectivity

TDM Switch

TDM connection

Media Gateway

LAN

IP Router

Ethernet connection

vpf

Service Provider POP

End-Users

VoIP enabling a TDM network:

A Media Gateway and IP Router is required;

Provision one or more TDM connections between the TDM Switch and Media Gateway.

The IP Router routes traffic between the Media Gateway and the VPF.

## Service Providers: VoIP enabled



PSTN Connectivity

Media Gateway

VoIP network

SBC

IP Router

Ethernet connection

vpf

Service Provider Network

End-Users

For a VoIP enabled network, with a SBC:

Provision an Ethernet connection from the IP Router directly into the nearest VPF POP.

The IP Router and SBC should have connectivity to the various VoIP network elements which includes:

> Media Gateway
> Softswitch
> Client devices

# Summary

Literally, "One Connection to the World!"

The Internet has revolutionized business practices and enhanced the value of our lives. It is a tool that enables us to explore our interests and expand our dreams and imagination. The VPF is an evolution of the Internet's ability, via VoIP, to make voice communications faster, cheaper, and more comprehensive. Unlike the Internet, an organic community with no controls, the VPF has its implementation focused on security and quality.

The VPF has become the world's largest telephony marketplace. Working closely with its alliance partners, the VPF has expanded, and will continue to expand into businesses of different industries and markets. The growth of its VPF Minutes Market and VPF ENUM Registry over the last year has changed many businesses and benefited millions of users. With the recent introduction of the VPF ASP Market, the VPF provides an open architecture allowing third party applications to be developed and incorporated within the fabric - for instant accessibility to a global audience.

For information about the Voice Peering Fabric, visit the VPF web site at http://www.thevpf.com.