

Ministry of Commerce

ISDN Pricing Study

Ministry of Commerce - ISDN Pricing Study

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1. Introduction

The Integrated Services Digital Network (ISDN) is a communications platform providing end-to-end circuit switched digital communication. It can provide a channel for voice, data and video services through a single customer access point.

ISDN service in New Zealand is currently only available from Telecom (although other service providers are contemplating introduction of the service) and was introduced in 1991. In New Zealand, as in many other parts of the world, there has been significant debate on the charges associated with connection and use of the service by customers. The debate centres on two primary aspects of the charges; firstly the incremental cost of supplying an ISDN service is argued as being significantly less than the Telco charges would suggest and, secondly, that Telecom, in New Zealand, charges significantly more for the service than its overseas counterparts.

This study into ISDN pricing attempts to quantify the relativity of Telecom pricing to that of major overseas Telcos. This report does not attempt to quantify the actual incremental cost of supplying the service.

The study was commissioned by the Ministry of Commerce on behalf of the IT Advisory Group and was undertaken in May 1996.

2. Methodology

Pricing regimes for ISDN services differ markedly throughout the world and are typically dependent upon the number of B-channels, the distance between terminals, the usage, the lease period discounts and itinerant or full-time use. Because of these variants it is difficult to directly compare standard list prices amongst service providers.

In order to overcome this difficulty and to allow a more “real-world” comparison we have chosen to detail 6 businesses whose voice and data requirements cover a full range of bandwidth requirement. For each of these businesses we have costed an ISDN service for local, national and international circuits. In addition, alternative service platforms (such as leased line, Internet etc) have been studied and costed for the New Zealand scenario. The six business scenarios are detailed on the following page.

The countries chosen for comparative studies were Australia (Telstra), USA (US West), United Kingdom (BT), Finland (Tele) and Sweden (Telia). These countries were chosen because they are either a neighbour of New Zealand, have similar population bases or operate in an open market. The major carriers in each of these countries were contacted and requested to supply appropriate ISDN pricing information. This information was then applied to each of the business scenarios and for each of the distance requirements.

Pricing was provided in the currency of origin and has been converted to equivalent Units using Purchase Price Parity (PPP) conversion rates supplied by the Ministry of Commerce on May 29, 1996.

As some of the services incur an installation charge in addition to the monthly service fee we have chosen to total all costs (including installation) over a five year period and then divide this total by 60 to give a monthly fee for the service. No inflation or finance fees are included. In effect, the installation fee is amortised over 5 years.

The costs presented on the following pages are therefore ones that a typical business might incur in order to provide for its telecommunications requirements. However, we recognise that for each scenario, additional terminal equipment may be required (such as PC-ISDN cards, videoconferencing equipment, terminal adapters, etc). Because this equipment is available from a variety of sources and in a variety of price brackets, it is difficult to incorporate it into this study such that each scenario and country may be directly compared. For this reason the prices presented on the following pages are for the ISDN service to each network interface only and do not include the additional network-terminal interface cost.

There is therefore some discrepancy in the comparison of an ISDN delivered service and alternatives to ISDN such as Internet and modems. Using the 5 year amortisation methodology we believe the additional equipment costs, for ISDN services over leased line or modem service, could add up to \$20 per month. This would have little effect on the comparison with alternative technologies costed in this report.

ISDN Business Scenarios

- A) A design business moving 10 Mbytes of data to and from sites in the same metropolitan area per day. Compare ISDN with Internet over a standard phone line reserved for this purpose.
- B) A doctors' practice receiving test results and other data at the rate of 15 x 2 Kbytes messages and 5 x 2 Mbytes images per day. Compare ISDN with a leased line for the images and a standard dedicated telephone line for the smaller messages.
- C) A rural high school using 2 hours of audiographics and 2 hours of video per day. 40% of the time is local connection, 50% national long distance, 5% international long haul and 5% international short haul. * Compare ISDN with a single 128 kb/s link to the nearest city (Internet Service Provider).
- D) An architect business sending and receiving 30 MBytes of drawings per day, of which 50% are local, 25% are national long distance, 15% are international short distance and 10% are to Japan. Compare ISDN with a suitable leased line Internet connection.
- E) A graphics house with 2 ISDN lines doing 2 hours per day of videoconferencing national long distance and exchanging 100 Mbytes of high quality graphics information split as in D above. Compare with 1 ISDN line and 1 leased line Internet connection with the video and half the data going by ISDN.
- F) A retail chain with 25 branches, 20 of which are national long distance from the head office and 5 are local. Each branch backs up their system to head office at night, this is an average of 100 Mbytes per branch. Compare ISDN with 64 kb/s leased lines.

*

Definitions	From	To
National Long Distance	Auckland	Wellington
International Short Distance	Auckland	Sydney
International Long Distance	Auckland	Tokyo

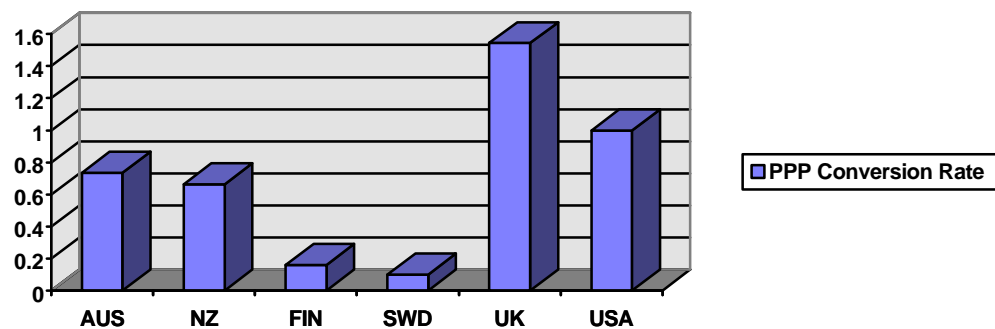
Note that the definitions change for each country studied.

3. Pricing Basis

3.1 Price Parity Conversions

Prices for ISDN services were quoted in the currency of the country of origin. In order that they may be directly compared a Purchase Power Parity conversion figure has been applied based upon a standard of United States dollars. These conversion figures were supplied by the Ministry on May 29, 1996 and are listed in the table below.

	AUS	NZ	FIN	SWD	UK	USA
PPP Conversion Rate	0.7353	0.6622	0.1602	0.0990	1.5430	1.0000

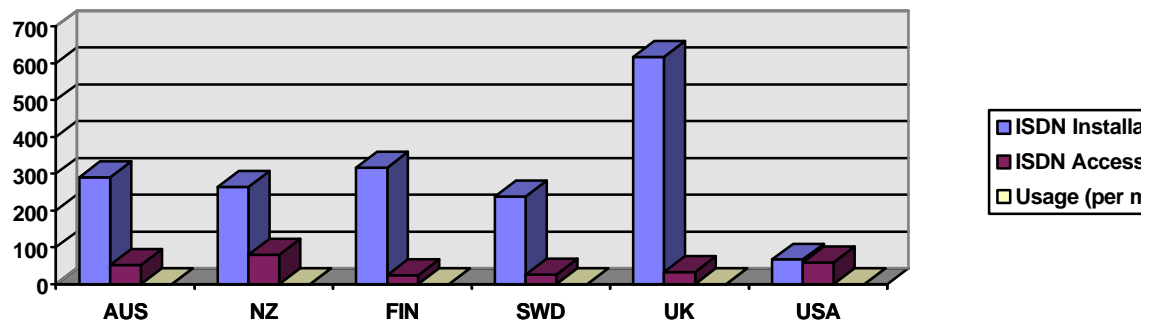


Note that the calculations provided in Appendix A are all given in the currency of origin. Only the summary figures provided in the body of this report have been converted for parity.

3.2 Base Service Fees

The base service fees for each of the five countries are summarised below (Figures refer to Basic Rate Access only). All figures have been converted using the parity rates above.

	AUS	NZ	FIN	SWD	UK	USA
ISDN Installation	291.18	264.88	316.39	237.6	617.20	67.00
ISDN Access (per mnth)	51.47	79.46	24.99	26.73	32.40	60.00
Usage (per min)	0.0294	0.0235	0.0360	0.0158	0.0518	0



Note that the zero usage fee for the United States based service applies to local calls only. National and International do carry an associated usage charge.

The New Zealand local usage charges are based upon the standard business telephone charges.

The Australian usage charges apply a flagfall of \$AUS0.20, which covers the first three minutes, and then a per minute charge of 4 cents (local calls).

Sweden and Finland have similar regimes to New Zealand with a standard per minute charge.

The UK is similar to New Zealand except that a minimum fee of 4.2 pence applies for the first minute and 3.36p thereafter. International data traffic is charged at a premium to voice services.

The US service has no time based charges for local calls.

4. Business Scenarios

4.1 Assumptions

- All monthly calculations assume there are 21 working days in each month
- Prices are exclusive of refundable taxes (such as GST, VAT) and are converted to equivalent PPP units using the parity rates detailed in the previous section.
- Toll charges are based upon the standard daily rate (8am - 5pm) unless indicated otherwise
- Total charges include installation fees at one end of the link only. The recipient on the other side of the ISDN network will incur similar installation charges (except where dedicated lines exist, such as to an ISP, where both ends of the link cost are included).
- Total charges include access fees at one end of the link only. The recipient on the other side of the ISDN network will incur similar access charges.
- Installation fees assume a straightforward connection only and no allowance is made for premise wiring.
- Data files are assumed to be compressed at a ratio of 2:1.
- Data sent via the ISDN is transferred at 64kb/s, a 1MByte file takes 1 min to transfer at 2:1 compression.
- Data sent via modem and the PSTN is transferred at a rate of 9.6 kb/s, a 1MByte file takes 7 mins to transfer at 2:1 compression.
- Data sent via leased line and modem on the Internet is transferred at a rate of 4.8 kb/s (due to bottlenecks within the Internet), a 1MByte file takes 14 mins to transfer.
- No allowance is made for interface equipment such as terminal adapters and modems which may be required in some instances.

4.2 ISDN Calculation

The “Total per Month Fee” shown in the scenarios following is calculated from the following:

$$\text{Total} = (\text{Installation}/60 \text{ months}) + (21 \text{ days} * \text{Transfer time} * \text{Usage charge}) + \text{Monthly Access Fee}$$

and then adjusted using the PPP rates.

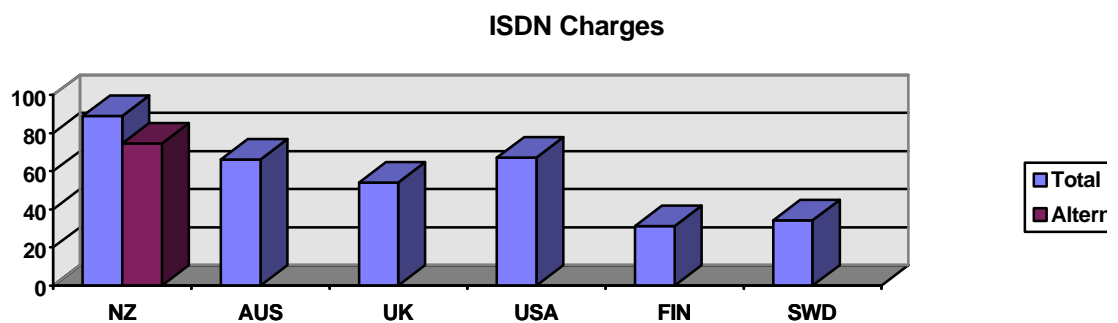
A summary of all results is provided on page 9.

4.3 Small Design Business (A)

Scenario: A design business moving 10 MBytes of data to and from sites in the same metropolitan area per day. Compare ISDN with Internet over a standard phone line reserved for this purpose.

Assumptions: 10 MBytes takes 10 mins to transfer over the ISDN 10 MBytes (5 files) takes 69 mins to transfer over the PSTN

ISDN Charges	NZ	AUS	UK	USA	FIN	SWD
Total Monthly Fee	89.02	66.14	54.03	67.12	31.27	34.16
Alternative ccts	74.68					
Comment		*1				



*1 This figure is dependent upon the number of files transferred as the Australian regime uses a single flagfall of 25c with no additional usage fee. For this example we have assumed the 10 Mbytes is comprised of 5 x 2 MByte files.

4.4 Suburban Doctors (B)

Scenario: A doctors' practice receiving test results and other data at the rate of 15 x 2 KBytes messages and 5 x 2 Mbytes images per day. Compare ISDN with a leased line for the images and a standard dedicated telephone line for the smaller messages.

Assumptions: Messages take less than 1 minute but incur a minimum charge 2 Mbytes takes 2 mins to transfer over the ISDN

ISDN Charges	NZ	AUS	UK	USA	FIN	SWD
Total Monthly Fee	96.43	118.09	74.44	67.12	40.58	39.14
Alternative ccts	745.20					
Comment	*2	*1				

*1 The higher charge is primarily due to the flagfall incurred with each message sent.

*2 2 KByte messages are subject to minimum charge.

4.5 Rural High School (C)

Scenario: A rural high school using 2 hours of audiographics and 2 hours of video per day. 40% of the time is local connection, 50% national long distance, 5% international long haul and 5% international short haul. Compare ISDN with a single 128 kb/s link to the nearest city (Internet Service Provider).

Assumptions Messages take less than 1 minute but incur a minimum charge 2 Mbytes takes 2 mins to transfer over the ISDN

ISDN Charges	NZ	AUS	UK	USA	FIN	SWD
Total Monthly Fee	3969.89	3945.41	3029.57	2689.98	1545.59	1117.92
Alternative ccts	2002.49					
Comment	*1					

*1 Both ends of the ISDN link are costed

4.6 Architect Business (D)

Scenario: An architect business sending and receiving 30 MBytes of drawings per day, of which 50% are local, 25% are national long distance, 15% are international short distance and 10% are to Japan. Compare ISDN with a suitable leased line Internet connection.

Assumptions: Messages take less than 1 minute but incur a minimum charge 2 Mbytes takes 2 mins to transfer over the ISDN

ISDN Charges	NZ	AUS	UK	USA	FIN	SWD
Total Monthly Fee	432.73	436.46	390.62	312.79	204.45	149.19
Alternative ccts	704.58					
Comment	*1					

*1 National call charges are based upon 50% 8am - 12 noon and 50% 12 noon - 6 pm

4.7 Graphics Design House (E)

Scenario: A graphics house with 2 ISDN lines doing 2 hours per day of videoconferencing national long distance and exchanging 100 Mbytes of high quality graphics information split as in D above. Compare with 1 ISDN line and 1 leased line Internet connection with the video and half the data going by ISDN.

Assumptions: Messages take less than 1 minute but incur a minimum charge 2 Mbytes takes 2 mins to transfer over the ISDN

ISDN Charges	NZ	AUS	UK	USA	FIN	SWD
Total Monthly Fee	3297.50	3119.41	1892.16	2066.40	971.37	616.06
Alternative ccts	2432.72					
Comment						

4.8 Retail Chain (F)

Scenario: A retail chain with 25 branches, 20 of which are national long distance from the head office and 5 are local. Each branch backs up their system to head office at night, this is an average of 100 Mbytes per branch. Compare ISDN with 64 kb/s leased lines.

Assumptions 100 Mbytes takes 100 mins. 25 branches over 4 lines takes 10.4 hours in total.

ISDN Charges	NZ	AUS	UK	USA	FIN	SWD
Total Monthly Fee	8585.56	8124.41	4809.08		3846.05	2362.64
Alternative ccts	>25,000					
Comment	*1, 2, 3			*4		

*1 In order for each branch to be able to back-up overnight a minimum of 4 ISDN lines are necessary into the Head Office (100MB of data takes approx 100 mins for each branch). 29 ISDN lines in total are required.

*2 The exact cost of the alternative leased lines is dependent upon the location of each branch office as each 64kb/s line would be aggregated into larger bandwidth lines as they approached Head Office. The cost of installing this network would be at least twice that of an ISDN solution.

*3 It is assumed that 5 branches are local, and 20 branches are rural rate.

*4 Off peak call charges were not able to be obtained.

figure 1 comparison monthly charges

5. Analysis

This section provides an analysis of both the ISDN and the alternative service charges for each of the business scenarios and for each of the countries studied. A graph of the charge components is provided on page 12. Alternative circuit charges apply to the New Zealand scenario only as detailed price structures were unobtainable from other countries.

5.1 Small Design Business (A)

ISDN charges for this business scenario range from \$31.27 (Finland) to \$89.02 (New Zealand). For all countries studied the major contributor to the ISDN costs is the access fee charged. Installation and usage fees are minimal (10.7%) except for the United Kingdom where they total 40%.

Using a standard telephone, modem and Internet connection incurs a slightly lesser monthly charge (excluding the ISP fee). However, using the telephone and Internet would require substantially longer transfer times than with an ISDN connection (69 minutes instead of 10). In some instances this additional time may be unacceptable.

5.2 Suburban Doctors (B)

ISDN charges for this business scenario range from \$39.14 (Sweden) to \$118.09 (Australia). New Zealand is at the high end with a charge of \$96.43. Access fees still form the major part of the total. In the Australian example usage fees are almost half the total because of the regime that charges a flagfall of 20 cents for each message, irrespective of length.

The alternatives to ISDN, using a leased line and standard telephone is hugely more expensive at \$745 per month. This is due to the high cost of a permanently installed leased line that is only used for five 2 MByte messages each day.

5.3 Rural High School (C)

The high time use of the ISDN circuits results in a fee dominated by the usage charge. In the USA example, where local usage is free, this would result in a significantly less expensive service. Charges range from \$1117.92 (SWD) to \$3969.89 (NZ). Australian and New Zealand charges are significantly more than the US and Scandinavian charges and 30% more than the UK.

A comparative cost has been made with a 128 kb/s leased line to an Internet provider however this may not be a fair comparison in that the speed of the Internet is unlikely to reach 128 kb/s and is more typically 4.8 kb/s. The Internet is therefore not suited to videoconference of the same quality as that enabled by ISDN circuits.

5.4 Architect Business (D)

Usage fees dominate this example with charges ranging from \$149.19 (Sweden) to \$436.46 (Australia).

The alternative to this ISDN network could be a leased line to the Internet. Based upon a throughput of 4.8 kb/s the 30 Mbytes of data would require 7 hours to transmit which is likely to be unacceptable to most businesses. However, if we assume a theoretical maximum transfer rate of 64 kb/s were achievable, the alternative cost would be \$705 per month. This is still significantly greater than the ISDN cost and is not a recommended alternative.

5.5 Graphics Design House (E)

Again the usage fees dominate the total charge and prices range from \$616.06 (Sweden) to \$3297.50 (New Zealand). Australia and New Zealand are 65% more expensive than the next country studied (USA) and 5 times greater than Sweden.

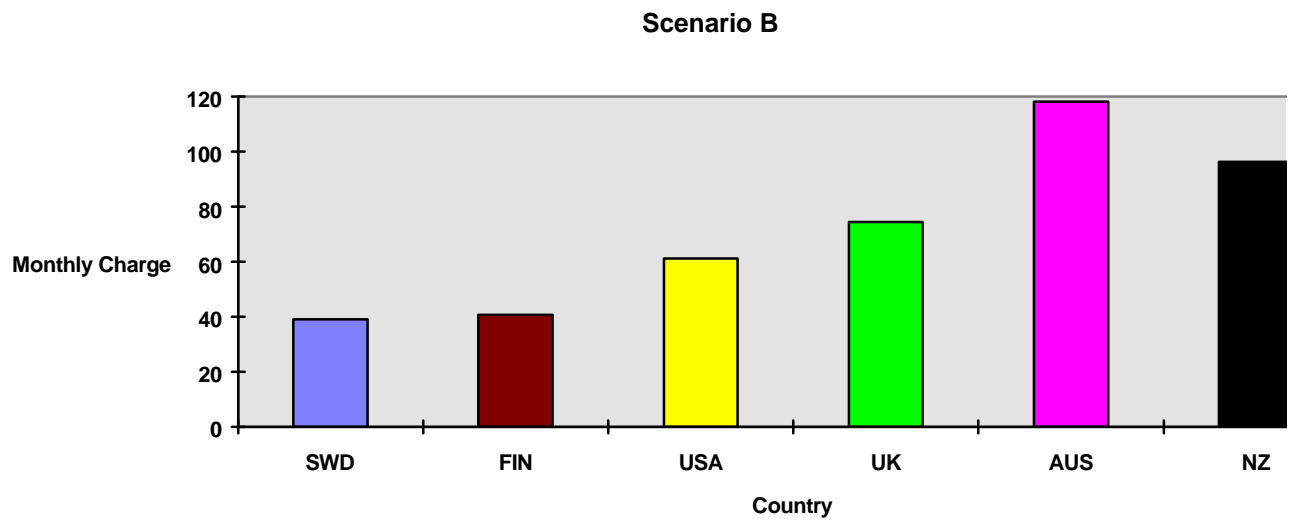
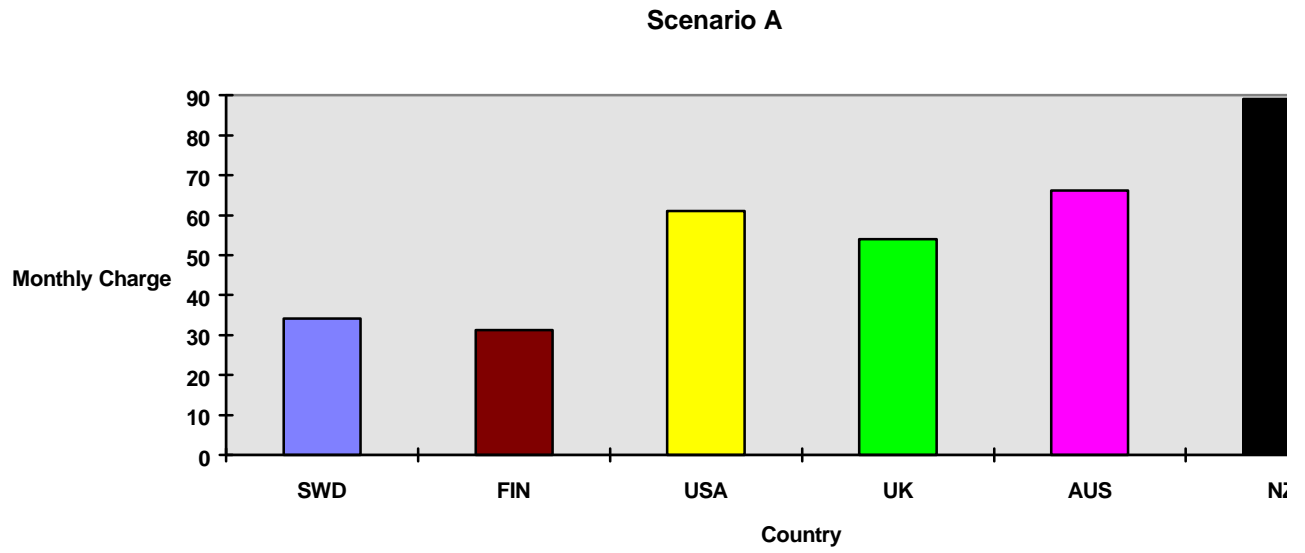
The alternative scenario uses a single ISDN line and a leased line Internet connection. The cost for this is \$2432 per month which is significantly less than a 2 channel ISDN connection. Note however that the time required to send half of the data (50 MB) over the Internet is likely to be unacceptable. Even at the maximum transfer rate of 64 kb/s it would take almost one hour and at a more typical rate of 4.8 kb/s it would take almost 12 hours.

5.6 Retail Chain (F)

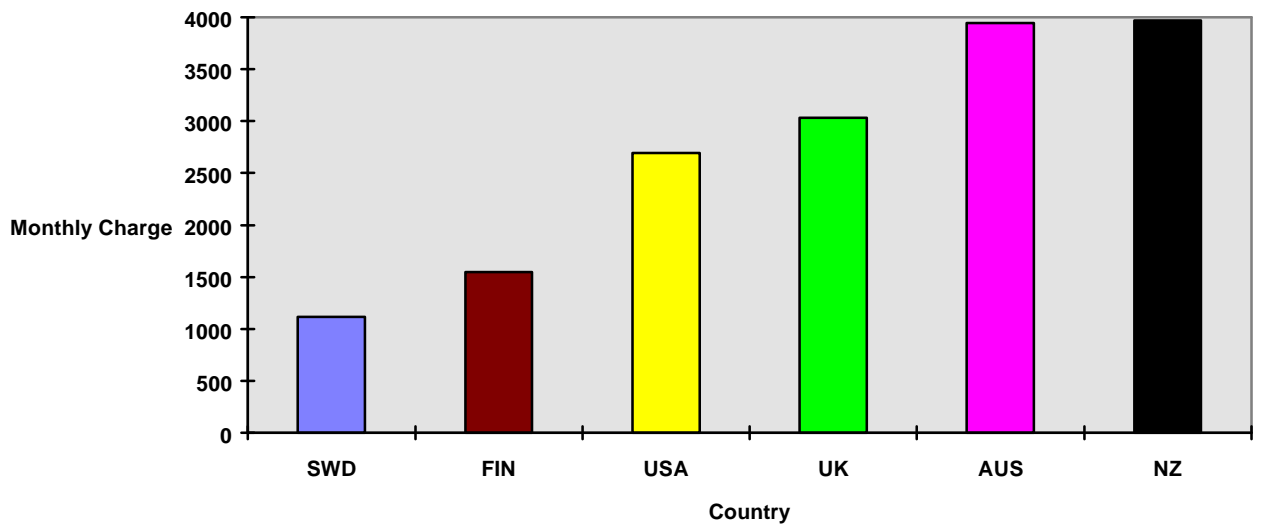
Usage charges dominate although access fees are significant. Charges range from \$2362.64 (Sweden) to \$8585.56 (New Zealand). Australia and New Zealand are significantly more expensive than the other countries.

The cost of the alternative network of leased lines is dependent upon the geographic location of the branch offices as, in a practical network, individual lines would be aggregated as they approached Head Office. If 25 separate 64 KB/s lines were installed the cost would be prohibitive at over \$25,000 per month. Even with aggregation, the cost of a leased line network for this scenario would be significantly greater than that available from an ISDN network. For this reason no further analysis of this network was carried out.

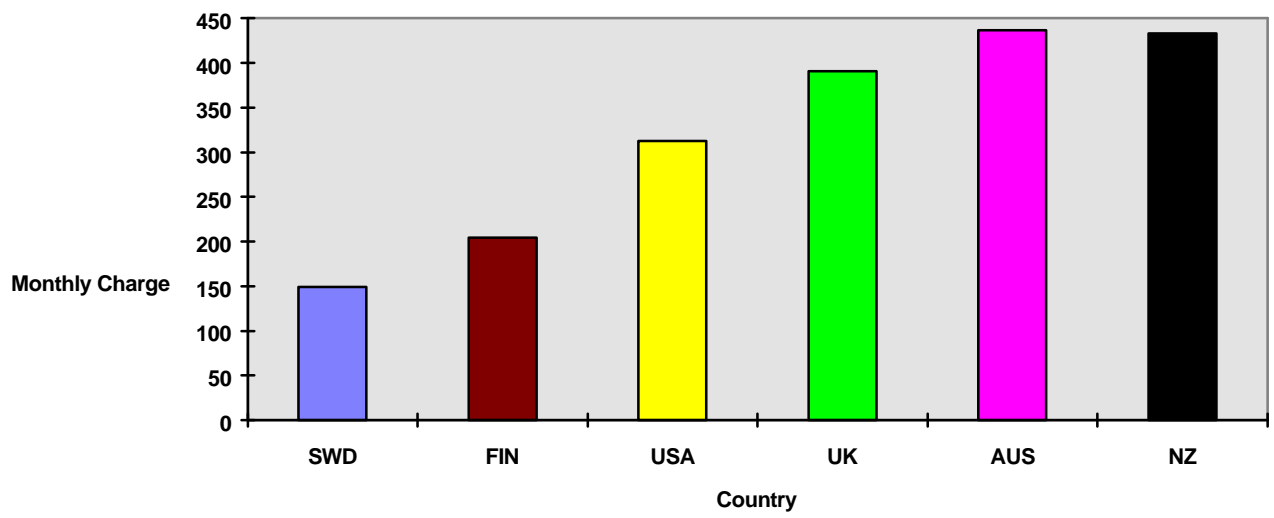
figure 2 components



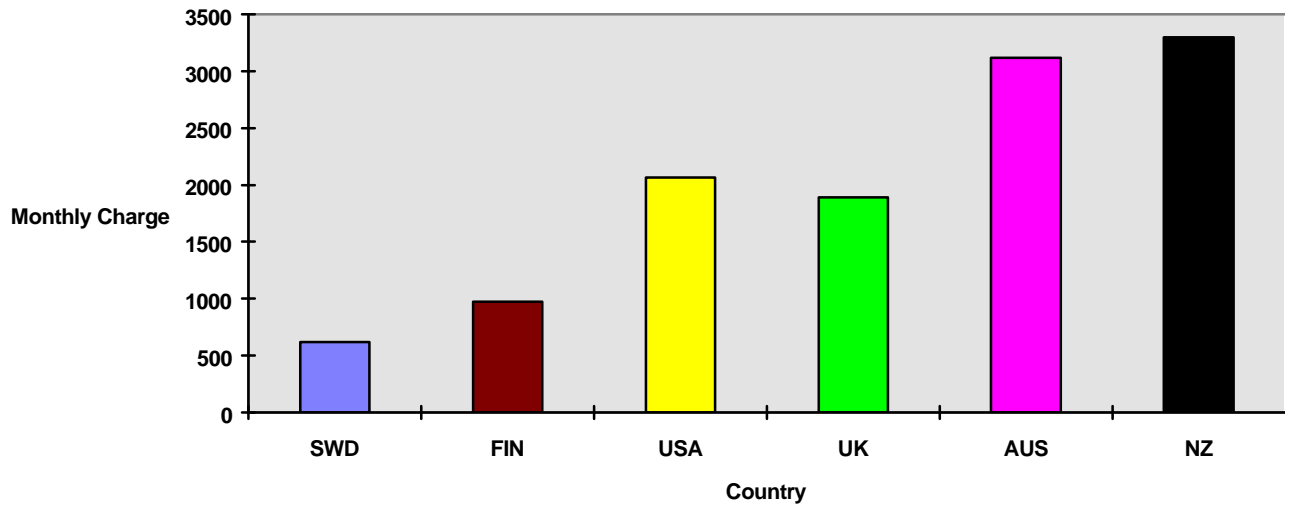
Scenario C



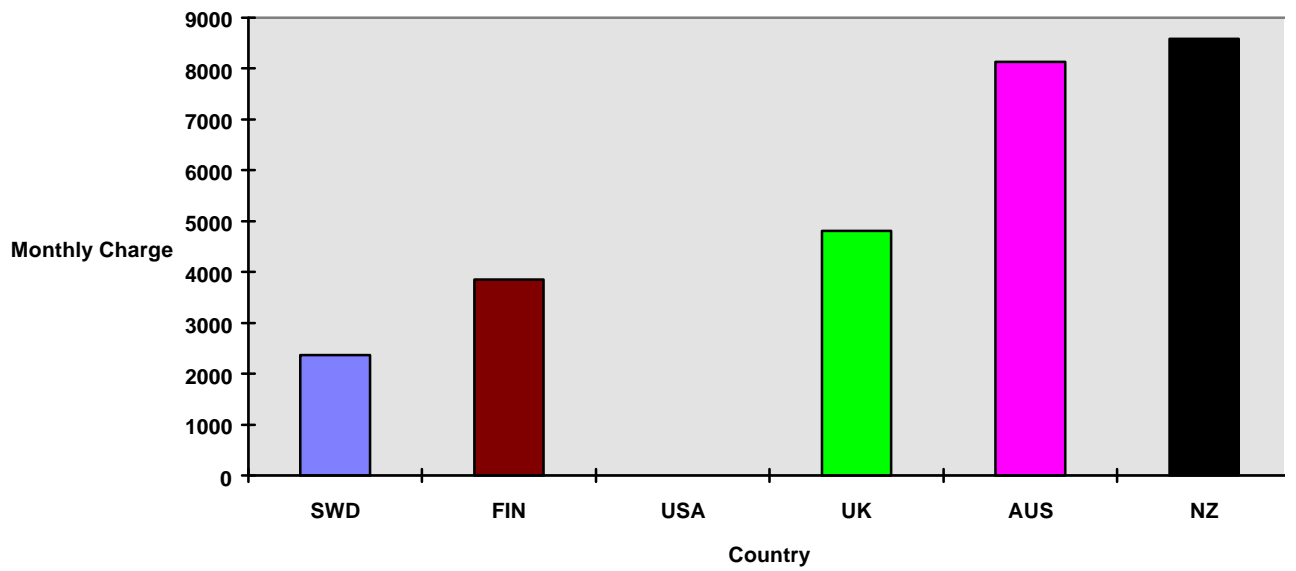
Scenario D



Scenario E



Scenario F



6. Summary

The business scenarios are summarised in the table below using the PPP rates previously discussed. Highest and lowest charges are shown in bold type.

Scenario	NZL	AUS	UK	USA	FIN	SWD
A	89.02	66.14	54.03	67.12	31.27	34.16
B	96.43	118.09	74.44	67.12	40.58	39.14
C	3969.89	3945.41	3029.57	2689.98	1545.59	1117.92
D	432.73	436.46	390.62	312.79	204.45	149.19
E	3297.50	3119.41	1892.16	2066.40	971.37	616.06
F	8585.56	8124.41	4809.08		3846.05	2362.64

The figures indicate that New Zealand and Australia have significantly higher charges for ISDN services than other countries studied. At the low-use end the charges are dominated by the relatively high access fee of \$NZ120 - \$150 per month and at the high-use end by the usage charges.

Figure 3 on page 15 details the total monthly charges for an ISDN circuit based upon the amount of minutes per day of use. Only local use is costed. As in the examples above it comprises access and usage fees plus an amortised installation fee (over 60 months).

The graph can be divided into 2 broad time periods; low use at less than 1 hour per day and high use at over 1 hour per day. For the low use scenarios New Zealand charges are the highest of the 6 countries studied and Sweden the lowest. New Zealand is approximately 160% higher than Sweden. The charges at the low end of use are dominated by the installation and access fees.

As the use of the ISDN circuits increases the individual country charges begin to diverge as the usage fee begins to dominate over the access and installation fees. At the high-use end of the graph New Zealand is comparable to Australia and Finland. The United Kingdom is highest (with a usage fee of 3.36 pence per minute) and the USA lowest (where there is no usage fee for local calls). The high New Zealand usage fees identified in the study therefore only apply to national and international calls and not to local calls.

To demonstrate this point we have included (Figure 4 on page 15) a graph depicting the relative usage charges of national and international ISDN for the six countries studied. The graph is based upon the following distance scenarios.

From	20 minute link To	5 min link To	3 min link To
Auckland	Wellington	Sydney	Tokyo
Sydney	Melbourne	Auckland	Tokyo
London	Glasgow	Stockholm	Tokyo
Stockholm	Göteborg	London	Tokyo
Helsinki	Oulu	London	Tokyo
Denver	Salt Lake City	Vancouver	Tokyo

With the exception of long distance charges from the United Kingdom, both New Zealand and Australian charges are significantly greater than the other countries studied.

Conclusion

- New Zealand rates for local, low usage, ISDN applications are 69% higher than the average of all other countries studied.
- New Zealand rates for local, high usage, ISDN applications are in the mid range of other countries studied.
- New Zealand rates for national and international, low usage, ISDN applications are 49% higher than the average of all other countries studied.
- New Zealand rates for national and international, high usage, ISDN applications are 97% higher than the average of all other countries studied.