

A2Billing, FreePBX and Locustworld Mesh Holiday Home Installation.

Introduction

Concordiax Ltd (www.concordiax.com) was approached by a company named Wildfire IP who specialises in providing internet and telephony for residential and holiday parks to install a data and telephony system into a number of holiday homes at a site in the south west of England. So far, 19 cottages or lodges have been built, with a further 26 under construction.

The occupation of the holiday homes was about 40%, with some holiday homes being occupied to a greater degree than others. Mobile reception was patchy, and non-existent on some mobiles in some of the accommodation. It would have been very expensive to get British Telecom to install lines to each of the 19 properties, and there was some doubt as to whether BT had sufficient capacity, as the area is very remote.

Data Network

Two telephone lines which had business class ADSL2 installed were available in the site office. One ADSL circuit was to be dedicated to Voice over the Internet, while the second ADSL circuit was to be used for all other data.

It was difficult to retro-fit the existing lodges with CAT5 cable, so a single length of cable was taken to a central power distribution point and Ethernet injected into the mains circuit using Homeplug - <http://www.solwise.co.uk/net-powerline-pl-14pe.htm>

Tests were then done in each property to check for connectivity. Fortunately, it was found that all properties could get an Ethernet connection from any power plug in the property, as they were all in fairly close proximity to the power shed.

The claimed range of Home-Plug is 200 metres but the signal can be attenuated by older wiring and connections, fortunately in this case, the wiring was less than 12 months old, and all 19 properties were on the same electrical phase. Had the builders employed 3 phase power, then we would have had to inject Ethernet into each phase separately.

Authentication and Traffic Shaping

To authenticate each customer, and to ensure that each customer got a fair share of the 8Mb/s broadband, a Dual Ethernet Mesh box was purchased from LocustWorld – www.locustworld.com. The author has used these units in a variety of installations. (Google on mesh+roper for more information)

All traffic passed through the mesh box, which supplied DNS, DHCP, traffic shaping, authentication, peer to peer file share blocking and also prioritised VoIP traffic.

New Builds

The remaining 26 properties currently being constructed will be fitted with a CAT5 Ethernet connection brought back to the LocustWorld mesh box. It was decided to use this method, as it is very cheap and easy to install at the build point.

Telephony Server

A Concordiax PBX was built, which consists of a CentOS operating system, Asterisk 1.2, FreePBX 2.2.3 and A2Billing 1.3. The hardware was a fairly powerful PC with mirrored hard drives and 2Gb of RAM.

A TDM400P card was fitted to it for connectivity to the PSTN, although the vast majority of the calls would be delivered via Voice over the Internet.

The reason for the PSTN card was to allow 999 (Emergency Calls) to route out of the local lines for CLI delivery purposes, and to use the functionality of the PBX and existing lines and numbers for the office in terms of transferring calls, presenting IVR menus and voicemail.

Extensions

The Lodges were numbered from 1 to 19 and the new lodges were to be numbered from 20 to 45. Extensions were entered into FreePBX to match the lodge numbers, e.g. 201, 202 etc up to 245.

This meant that each lodge would be able to talk to any other lodge completely free of charge, as well as well as enjoy voicemail services and generally use all of the features in FreePBX and Asterisk.

The phones purchased were Grandstream BT102's. The advantage of these is that they have a 2 port switch on them, and they are low cost. So the telephone would be plugged into the Homeplug unit, and then the customer could plug in a piece of CAT5 cable into the spare port in the back of the BT102 and daisy chain their PC or laptop from the phone.

Billing and Authentication

The owner of the lodges wanted to make a charge for telephone calls, and preferred the system to be pre-paid and as low maintenance as possible. A2Billing was the clear choice.

Each Lodge had an account created in A2Billing, and a2billing.conf was modified to authenticate calls on the basis of CLI (CID) E.G. the extension number.

Rates were then set up for each destination and dial code in A2Billing.

A custom trunk was created in FreePBX to feed the calls into A2Billing.

The custom dial string in the custom trunk in FreePBX was: -

local/\$OUTNUM\$@a2billing which fed calls into a context previously created which looked like this:-

```
[a2billing]
exten => _X.,1,Answer
exten => _X.,3,DeadAGI(a2billing.php1)
exten => _X.,4,Hangup
```

A2Billing would then authenticate the call on the basis of the extension number (caller ID) and deliver the call to destination via a VoIP trunk.

Only calls that began with 01, 02, 07, 08 or 00 would be delivered via the A2Billing Trunk, this was achieved with putting the correct dialling rules in FreePBX outbound routing.

To deliver emergency calls, a dial rule was made to match 999, which would feed the call out of one of the PSTN trunks without needing to go via A2Billing

Inbound Numbers

Each lodge was supplied with an inbound number. UK Geographic numbers were purchased from Magrathea-Telecom which the Author has found to be highly efficient and good value for money, however they only deal with telecom companies and not the general public. (sales@magrathea-telecom.co.uk)

The number was delivered to the fixed IP address of the Concordiax system via SIP Calls were then routed to the appropriate SIP phone or extension by simply entering them into the DID field of each FreePBX extension.

Payments

A2Billing was able to handle pre-payment of the telephony account by two methods.

1. The customer could go to the office and pay a sum of money, which the owner would apply to the customers account via the refill button in customers, and not forgetting to “add payment” in order to keep his accounting in order.
2. Alternatively, the customer could log on to their A2Billing interface and top up using Paypal or credit card.

Additionally, A2Billing showed a record of all calls made along with the duration and cost.

A re-occurring charge was applied to all those who wanted internet access. Additionally the LocustWorld system has a basic ticketing facility, so tickets could be issued which were for one time use and valid for 24 hours at a time.

Administration

An Aide Memoire was designed for each customer to tell them how to use the phone system, how to add credit, check their balance.

A2Billing was set not to read the balance on each phone call, but an IVR menu was made that delivered the call into a second AGI-CONF that did read out the current balance of the customer account.

It was noted that when a DID was added to the FreePBX extension, that the CLI delivered to A2Billing was the CLI of the DDI, not of the extension, so each customer had to have the CLI of the DDI added to their account for CLI recognition.

For outbound calls, a professional business class VoIP provider was chosen that allows the delivery of the CLI all the way to the called party.

Manifest

The equipment used was readily available and easy to install. The equipment required was: -

- 1 x Concordiax PBX – based on a standard PC with onboard RAID
- 1 x TDM400P with 2FXS and 2 FXO
- 1 x Dual Ethernet Mesh Box with a wifi card and external antenna to provide local limited Wifi access around the pool and public areas.
- 1 x 16 port switch to terminate the customer CAT5 – this will need to be added to as more properties come on line.
- 1 x 5 port switch for the WAN side of the network, into which was plugged the ADSL routers, WAN side of the Mesh Access point and the Concordiax / A2Billing server.
- 2 x ADSL routers.
- 20 x Solwise Homeplug units.
- 100 metres of external grade CAT5 cable.
- 22 Grandstream BT102 phones – 3 phones were to be used in the office.

Conclusion

The new owner of the system is very happy with the result, and pleasantly surprised at the relatively low cost of the installation.

Now he has got an idea on how the system works and the basic infrastructure is in place, he is coming up with all sorts of schemes, such as installing an IP camera to keep an eye on the pool and public areas, and an IP infrared camera pointed at an active badger set in the woods, so that holiday makers can watch the wildlife.

Additionally, he would like to supply his granddaughters with telephony services as they are both at university, as well as some favoured relatives abroad, who could be equipped with a simple IDEFISK soft phone, letting them have calls at his cost price.

For more information, you would be welcome to email me at joe at concordia dot com.