



Runway.X

ViBE enhanced Gateway deployment

White Paper

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1 Overview

ADSL (Asymmetric Digital Subscriber Line) is the ubiquitous broadband offering available to the average Small to Medium Enterprise (SMME) in South Africa. However, ADSL exchanges (DSLAMs) typically suffer from high levels of over-subscription. In addition, South Africa's IP backbone network suffers from bandwidth congestion.

Due to these factors, ECS/ECNS license holders and Internet and telecommunications Service Providers (ITSP's) are severely limited in the quality of voice services they may provision over these last mile networks. As a result, voice services provisioned over a single ADSL link are limited to the SOHO (Small Office Home Office) end of the market.

ADSL is an asymmetrical service, typically with download rates a multiple of upload rates. The symmetrical nature of voice communication limits the VoIP (Voice over Internet Protocol) capacity of an ADSL link to that of the upstream direction.

VoIP packets require at least 42 kbits/s per VoIP call. It is general practice to route no more than 4 to 6 simultaneous VoIP calls (G.729 SIP) over a typical 2Mbps (256kbps uplink) ADSL link.

SMME's are required to subscribe to multiple, dedicated VoIP-based ADSL lines in order to provision sufficient bandwidth to route their voice to lower cost VoIP termination services. ITSP's are then required to provide additional equipment in the form of external ADSL Bridging devices. In addition, SMME's are also advised to maintain "fail-over" services to dedicated telecom networks (e.g. Telkom ISDN).

All these contingency factors increase the SMME's monthly telephony subscription costs. This raises the cost and complexity of the equipment required by the SMME while also raising the ongoing service level requirements of the service provider.

The key to unlocking the potential of ADSL as a low cost telephony pipe for the SMME, is provided by Voipex, UK (<http://www.voip-x.co.uk>), through their patent pending "ViBE" software solution (Voice over IP Broadband Enhancement). "ViBE" is designed to maximise the use of bandwidth for simultaneous Voice and Data applications across bandwidth, delivering higher density of voice calls, security, QoS (Quality of Service), resilience and more. ViBE technology reduces VoIP bandwidth requirements, enabling a 256K ADSL link to provide up to 28 simultaneous G.729 trunk calls with superb quality.

The higher call capacity introduces lower infrastructure costs and leverages existing infrastructure investment.



2 ViBE

2.1 Quality and Performance

Though the audio stream associated with a VoIP call requires only 8 kbits/s, SIP (Session Initiation Protocol) and network overhead introduced in the transmission of VoIP packets amount to at least 34kbit/s of additional bandwidth requirements.

Using ViBE, a tunnel is established between two ViBE end-points (ViBE CPE and ViBE server, or two ViBE CPEs) and protocol overhead on multiple packets is significantly reduced and voice compression optimized dynamically at the byte level, allowing actual VoIP traffic rates to approximate the data rates associated with the audio compression scheme employed.

This allows a much higher call density over a standard ADSL connection. For example, up to 28 simultaneous VoIP calls are possible on an ADSL link with 256kbits/s upstream capability, where such a link traditionally could only support a maximum of 6 simultaneous calls.

The ViBE approach to QoS treats voice traffic differently from data traffic, prioritizing both the ViBE packets as well as optimizing the delay and drift (jitter) incurred between packets to meet VoIP quality requirements. The ViBE QoS scheme is well suited to slower links and is used to optimize ADSL bandwidth for VoIP. Improved QoS also allows ViBE traffic and data to be assigned different data classes and managed separately.

Secure ViBE virtual private networks can also be established between vibe-enabled devices. Fail-over without loss of voice traffic becomes possible across redundant ViBE links.

2.2 Deployment

The figure below depicts a typical deployment using ViBE technology.

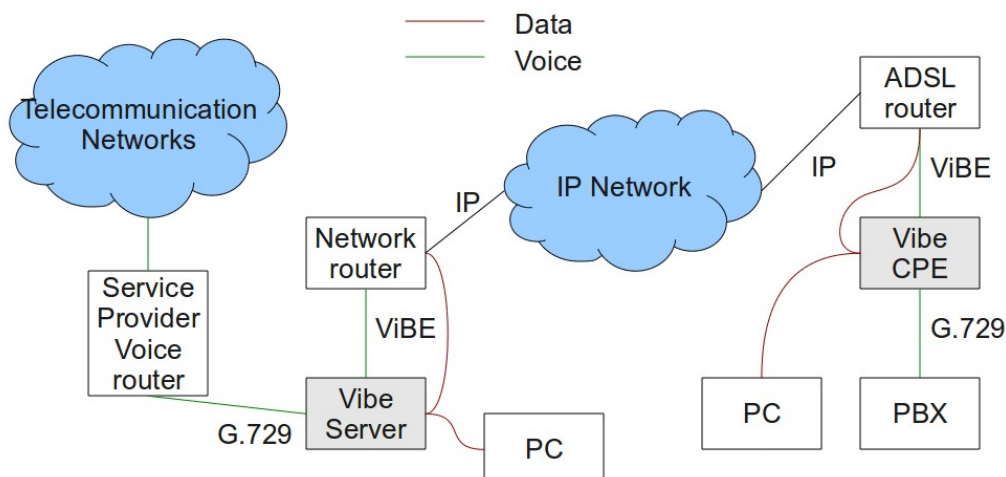


Figure 1 – Typical ViBE connectivity

ViBE CPE devices monitor all network traffic and extracts VoIP traffic, stripping out redundant protocol headers and providing byte-level compression for optimized



bandwidth use. The audio streams are then re-packaged by the ViBE CPE using QoS measures that ensures high-quality audio paths.

The ViBE CPE device routes ViBE traffic across a ViBE tunnel that has been established with a ViBE-enabled server at the Service Provider. The ViBE server interprets the ViBE data stream and reconstructs VoIP traffic for further routing through the provider's network. This process is the same for traffic traversing the ViBE tunnel from the ViBE server to the ViBE CPE or ViBE router.

Point-to-point installations require a ViBE CPE or ViBE router at one end of the link and a ViBE server at the other, allowing up to 100 concurrent G.729 calls on a 2Mb link. Voice and data can share the same ADSL links, configured using ViBE QoS to ensure data does not impact on call capacity and quality.

ViBE Server products scale from medium to large enterprise capable devices, enabling multiple ViBE CPE devices to be served by one centralized ViBE server device.

2.3 Licensing

In order to operate a ViBE enabled link or network, a once-off license fee is applicable to each ViBE-enabled CPE. The license requires a software install on the CPE device with a license key to unlock the ViBE application. Far South Networks' popular Com.X systems can be seamlessly upgraded to support ViBE tunnels and ViBE traffic (Runway.X systems) by installing the ViBE software stack. Runway.X systems come with the software pre-installed, only requiring license activation.

ViBE servers installed at Service Providers require a monthly ViBE core license per call routed through the system.

Runway.X units ship with 4xG.729 licenses included. Additional codec licenses can be purchased from Far South Networks or directly from Digium (<http://www.digium.com>)



3 Introducing Runway X



Far South Networks (<http://farsouthnet.com/>) has teamed up with Connection Telecom (<http://connection-telecom.com/>) to provide “ViBE Enabled IP-PBX Products”, named Runway.X1 and Runway.X2, to the South African market.

Including all the features and capabilities of the renowned Com.X platform, Runway.X removes the need for additional ViBE enabled routers and CPE devices by supporting ViBE functionality directly from within the Runway.X IP-PBX / Gateway.

Management of ViBE licensing and configuration of ViBE server credentials is a simple process facilitated via the Com/Runway.X Administration GUI.

The Runway.X seamlessly integrates traditional telephony and VoIP, maximizing bandwidth usage using ViBE. Please see appendix A for more information on total transcoding limitations. ViBE performance enhancements are illustrated in the table below. In most if the entries listed, ViBE is an attractive alternative to PRI-based solutions. Note that performance may vary if the ADSL connection is used to share voice and data traffic.

Far South Networks Runway.X	ADSL Upstream (kbps)	Simultaneous G.729 calls	
		Traditional	ViBE
X1 (G.729 codec translation)	256	6	12
	512	12	12 #
X2 (G.729 codec translation)	256	6	24
	512	13	53
	1024	26	70 #
X1 (G.729 pass-through) *	256	6	24
	512	13	53
X2 (G.729 pass-through) *	256	6	24
	512	13	53
	1024	26	109

Table 1 – Runway.X ViBE capacity

Platform G.729 transcoding limitations

* IP phones configured for G.729 encoding



4 VoipEx equipment

VoipEx manufactures a range of products including ViBE routers and ViBE servers that scale from 100 simultaneous calls to thousands.

The Voipex SPS-501 provides 3000 simultaneous ViBE calls, Secondary Failover, 250 remote locations and Full ViBE QOS.



Figure 3 – VoipEx SPS-501 (<http://www.voip-x.co.uk/vibe/hardware.shtml>)

VoipEx	Simultaneous G.729 calls
Enterprise routers	
P2PB-202 (2 LAN ports)	100
P2PB-203 (3 LAN ports)	100
Service Provider appliances	
SPS-503	200
SPS-501	3000

Table 2 – VoipEx ViBE appliances



5 Runway solutions

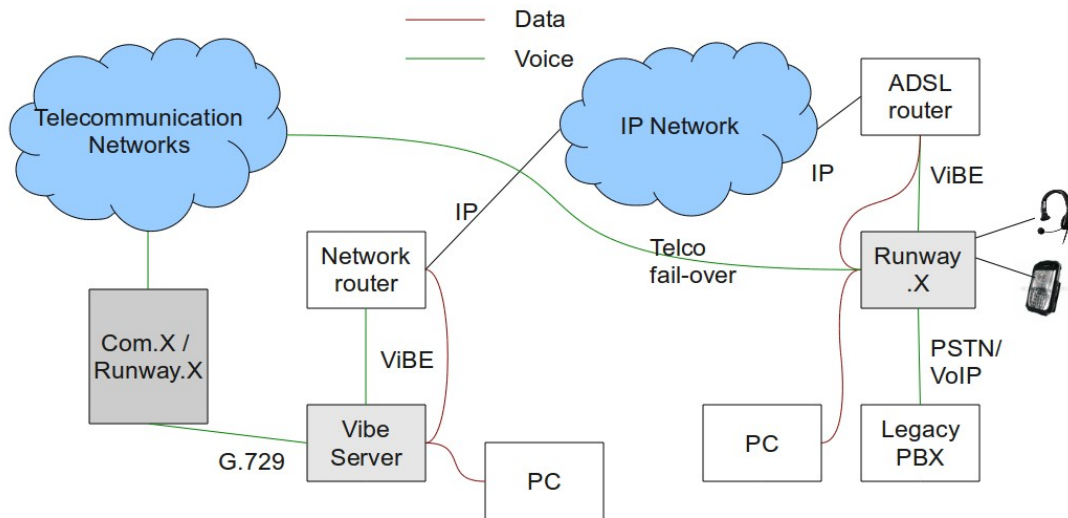


Figure 2 – Runway.X CPE deployment (ViBE + IAX gateway)

Deploying Runway.X units as ViBE CPE gateways provides scalable yet very competitively priced solutions.

Runway.X gateways can provide access for legacy PBX systems to ViBE performance enhancements and LCR, as well as a full PBX feature set, leveraging and scaling existing infrastructure while utilizing the savings and flexibility of VoIP.

Runway.X gateways can also be employed to provide pass-through G.729 services, with handsets configured to G.729 and PBX services hosted in the cloud. In this configuration Runway.X provides significant G.729 trunking capability with the option of failing over to PSTN trunks in case of ADSL failure, as well as fail-over of PBX functionality from the hosted PBX in the cloud to the fully featured Runway.X PBX services, ensuring transparent and continuous service to users.

The Runway.X can also serve as a fully-featured standalone PBX, utilizing ViBE trunking to the Service Provider.

At the Service Provider, the Runway.X and Com.X products scale fully to provide comprehensive voice routing as well as hosted PBX functionality to service providers.



Far South Networks	VoipEx	Deployment description	Simultaneous G.729 codecs	
ViBE CPE solution for connecting to a ViBE service provider			X1	X2
Runway.X1G / X2G	-	ViBE gateway to a legacy PBX with Telco gateway and fail-over	12	70
Runway.X1 / X2	-	ViBE-enabled Hybrid IP PBX with Telco gateway and fail-over	12	70
ViBE Service Provider solution			translation	pass-through [#]
1 x Runway.X2G	P2PB-202 / P2PB-203	ViBE service provider core. Translation required for Telco break-out	70	200
2 x Runway.X2G	SPS-503	ViBE service provider core. Translation required for Telco break-out	140	400
3 x Runway.X2G	SPS-503	ViBE service provider core. Translation required for Telco break-out	210	600
4 x Runway.X2G	SPS-501	ViBE service provider core. Translation required for Telco break-out	280	800

Table 3 – Runway.X configuration capacity

IP phones configured for G.729 encoding

Please refer to the Com.X & Runway.X IP gateway pricing documents for purchasing and pricing information.



Appendix A - G.729 Transcoding Capacity

The Com.X and Runway.X products perform G.729 transcoding when the destination of an audio stream is a G.729 device or trunk, and when the audio data stream from a source such as an IP phone or a PSTN or IP trunk is encoded in a different codec (e.g. G.711, ILBC, etc.)

Also, when an audio stream is encoded with G.729 and a PBX feature (such as conferencing, music on hold, voicemail, etc.) is required, a transcoding is required to G.711, the Com.X and Runway.X native encoding.

When the Com.X or Runway.X performs a pass-through gateway function, no transcoding is required.

G,729 transcodings are resource intensive, and the Com.X and Runway.X products has capacity limits as per the table below:

Far South Networks	Simultaneous G.729 calls
X1 (G.729 codec translation)	12
X2 (G.729 codec translation)	70
X1 (G.729 pass-through)	50
X2 (G.729 pass-through)	200

* IAX bandwidth calculate at 12.5kbps per call, mileage may vary

Table 4 – Com/Runway.X capacity