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## “SIP” Voice Services Whitepaper

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### 1. Introduction

This whitepaper outlines Our Community Broadband’s independent view of SIP Voice services and the Pros and Cons of moving to SIP services for Australian Business’s. In this paper we discussed the following topics:

- What is SIP?
- Models for SIP adoption
- Why Implement SIP? – The Business & Commercial benefits
- Difference between Skype and Enterprise grade SIP
- Conclusions

### 2. Telephony infrastructure components

The majority of companies have Traditional telephony infrastructure with the following components; Telephones, PABX’s and the PSTN access and core Infrastructure. An overview of each is provided below:

#### 2.1 Telephones

A telephone is a device that transmits and receives sound and its primary function is to allow two people in separate locations to talk to each other.

The two main types of telephones available are

- Traditional telephones
- IP telephones

The key difference between the two types of telephones is that an IP based telephone connects to the local area network in an office. i.e. It is connected to the same cable as the user’s PC.

#### 2.2 Telephone System

A telephone system or PBX as often referred (usually the big grey or brown box that sits in the corner of the Telecoms rack) has two functions, namely, to allow staff in a company to:

- make internal calls

- Connect an office to the public switched telephone network and allow staff to make external phone calls

### 2.3 PSTN, ISDN (BRI) and PRI circuits

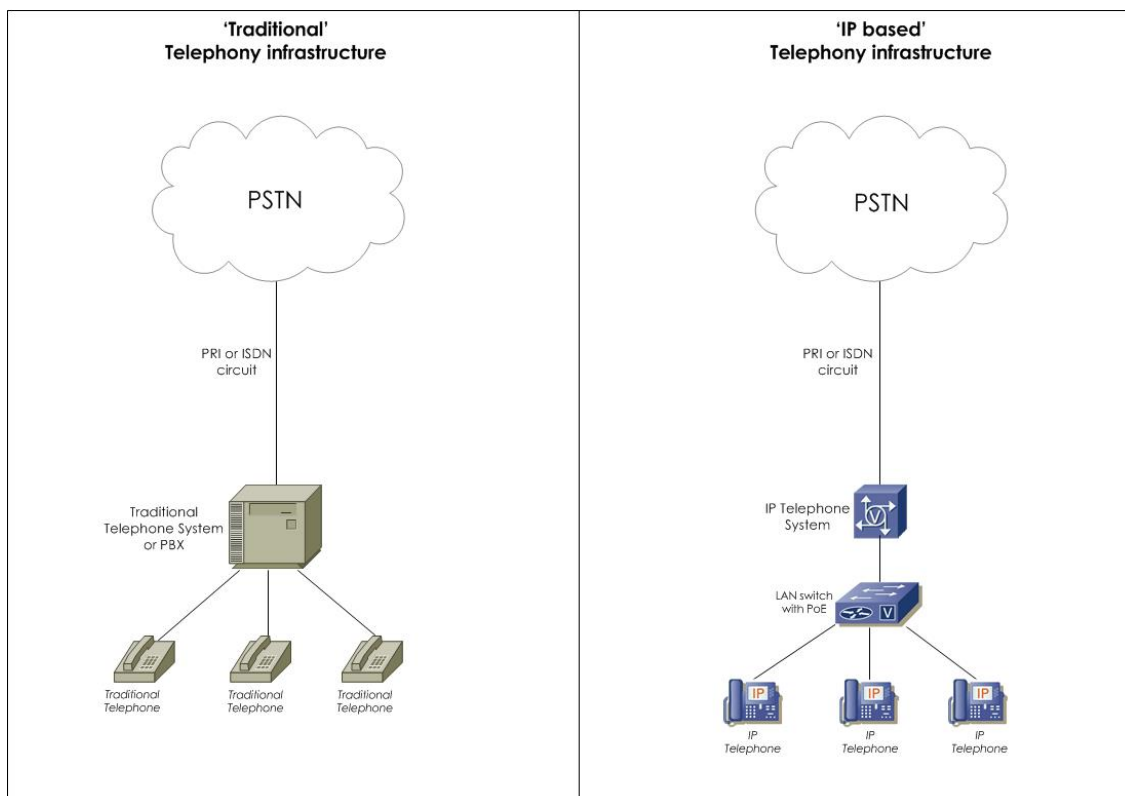
PSTN, ISDN or PRI circuits connect the customer’s premises to the Public Switched Telephone Network described below;

- PSTN circuits allow 1 call,
- ISDN (BRI) circuits allow for 2 simultaneous calls,
- PRI circuits typically allow between 10 and 30 simultaneous calls and are commonly known as On Ramp; 10,20 or 30 services (with Telstra) or Multi-lines (with Optus).

### 2.4 Public Switched Telephone Network

The Public Switched Telephone Network is the backbone which connects together telephone networks around the world. It is the Public Switched Telephone Network which allows a person to make a call to any location in the world. The network itself is made up of a number of underlying technologies and is managed by different companies in each country around the world.

Figure 1 below illustrates the difference between a typical “Traditional” and an “IP based” telephony infrastructure.



### 3. What is SIP?

The term SIP refers to “session initiated protocol” and is the signalling protocol used to control voice and video calls over a public (Internet) or private network.

In many mid-sized corporate today where the business will have both public and Private based IP networks for data applications, SIP voice services can be used over these networks rather than using the traditional PSTN, ISDN or PRI circuit component of a traditional telephony infrastructure.

### 4. Models for SIP adoption

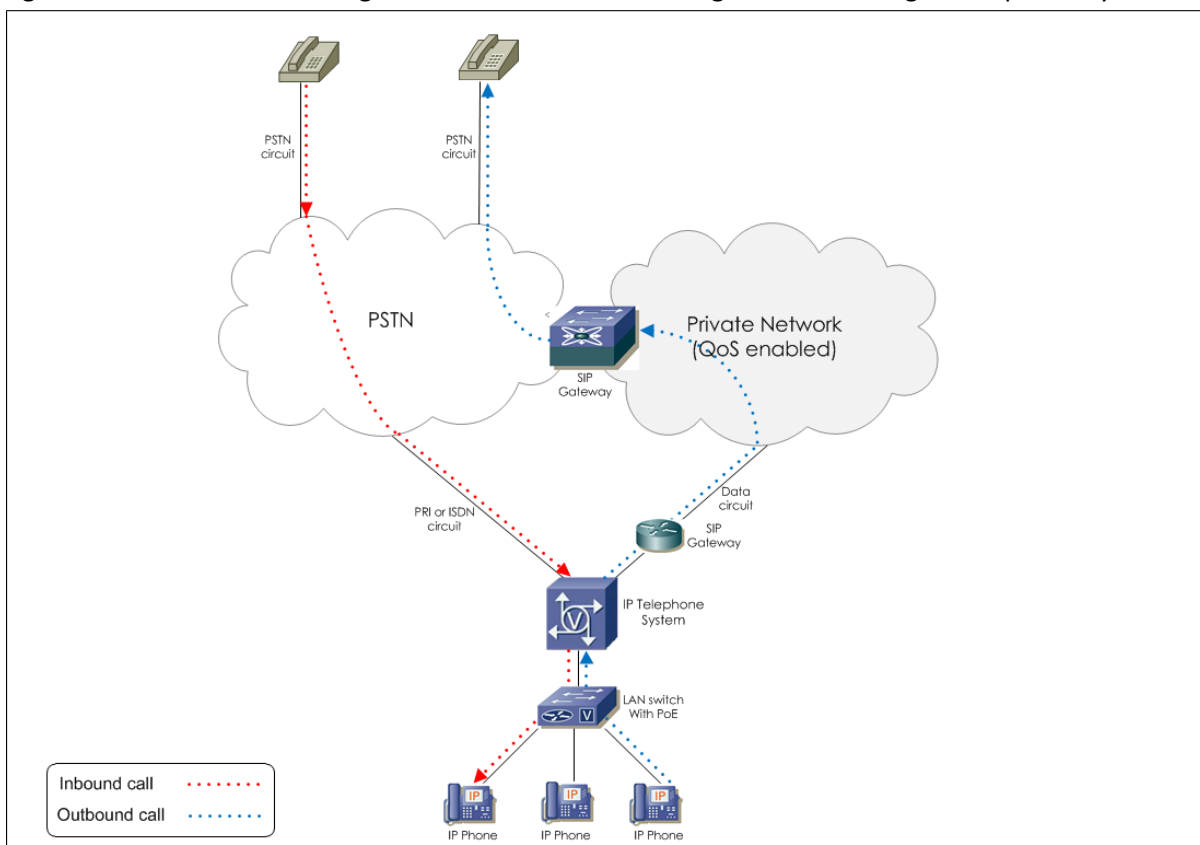
There are two common ways in which SIP voice services can be implemented, namely; 1) Out bound calling only and 2) Full SIP migration. Both are explained in more detail below:

#### 4.1 Option 1 - Outbound calling only

Large and medium-sized companies tend to adopt the outbound-only SIP for voice services in order to reduce call costs. This model retains the existing telephony system, but provides cost benefits in reduced call tariffs and the flexibility of being able to make lots of concurrent calls.

The outbound-only model can be deployed with either a PBX telephony system or an IP-based one. Deployment requires minimal changes to the existing telephony system and no changes at all to the existing data network. Figure 2 illustrates SIP for outbound calls only in an IP-based system.

Figure 2 below shows the integration of outbound SIP calling with an existing IP Telephone system.



## **Service components**

A SIP telephony system for outbound calls only has the following components:

- Data connection to a private network, scaled to allow for the maximum number of concurrent calls required.
- A SIP gateway connecting the existing PBX or IP-based telephony system to the private gateway.

## **Call routing**

Inbound calls are routed via the existing PSTN, ISDN or PRI networks. Outbound calls are routed via the SIP gateway and over the private network.

## **Pros**

- Significant savings in call tariffs
- Minimal disruption during implementation.
- No number porting.

## **Cons**

- The monthly cost of PSTN and ISDN circuits.

## 4.2 Option 2 – Full migration to SIP Voice services.

Companies reviewing their telecoms infrastructure, looking for cost reductions and additional flexibility should consider a full migration to SIP.

This “Full SIP” deployment requires minimal changes to the existing telephony environment however it does require number porting. This model can be deployed using either a traditional or IP based telephone system.

Figure3 below shows the deployment of inbound and outbound SIP calling with an existing IP Telephone system.

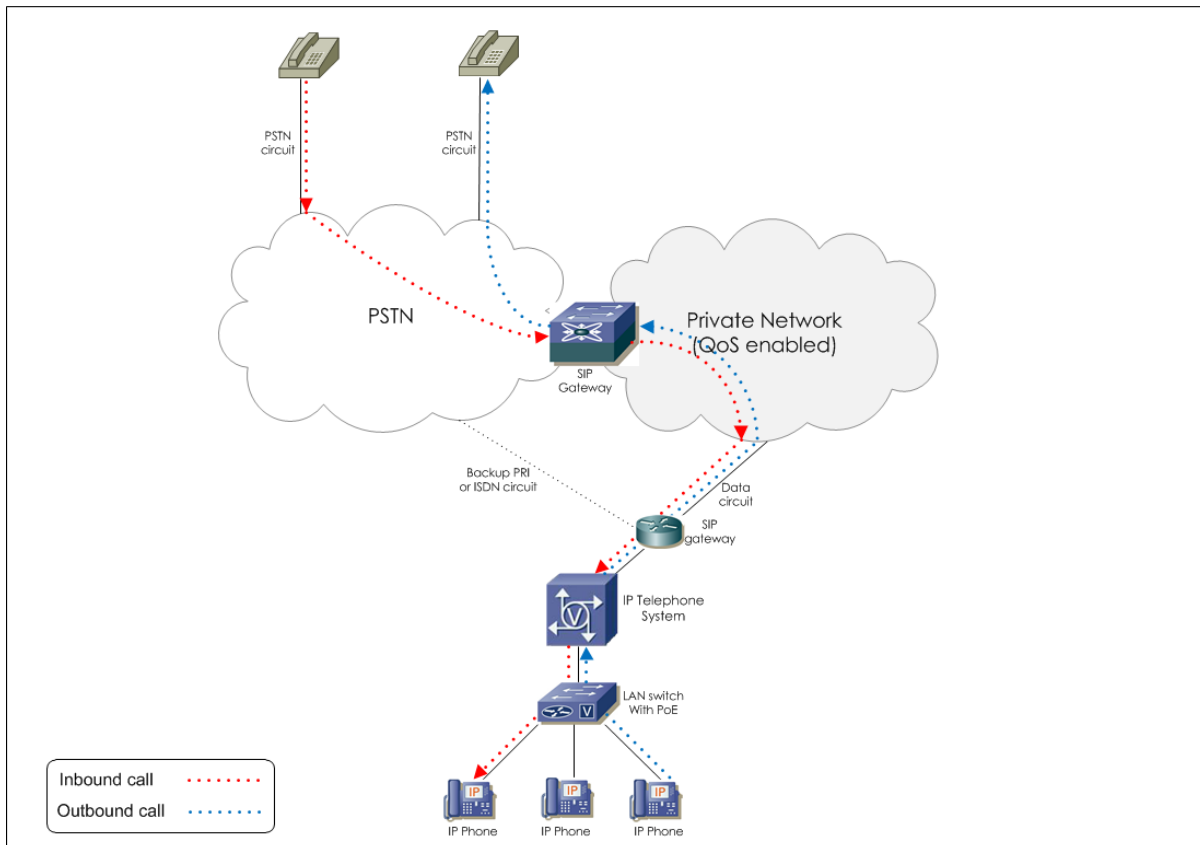


Fig3.

### Service components

A full SIP implementation has the following components:

- Data connection to a private network, scaled to allow for the maximum number of concurrent calls required.
- A SIP gateway connecting the existing PBX or IP-based telephony system to the private gateway.

### Call routing

- Inbound calls – are routed via the data network to the SIP gateway
- Outbound calls – are routed via the SIP gateway and over the private network
- In the event of failover i.e. if the data circuit fails, inbound and outbound calls are automatically routed via the backup ISDN or PRI circuits.

**Pros**

- Significant cost savings in call tariffs
- Significant cost savings through the removal of most of the existing PSTN, ISDN and PRI circuit's line rental charges.

**Cons**

- Number porting is required.

## 5. Benefits of a SIP telephony system for business

### 5.1 Disaster recovery

In the event of a disaster, all calls can be quickly and automatically re-routed to another location. For example, if head office suffers a power outage, all inbound calls to the head office can be automatically re-routed to the call centre.

#### 5.1.2 Flexibility

In a traditional telephony infrastructure, the PSTN, ISDN or PRI circuits limit the number of concurrent calls, as shown in Table 1.

Circuit Type	Concurrent calls
PSTN	1
ISDN2	2
PRI10	10
PRI20	20
PRI30	30

Table 1. Fixed concurrent calls per circuit type

This results in two issues. First, it does not allow staff to make more calls than allowed by the circuit type. For example, on a day-to-day basis, a sales office with 20 staff being able to make 10 concurrent calls may be adequate. However, if the company initiates a sales drive, the 10-calls restriction would limit severely the operation of the sales drive. In contrast, a SIP telephony system would enable a sales office to burst its concurrent calls restriction on an *ad hoc* basis.

Second, a company has to commit to a specific circuit type, which can lead to it paying for a large number of unused lines. For example, a company with seven staff may be forced to purchase a PRI10 because of the limited choice in the traditional telephony market place. Even when all staff are on the phone at the same time, the company is still paying for three unused lines.

SIP voice services allow any number of users to be added to or taken from the service without financial penalty.

#### 5.1.3 Virtual business presence

By deploying SIP voice services a business can hold all of its geographic numbers (02, 03, etc.) centrally and route them to any office. This allows a company to have a virtual business presence in a town or state. i.e. A growing company may only have offices in Sydney, but wish to grow their sales presence and customer base in Melbourne. The company can add a Melbourne geographic number (03 xxxx xxxx) to its website and sales material. The Melbourne number can be held on the SIP gateway and all calls to the Melbourne number are delivered to the Sydney office's telephone system.

## 5.2 Cost benefits of SIP voice services

### 5.2.1 Reduction in Call tariffs

One of the key benefits from migrating to SIP voice services is the significant reduction in call tariffs. The table below compares the tariffs of a 'small' and 'large' company in a traditional telephony set up versus the tariffs of a SIP deployment.

It is worth looking at the traditional telephony rates and comparing these against your own current rates to see if you are in line with current market tariff structures.

	Small Company	Large Company	SIP
Call type	Tariff (cents/minute)	Tariff (cents/minute)	Tariff (cents/minute)
Flag fall	6	0	0
Fixed to Mobile	30	17	15
International - Singapore	40	8	5
International - UK	35	6	3
International calls - New Zealand	30	6	4
Local	*20	*8	6
National	17	8	6
13/1300	40	35	35

Table 2. Comparisons between traditional and SIP tariffs in cents per minute.



## 5.2.2 Removal of PSTN, ISDN and PRI circuits

Migration to a full SIP telephony system enables removal of most of the PSTN, ISDN and PRI networks.

Depending on the type of business and importance of voice services, a company may decide to retain a small number of traditional PSTN, ISDN or PRI circuits. But retaining them can be expensive. For example, if a small company retains its traditional telephony networks, it could be paying \$270 per month in line rentals alone, as shown in Table 3.

Circuit Type	No.	Monthly charge	Total monthly charge
PSTN	2	\$45.00	\$90.00
ISDN2	2	\$90.00	\$180.00
<b>TOTAL</b>			<b>\$270.00</b>

Table 3. Cost of retaining traditional telephony systems in a small company.

Assuming that a company's Data connection (internet) network can support Quality of Service (QoS), it could save this \$270.00 a month by removing its traditional telephony services.

## 6. Skype vs. Enterprise SIP service

Skype is a consumer grade software application that allows users to make free voice and video calls over the Internet.

Table 4 summarises the differences between Skype and an enterprise-grade SIP voice service:

Call type	Skype	Enterprise SIP
Network	Public (Internet)	Private (Business)
Quality of Service	No	Yes
Service Level Guarantees	None, best efforts	Yes
Service Type	Consumer	Business

Table 4. Differences between Skype and enterprise-grade SIP.

## 7. Conclusions

The key benefits of SIP:

- Costs reductions via the removal of legacy PSTN, ISDN and PRI circuits
  - Cost reductions via reduced call tariffs
  - Increased flexibility to allow to accommodate business initiatives (i.e. virtual call centres)
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- SIP is no longer only for the consumer market
  - The majority of SIP or VoIP (Voice over IP) implementations fail due to a lack of knowledge about the underlying network connectivity.

Companies should consider their Voice and Data requirements together and not as isolated infrastructures, as the business and commercial benefits of convergence are now tangible.