



Figure 7. MultiCat (a) and IPCat (b) of the Inovatech PLC system.

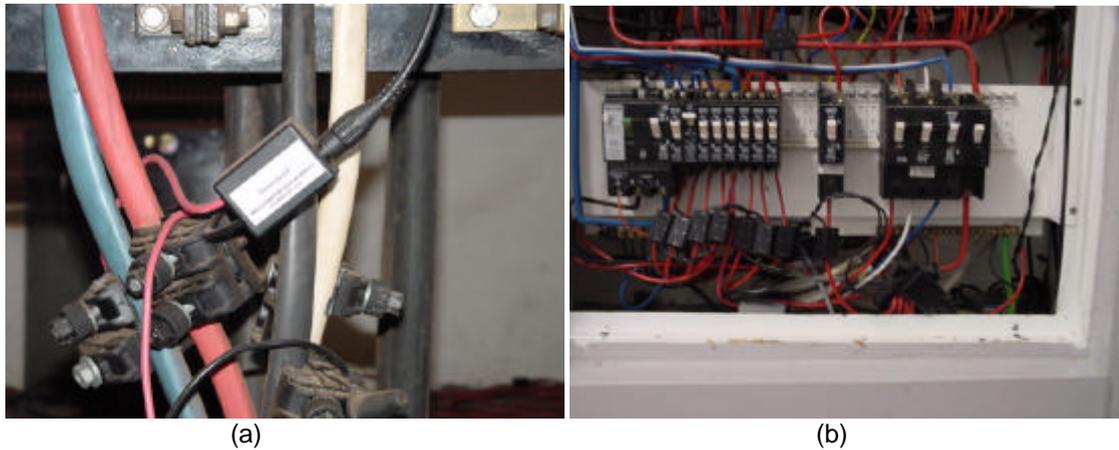


Figure 8. Different coupling methods: (a) Capacitive and (b) inductive.

1. Wireless Access

Another way of bridging the last mile is by going wireless. There are several wireless standards but the two of interest is IEEE 802.11 and IEEE 802.16.

The IEEE 802.16 wireless standard is a Wireless Metropolitan Area Network (W-MAN) standard that provides point to multipoint broadband primary data distribution. With this standard, (approved and introduced in January 2003), data transmission rates of up to 120 Mbps can be achieved. This wireless standard was designed to distribute high bandwidth data to multiple points throughout the network from one central point. Figure 9 shows a typical Wireless MAN network application.

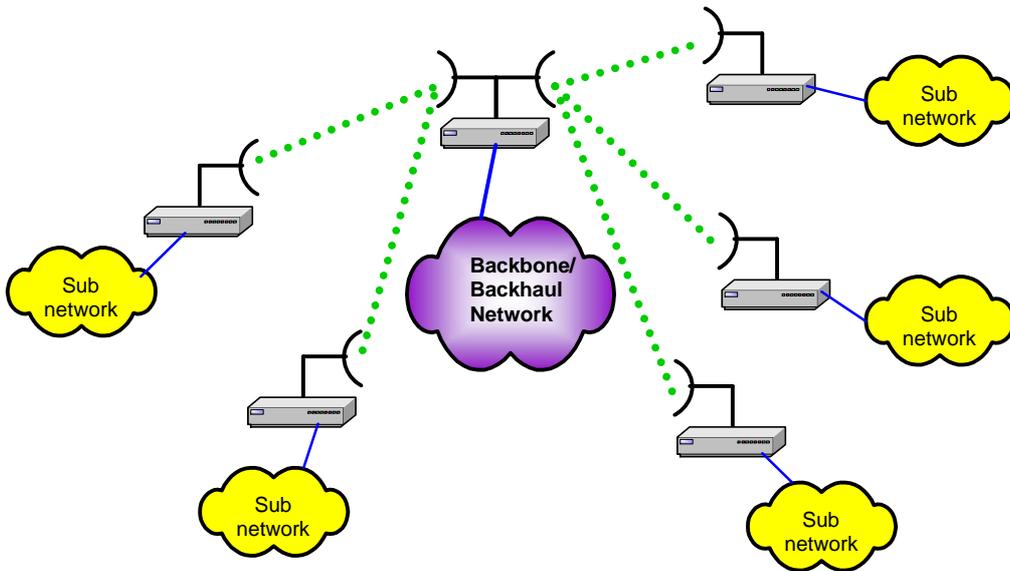


Figure 9. Typical IEEE 802.16 Wireless MAN network.

The IEEE 802.16 Wireless MAN standard is however operating in the licensed frequency band (6GHz up to 50 GHz) for which an operating license is required. The advantage of the licensed frequency band is that one will be the sole user of that band with no other users in the same band. The other drawback of this standard is that equipment is extremely expensive, partially because of the fact that technology is still brand new and equipment will be first generation equipment.

The IEEE 802.11 wireless standard is a Wireless Local Area Network (W-LAN) standard that provides point to point or point to multipoint data distribution. With this standard data rates of up to 22 Mbps can be achieved and is designed to provide data access to single users. Figure 10 shows an application of IEEE 802.11 wireless standard.

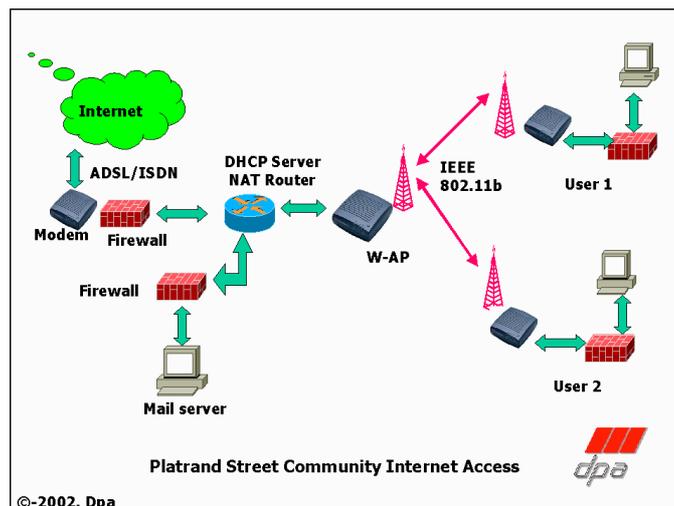


Figure 10. IEEE 802.11b Wireless application – courtesy of DPA

The advantage of this standard is that it operates within the free/unlicensed frequency bands (2.3 GHz and 5.88 GHz) for which no license is required. The drawback of this is that any one can

use this band and interference can quite easily occur. Another advantage is that the technology has been around for about 11 to 15 years and the equipment comes at a relatively low cost.

These two wireless standards combined provides efficient and easy to roll out last mile solutions where the IEEE 802.16 standard can be used to distribute data from a central point to several distribution points (long distances), and the IEEE 802.11 standard can be used to distribute the data further to the end user (shorter distanes).

2. Last Mile Access Pilot Projects

At Tshwane we have eight Last Mile Access Pilot Projects. These projects are all aimed at testing the ability and feasibility of different last mile access methods. The eight projects are summarised as follows.

- Project 1: Power Line Communication (PLC) in a laboratory environment

This project investigates the use and implementation of low voltage power line communication (PLC) in a laboratory type environment, where traffic-capacity, HF interference, HF propagation, and network security is studied.

- Project 2: The use of electrical network infrastructure to support the learning process in schools

This project involves the evaluation of the electrical supporting network infrastructure to supplement the present distribution of learning material to schools by making available video streaming on demand. It also investigates the integration of the Gauteng on Line (GOL) programme of internet to schools.

- Project 3: Internet connectivity to schools

This project investigates the ability of the electrical network supporting infrastructure to provide internet connectivity to schools using PLC equipment. The project will integrate with the current GOL programme.

- Project 4: PLC power cell in a residential area

This project will evaluate the ability to provide high bandwidth last mile access to residential users by means of PLC equipment over the low voltage network.

- Project 5: Application of wireless standard IEEE802.11b in a community network

The project will evaluate the ability of the IEEE802.11b standard to provide internet connectivity in a residential community.

- Project 6: Medium voltage PLC

The project will evaluate the feasibility to use the 11kV electricity network to provide broadband data services.

- Project 7: IEEE802.16 Wireless MAN standard

This project will explore the deployment of the IEEE802.16 Wireless Metropolitan Area Network (MAN) standard for the purpose of telecommunication services.

- Project 8: PLC Pilot test Site

This project explores the deployment of PLC from a substation on overhead lines to the Electronic Services offices at the City of Tshwane.

These projects make use of a combination of PLC and wireless technologies amongst others to provide telecommunication services.

This extensive range of projects are all conducted to show that Metro/Municipal Telco's are able to play an important role in the Second National Operator and to provide Last Mile Telecommunication services to the end user.

3. Conclusion

The investigation into Last Mile Telecommunications proves that the available technologies can be used by an electricity utility to provide Telecommunication services as an addition to the traditional supply of electricity. This can be a great solution to generate new and extra revenue an electricity utility.

The provision of Telecommunications does not only include the generation of new or extra revenue, but it can be the carrier of other services required or provided by Local Metro's or Municipalities. Services that can piggy back on Telecommunication infrastructure include remote metering (electricity and water), ripple control, scada, traffic light monitoring, streetlight control etc.

The provision of Last Mile Telecommunication is a new and very exiting field in the electricity supply industry and time to get a piece of the pie is running out fast!

4. References

PLC: Demonstrating the convergence capability of the technology; Fernando Nogueira; June 2003.

<http://www.platrand.co.za>