History

I first reported on the IT situation at St. Joseph's in April 2007 and my recommendations then were as follows:

1. *A purpose built server to be purchased with multiple hard drives, where protection such as Anti-Virus, Anti-Spyware, Worm Checker, Firewall etc. can be installed and, correct back-up procedures maintained. (Also recommended by Daviran Computers Limited.)*

   Server partly achieved Antivirus, worm checker etc. achieved Back-up procedures Not yet achieved

2. *Broadband internet connection at the hospital is essential as this would greatly assist in protecting the network to the best possible level, as software updates will be installed automatically. (Research will be undertaken to find the best service provider once the decision is approved)*

   Achieved, but could be improved

3. *Install a suitable encrypted wireless router to allow internet access to visitors who use wireless enabled laptop computers, especially useful when Motec provides educational sessions.*

   Not yet achieved

4. *Networked computers to be installed in the consulting rooms in OPD. This would give medical staff access to patient records during consultation sessions. The ability for records to be updated 'on-the fly' rather than waiting for them to be input at a later stage would also be possible. A networked computer in the laboratory and another somewhere within the operating theatre would be also beneficial.*

   Not yet achieved. (One computer is in the theatre but not connected)

5. *Basic I.T. safety/best practices awareness training session's for all relevant hospital staff.*

   This has already been done by Peter

   Eventually, the creation of an intranet site for the hospital where advice and training can be shared and accessed easily and, the ability for staff to have their own work email accounts.

   Not yet achieved

I met with Brother Johannes to discuss what help was required with regard to their general IT systems. He introduced me to Peter Ankobi the assistant hospital administrator, and asked me to work closely with Peter for the duration of my stay.

I was to become very impressed with Peter who has been responsible for the setup of the IT and basic training at St. Joseph's in 2000, a fact I wasn't aware of when I first reported in 2007. He then went to work for the Brothers in Asafo in the Western region, returning to St Joseph's earlier this year. He is clearly a very knowledgeable chap with a sound understanding of networking systems. Peter is definitely an asset to St. Joseph's even though occasional communication issues between him and Brother Johannes are apparent. I do hope this can be resolved in a positive way, as I will want to work closely with Peter on my next visit, hopefully to implement a wireless network of some description, amongst other tasks, and to assist with the new hospital IT infrastructure.

I explained how a wireless network would be of benefit, especially for visiting health professionals equipped with laptops. This would not only be useful now but also when the new hospital is up and running. Brother Johannes seemed very interested in this possibility.

One thing Brother Johannes is keen to achieve is the setting up of an internet café which would be located in the older of the two guest houses where he hopes staff and local residents will benefit from it as well as generating an income. Apparently there is a similar facility at Asafo, where Brother Johannes was last posted.

The location for the proposed internet café is currently one of the guest houses situated to the rear/side of the Angulo Canteen.

Observations

P.H.I.S. (Patient Health Information Software)

Peter showed me around the computer system P.H.I.S., which I also reported on in my previous report. This system has not changed as far as I can tell apart from the fact the license has now expired. The hospital does not appear to want to renew this license as it is believed there are alternative software packages that would suit the hospital better. Meanwhile however, in order to get around the license issue, every 30 days (the 'free trial period' for P.H.I.S.) each and every computer that accesses P.H.I.S. has to be formatted and the operating system and all the software re-installed from scratch, which then allows P.H.I.S. to work for another 30 days, and so on.

All the patient data is stored on a PC in the Medical Directors office which is acting as a server. There are no back ups done at all! Peter is obviously aware of this but says he requires another hard drive, preferably an external unit, of 500GB for this purpose. This really must be made a priority.

The 'Server' is a simple PC in the Directors office.
Peter shows visitors from the All Nations University the P.H.I.S. database. The hub that distributes the service to other computers can bee seen mounted above on the wall

There are also concerns over the UPS equipment (Uninterruptible Power Supplies (UPS) - Computer Power Protection) and with the regular power cuts in the region this is a real issue. Some need to be replaced with units of a higher capacity and some areas do not have UPS at all.

National Health Insurance Scheme

Since my last report the National Health Insurance Scheme has begun in Ghana and for those patients on the insurance scheme the hospital is required to submit an invoice at the end of their treatment. However, the way P.H.I.S. outputs its invoices is not acceptable to the insurance scheme, so official insurance scheme documentation has to be filled in manually from the P.H.I.S. system/print-out. It would however be possible to get the designers of P.H.I.S. to design a form which would mirror precisely the layout of the official document. *But not if the license isn't being paid for, I would hazard a guess.*

The hospital staff connects to the national insurance scheme database through the network and via a satellite dish positioned outside the laboratory.

The National Health Insurance Scheme is accessed via this satellite dish outside the Laboratory

The hospital now has a broadband connection but the bandwidth is only 256kbs and it is shared with the fax and phone lines. However, it does mean that the computer is able to stay online all day and can update its virus software regularly.

The internet service provider is Vodafone, previously Ghana Telecom. A meeting will be arranged to visit their offices during the week to discuss what else they can offer.

<u>General computer hardware</u>

The vast majority of the computers in the hospital are old and slow and really could do with replacing. At the very least they could do with some new components fitting such as new network cards and possibly some more memory/RAM.

In the health insurance printing room there are only two computers and there is a need for more here.

There is a computer under a desk in the In-Charge office in the theatre. This computer is there to give doctors/surgeons access to P.H.I.S. so that they can refer to a patient's records. The hospital does not have enough data cable to reach all the way over to the theatres however.

Most odd is the fact that Peter does not have a workstation for his sole use. He has to find unoccupied workstations and temporarily use them. The hospital administrator has a good sized

office with only one desk in it. Perhaps a second desk and computer could be placed here? If not, he could consider running a network cable to his house, which is next to the red/pink house. He could at least work from home then, where he could maintain the P.H.I.S. database and manage the network in times of need.

The hospital administrator has a good sized office with only one desk in it.

There is still a computer in the red/pink visitor's house but the computer has problems. It is reporting that it's version of Windows is counterfeit...which turns out to be the case. This is causing all sorts of issues with software not working properly. It will have to be formatted and rebuilt if it is going to be of any use to anyone and if a genuine copy of Windows cannot be obtained, I strongly suggest turning Windows updates off until it can be obtained. The good news is that it doesn't appear to have any viruses on it, which is marvellous. Since I last used this computer, which had a virus, antivirus software has been installed and it is now clean.

Also, a data cable has been laid (two in fact) under a newly paved driveway, which run out from a rear window in Father Oppongs room, where an ethernet swith is located, over a wall and into a plastic conduit buried in the ground. At the house the conduit and cables emerges from under the edge of the block paving by the veranda and (one of them) up and through the mosquito mesh into the living room. The other cable runs around the side of the house and into the garage, where a contractor was staying a while ago. *This cable could now be extended into Peter's house.*

It was going to be very beneficial to me to have access to the internet in order to help me with research for solutions to the IT issues here.

The cable leaves the rear of Father Oppong's room...

...spans the alleyway...

...over the wall and down into the ground...

...under the block paved driveway...

...emerging at the side of the porch in this conduit...

...up the side of the porch and through the window...

...and into the living room to the computer.

However, the computer has lost its internet connection due to a power cut which blew the ethernet switch, because it did not have a surge protector fitted. A new switch will be required and Peter will attempt to get funds from Brother Johannes to purchase the parts. This will require going to Accra where we will also get the quotations for wireless router equipment.

Now, a cautionary tale. When we set about rebuilding the computer we needed to access the main hospital server to copy some drivers that were required as Peter couldn't find the original discs. Over at the admin office my pen drive was utilized to copy the drivers because Peter's did not have enough free space on it. Beware! Peter has installed antivirus software called Bit Defender onto most of the hospital computers and it takes no prisoners. For some reason it saw all the photos, video clips and all my Motec documentation, like PowerPoint presentations and Word documents, as harmful viruses and, to all intents and purposes, deleted them, including a large portion of this report. Oddly, all the files were visible as transparent icons, suggesting they were there but not available. There was no undo/recovery option that I could find and I tried the pen drive in another computer but there was absolutely nothing showing there at all, they were never to be seen again it seemed. However, all was not lost.

The only computer that could see the missing/deleted files and folders was the one that did the dastardly deed. I could access some, but not all of the files, so I decided that the most important

document to recover was *this* report, well what there was written of it at that time. All the other documents were backed up on my computer at home, but it is a good job I didn't need to use them here. I opened the report in Word and to my delight, was able to save it to the desktop. This time the icon was solid, meaning the file was now available. I copied it to my pen drive and sighed a huge sigh of relief. Attempts to copy some of the rest of the 'lost' files and folders proved to be fruitless however. I have decided I do not like 'Bit Defender' one little bit. I can't win, either a virus gets me, or the anti virus does!!!

So beware. If you ever intend to use a pen drive in a hospital computer always carry a back-up (like a CD or DVD) so you can recover your data. You could always carry a second pen drive as a precaution, or better still, take your own laptop.

We eventually managed to get the drivers onto the computer by physically carrying the house computer over to the admin offices and plugging it directly into the network there. We also cleaned out all the dust and cobwebs, of which there were plenty.

Drivers go in, dust and cobwebs come out

I later installed the free version of AVG antivirus but no doubt Peter will put Bit Defender on at a later stage when I have left. *To be perfectly frank, I think AVG does everything you could want. It is installed on all of my computers at home and I have never had a problem with viruses. I have also put it on at least two of Motec's laptops.* Peter stated that he has experienced AVG failing to deal with a virus, but later I witnessed Bit Defender also fail to deal with some viruses, so I am confident AVG is every bit as good. And it's free!

Research

Broadband Fact Finding

I made a visit to Radio Sunrise FM 106.7 at the top of the road from St. Joseph's to ask about their internet connection and bandwidth etc. Radio Sunrise is the Eastern Region arm of the Ghanaian Broadcasting Company and it transpires they don't have internet access, can you believe that? I spoke to a DJ called Dansu. He explained that the company once had all the equipment in place to receive the internet via satellite in return for free radio advertising for the provider but, for some reason known only to the radio station management and the provider, they pulled out of the deal and removed the equipment.

My quest for knowledge of internet connection and bandwidth possibilities in Koforidua continues and I will be visiting the service provider tomorrow to discuss options and maybe Friday or early next week we will visit Accra to 'window shop' wireless routers etc.

The next day I had a meeting with a chap named Kumi, at Vodafone's office, in the centre of Koforidua, to discuss their tariffs. See the table below:

Feature	Lite	Res.	Bus.	Bus.+	Sch.	B-SOHO	B-Plus Pro
Speed – down Speed – up (kbps)	128 32	256 64	512 128	1024 256	1024 256	512 128	1024 256
Email Addresses	5	5	10	20	20	10	20
Storage Address	2MB	2MB	2MB	2MB	2MB	2MB	2MB
Web Page Storage	2MB	2MB	2MB	2MB	2MB	2MB	2MB
No. of Static IPs	-	-	-	-	-	Up to 4	Up to 8
Install Charges	90	90	90	90	90	90	90
Monthly Sub. Fee	42.09	63.14	184.14	231.48	89.44	231.48	278.83

St.Joseph's currently suscribe to the Res. (residents) Package at 63.14 GH Cedis per month.

Bus.+ would be a better option and if the hospital could only persuade the government into certifying the hospital as a school, due to their teaching element, the price would plummet as you can see. Achieving this is very doubtful but surely worth a try.

I also discovered that this service is, as are all the other options in the table above, a 'shared' one. In other words, the hospital is sharing the 256kbps line with several other customers/residents. How many I could not determine.

It is possible to have a 'dedicated' line where all the bandwidth is yours, but the prices are astronomical. See below for some examples, I stopped asking at 2MB for fear of falling over:

Bandwidth	512kbps	1MB	2MB
Monthly Sub. Fee	3000 GH Cedis	5000 GH Cedis	7000 GH Cedis
Install Charges	3000 GH Cedis	3000 GH Cedis	3000 GH Cedis

I understand that these dedicated services are mainly for clients who themselves want to provide bandwidth to other customers. Even so!

It is quite clear that until fibre optic cables reach West Africa the cost of decent broadband connections will remain high. We will have to accept that for the time being.
(Read a BBC report here ⟶   http://news.bbc.co.uk/1/hi/world/africa/7987812.stm)

Computer Equipment Fact Finding

The next day Peter and I went into Koforidua town centre to price up for the internet café equipment and do a bit of fact finding. The options for the internet café as I see it are these:

Option1: *Equip and run the internet café in-house, this will give a perfect opportunity to rotate out some of the older computers in the hospital and put some new(er) models in. The hospital should earn more money in the long run too.*

Option2: *Consider letting the space to a company to run the proposed internet café on site in return for rent/other benefits. This way the hospital will have an internet café on site without the responsibility of maintaining the equipment etc.*

First stop was at a small branch of IKE Computers. They could provide a Dell, Pentium 4/Celeron, XP, keyboard, mouse and flat LCD screen for 450 GH Cedis. Or a Compaq Evo, Pentium 4, XP etc. for 400 GH Cedis, all very expensive. They also sell HP P1005 Lazer printers for 250 GH Cedis the replacement toner cartridges costing 100 GH Cedis each.

Next stop is at the head office/outlet of IKE Computers. They could provide Compaq Evo, Pentium 4, XP with CRT monitor at 250 GH Cedis or 370 GH Cedis with a LCD screen. The printer was the same price. Attached to this shop is an internet café. The software they use to manage the café is called 'Handy Café 'We couldn't find out the price though. (It's free I later found out)

Next stop was at another internet café were the software they use is called 'Cafezee' (Not free). Incidentally, they are on 'Business +' which is the 1MB service. Peter states he uses this café at times and the computers are reasonably fast, unlike the neighbouring café, Aygemax, which is very slow he tells me, but I could not find anyone who could tell me what their bandwidth was.

Final stop is at a new shop just down the road from the hospital. It has no name yet so we will call it the green container/shop. They can provide very, very old computers as well as not so old but, still old computers. A Dell, Pentium 4, XP with CRT monitors is 320 GH Cedis, or for a slightly faster processor 380 GH Cedis. They all come with a keyboard and mouse. All these computers are pretty poor and really not suitable for St. Joseph's.

All the above computer are machines with unknown numbers of previous owners. I discussed the option of buying new computers with Peter who says they would cost about 700/8000 GH Cedis. This appears to be a far more sensible option to me. They will work properly, come with a warranty and will last a much longer time than used and abused ones, affording St. Joseph's much better long term value for money.

The day arrives when we are going to Accra to purchase some computer components and price hunt for wireless routers etc. but there appears to have been a communication breakdown between Peter and Brother Johannes regarding the cash. Peter says he asked Brother Johannes for it, Brother Johannes says he didn't etc. etc. Eventually a cheque is raised, which requires a trip to the bank to cash it, during which we have a minor accident with a parked car. We finally get going, nearly two hours behind schedule.

We arrive at the first computer shop, IPMC Computers, and obtain a quotation for various items of equipment. Then we drive to Dita-Dang Computers, and obtain a second quotation. We drive to a third location where there are two other computer shops. The first one is very flashy indeed but has nothing in stock that we are after. The second shop is just full of cheap rubbish and unknown brands from China, so we walk out.

Over lunch we decided which shops had the best deals on offer and IPMC Computers would appear to be the cheapest for the equipment we are buying today. Dita-Dang however offers the best deal for the wireless router and signal booster etc.

Peter purchases 3 x D-Link 8 port switches 4 x D-Link network cards and 1 x surge protected plug board, all for just under 220 GH Cedis. It's been a long day and we can now make our way back home. We agree to install all the new equipment tomorrow.

All the written quotations have been left with Peter to discuss with Brother Johannes.

Computer Equipment Installing

The following day I am having trouble finding Peter and his phone is switched off, so I headed over to OPD to see if he is there. I am approached by a member of staff in the records department who is having a problem printing a document from the 'satellite connected' health insurance server. It appears that Sophos, a different virus software package to Bit Defender, and why this computer is using a different one I don't know, is trying hard to update itself and is failing spectacularly, and it is using up all the computers resources in doing so and this is causing the computer to struggle with sending the document to the printer. I discover that I can't stop Sophos from running as this can only be done by someone logged on with administrator rights. That would be Peter then. Where on earth is he?

JK who works in the admin office and deals with the National Health Insurance side of things was eventually called over and sorted it out. He obviously also has administration rights.

At last, Peter contacts me. He is in town at the Ministry on official hospital business apparently, and will be two more hours yet. His phone is low on power which is why he keeps turning it off he explained.

Two hours come and go and well into the afternoon I give up all hope of installing the new equipment today.

During dinner the subject of the illusive Peter was brought up. It seems quite clear that Brother Johannes and Peter have ongoing communication issues and Peter I fear is probably in for a right Royal ear bending.

The following morning Peter made contact and again explained that he had been at the Ministry in Koforidua on official hospital business. His phone battery was low, which isn't unusual by the way, but it transpired that he had to make a completely unexpected trip into Accra to meet a Ministry official there. His phone battery by this time is now completely dead and because he wasn't expecting to be long he went out with no cash and so could not purchase any top up credit for his phone to inform us what was happening, or food for that matter. He had finally returned to St. Joseph's at 18:30.

I mentioned to Peter my discussion with Brother Johannes over dinner last night and his concerns over yesterday, but Peter was adamant that Brother Johannes was fully aware of the meeting with the Ministry. Communication definitely seems to be the issue, and needs sorting.

First job of the day is to install the new switch in Father Oppong's room but there's a problem. The key to his room is nowhere to be found and Father Oppong is in Togo for the week. Next job then, is to install some new network cards. One of the computers in the Health Insurance Printing room had a new card fitted as well as an old computer that is destined for the records room in OPD. Next we go down to the Hospital Administrators office to install a new card in his computer. After this, we went to see Brother Joseph who possibly has a spare key to Father Oppong's room. He is too busy to look for us but will check after lunch.

Returning to Bro Johannes's office we walked in on a meeting with members from the All Nations University in Koforidua. They are also at the hospital to get a view of the I.T. systems the hospital is using, to see if they can help in any way.

Brother Johannes requested a photo be taken of all the visitors, with us, on the steps to the main entrance before some of them left the hospital. Then, together with JK we take the remaining visitors on a tour of the PHIS System in OPD and the admin block.

They took copies of all the forms and booklets that are used for recording patient's details and were given an overview of how the National Health Scheme works by JK. Then, over at the admin offices, they were a little alarmed at the type of server that was being used, suggesting a purpose built server, as I had also recommended in my first report. They were even more alarmed at the fact no back ups are being kept.


When the visitors had left Peter and I came to the house to install the surge protector plug board, deciding that a smaller one should be purchased for the switch in Father Oppong's room. I would have preferred to have used the large one temporarily to be honest, but Peter says he will purchase one soon. I hope so. In fact all the computers require protection from UPS and surge protectors due to the regular power cuts this country experiences.

After lunch Brother Joseph took me to his room where he searched for and found the key to Father Oppongs room. We can at long last install the new switch which will provide internet access to our house and give me a tool to do some research on. We installed the switch and then went to the house to connect to the net. Absolutely nothing, there was still no connection.

We decided that the onboard network card could be faulty, many of the computers with these onboard cards are not working properly it seems, and went to fetch one of the new network cards from the admin block. This installed, still we had no connection. On further inspection we found that the cable to the house has been severed by a machete, just at the point where it emerges from the conduit under the block paving. Peter went to his house and returned with a friend, carrying a ladder. There is the second cable to the house that was being used by a sub-contractor last year. The idea is to re-route this cable into our house. (*Peter will have to run a new cable to his house now*) Peter wired up a plug on the cable and plugged it in, there still is no connection. Peter then goes over to Father Oppong's room to try a new plug at that end. Still there is no connection. In the end, Peter sets about repairing the severed wires outside in the front garden, twisting the copper wires together to make a connection. At last, we are online.

It has taken over a week to achieve this relatively simple task.
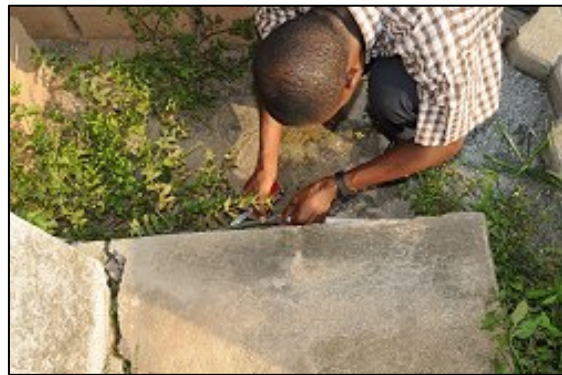
As we had not been able to find the printer driver for the printer, a Chinese counterfeit copy of an HP 3320, and the ink cartridges were empty anyway, we borrowed a printer from the admin offices for the time being. Peter says he will get the cartridges from the stores and find the printer driver tomorrow. This is important as the next occupants of the house will no doubt require it after we have gone. So we were now in a position to print off Steve's finished reports for Brother Johannes. We also visited the Motec website and printed off a Deaf Shepherd poster advertising the Charity gig in aid of Motec. This we gave to Brother Johannes with the reports, he was very pleased with both.

The following day, the man that normally uses the printer we borrowed is not in so we can hold onto the printer for a while. I still want to set up the house printer for the next occupants to use. Peter is however busy and we agree to meet later.

Peter called me while I was in a site meeting so, when it had concluded I went to the admin block to find him. He wasn't there. I phoned him and by now he was on his way into town. Maybe, just maybe we will get the printer sorted this afternoon... (It doesn't happen!)

The following afternoon we are leaving to fly home. Peter popped over to see us in the morning and we said our goodbyes then, just in case we don't get to see him again. When we set off I phoned Peter to say goodbye again, he says he will go to the house to recover the borrowed printer. He never did sort out the house printer, but promises to do so...maybe eh!

Follow-up UK Research

On my return to the UK I set about doing some research now armed with a better view of what is required.

My first thoughts were how best to achieve the wireless network. It became apparent that there probably wasn't going to be enough range from a wireless router without hardwire daisy chaining a number of them together. The maximum range that one unit could be relied on for is only up to about 50 metres and drop-out would be common towards the end of the range limits or even less depending on structural obstacles. Hardwiring from one location to another and placing a wireless router where it will be in close proximity to where laptops will be used is an option.

Another interesting option, which I think will work really well, is a system that utilizes the electricity circuit cables as a data cable. The modem is hooked up to an adaptor which is then plugged into a wall socket. Another adaptor/wireless transmitter is simply plugged into a socket where internet is required and hey-presto! a device where you can either plug in a network cable or wirelessly connect, just where it's needed. The downside is the signal strength is not quite as good as through proper Cat5 cable but it will good enough.

I also found the cost of equipment to be generally much cheaper here in the UK (about three times cheaper) but the issue would be if there was ever a need to return something under warranty. Also, could a similar replacement be found in Ghana? Would it therefore be wiser to source the equipment in Ghana?

Conclusions

A wireless router system will probably not be enough on it's own as I feel the range will not be adequate and will be affected by structures. I think a combination of hardwired, wireless and a system that utilizes the electric power supply as a data cable is the way to go.
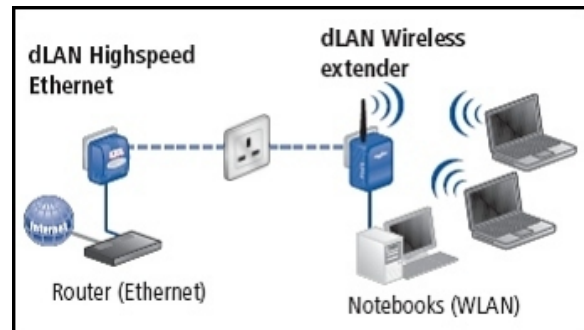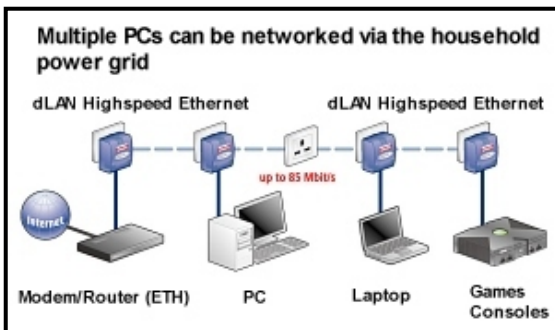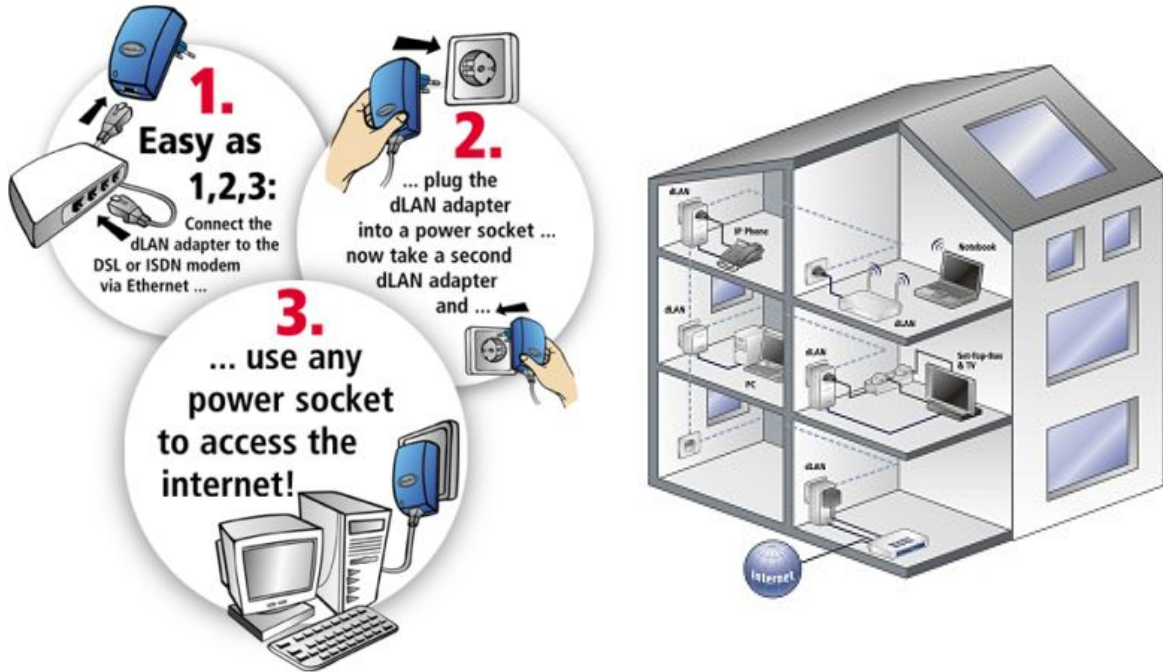
www.devolo.co.uk

The faster dLAN® — Up to 85 Mbit/s

Internet, PC or game console: linked together quickly and easily over the existing electrical wiring

"Thanks to HomePlug technology, you can now set up a home network easily and economically. You will not believe how simple it really is! Just connect your PC to a dLAN® adapter and plug it into a power socket to transform your household power circuit into a fully functional network. With dLAN® technology, you can surf the Internet and access other PCs or printers from any power outlet in the house. Simply take the adapter with you whenever you switch to a different PC or another room.

The actual connection to the Internet is realized over your telephone line as usual, leaving you absolutely free with regard to the type of connection (ADSL, Cable, ISDN or analogue) and your choice of provider and rate."

The following diagrams show how the system works:

1. Easy as 1,2,3: Connect the dLAN adapter to the DSL or ISDN modem via Ethernet ...

2. ... plug the dLAN adapter into a power socket ... now take a second dLAN adapter and ...

3. ... use any power socket to access the internet!

Multiple PCs can be networked via the household power grid

dLAN Highspeed Ethernet   dLAN Highspeed Ethernet

up to 85 Mbit/s

Modem/Router (ETH)   PC   Laptop   Games Consoles

dLAN Highspeed Ethernet   dLAN Wireless extender

Router (Ethernet)   Notebooks (WLAN)

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Recommendations

In order of importance:

- Obtain either an external USB hard drive or an additional internal hard drive for the 'server', with suitable capacity as a back-up drive for the P.H.I.S. database

  Peter has emailed me, this has now been obtained

- Reposition the modem, server and PHIS hub to a secure location where the IT administrator can gain access at all times, or, provide emergency access to the current location

- Seriously consider upgrading the broadband capacity to the maximum affordable, preferably 'Business+'

- Increase the capacity of the UPS in the administration block and obtain more units as necessary

- Obtain extra surge protectors, especially for the switch gear

- Initially invest in the Devolo (High Speed – 85Mbps) networking system. It is modular and expandable. Initial expenditure could be low, increasing as necessary. If required, this could be later complemented with a wireless router, one with the best range/coverage possible, together with a signal booster/relay. Dita-Dang Computers have a Linksys wireless-N router for 250GH Cedis and a compatible range booster for 210GH Cedis, alternatively, instead of a booster, subsequent wireless routers could be daisy-chained together either wirelessly or by hard wiring. Hard wiring is however always the preferred method. *Hard copy quotations submitted to Peter.*

- Invest in some genuine copies of Windows, but not Vista. If at all possible wait for Windows 7, available early next year, all being well. Until then, insure Windows Updates are **TURNED OFF IMMEDIATELY!** As from June 2009 Microsoft will apparently be sending out a signal to all computers running counterfeit copies of Windows that will disable the operating system, so turning the updates off will help to avoid this

- Hold essential I.T. spares in stock, such as network switches; network cards; printer cartridges; a box/roll of Cat5 cable and connectors; surge protectors etc. It will be far more efficient and cheaper than having to make a special and arduous trip to Accra. Spares that are used can be replaced during a regular trip to Accra.

- Purchase new computers wherever possible in preference to used ones

- Avoid buying any new or used computers with Vista unless they can be 'down/up'-graded to XP, or in the case of new computers in particular, try waiting for Windows 7

- Consider underground ducting from the existing hospital to the new one for data cabling if not already done.

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- **Internet Café:** Chose option 1 and equip and run the internet café in-house. This will give a perfect opportunity to rotate out some of the older computers in the hospital and put some new(er) models in. The hospital should earn money in the long run too. It may be necessary to obtain a second broadband line to serve the internet café and this should also be 'Business+'. Bear in mind, customers will not want to use or recommend to their friends and family an internet café that is slow and troublesome. Having said this, let's see if the internet café has many customers during hospital working hours. If not, then the single broadband line the hospital has may possibly suffice.
  Use Handy Café as the management software, for the simple reason it is free.