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Utility Asset Commercialisation – An Opportunity for African Utilities –

White Paper by the African Utilities Technology Council

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1. Introduction

Today's increasingly technology focussed business environment continues to drive the demand for broadband penetration and has almost guaranteed that these services have become a key contributor toward economic growth and prosperity, in both developing and developed markets. Invariably access to broadband services improves productivity, accelerates innovation, raises the standard of education and most certainly provides opportunities for new products and services. Furthermore, and this is particularly relevant to developing economies, enhanced broadband access also encourages foreign investment thereby improving job creation and consequently can serve as a catalyst for sustainable growth in a country's GDP (Gross Domestic Product).

While access to the internet has shown significant growth throughout Africa in recent years, the penetration, with possible exceptions of South Africa, Botswana, Namibia and Kenya, remains abysmally low. While mobile access has generally outstripped fixed line access, overall penetration by both options is largely dependent upon high capacity long distance transmission networks – typically underground fibre optic cable based. These are of course extremely costly and time consuming to install and are more often than not dependent upon the existence of wayleaves provided by other public infrastructure such as roads and railway lines etc. which may, or may not be available in rural regions.

Internet uptake (in line with almost every other public service offering) is very much dependent upon end user pricing; hence, it is an obvious “no brainer” to keep this as low as is possible. Public utilities, more especially electricity utilities, generally have extensive infrastructure in the form of HV (High Voltage) power lines providing electricity to many smaller towns and cities and even, in many instances throughout Africa, to the more remote regions. Moreover, in conjunction with the major power line routes, these lines are either already equipped with aerial fibre optic cables or are perfectly suited to the relatively inexpensive process of retrofitting similar cables.

Thus, this infrastructure, if appropriately utilised, presents an ideal option for both utilities and public telecommunications operators to expand data (and voice) services throughout the country quickly and in a comparatively cost effective manner. Furthermore, since fixed line access is also usually dependent upon the availability of electricity to households and businesses, the improved business case (due to increased revenue received from Telecommunications Companies) can also help to facilitate the construction of new power lines and associated infrastructure.

2. Utility Telecommunications Background

Most public utilities have for many years owned and operated private telecommunications networks to support both their operational and business service requirements. The establishment of privately owned telecommunications networks has been primarily motivated by stringent requirements for availability and reliability demanded by operators of the electricity grid. Furthermore, utility key installations (typically power stations and substations) are often located in sparsely populated and remote regions, thus rendering these uneconomical for public Telcos to provide sophisticated services at a reasonable cost.

Traditionally, utility telecommunications networks were entirely dependent upon PLC (Power Line Carrier) systems and microwave radio based systems to meet telecommunications and tele-protection needs. Microwave radio systems (typically narrow bandwidth) have migrated from early analogue systems to the very latest SDH (Synchronous Digital Hierarchy) digital systems. PLC systems have also undergone many developments and today manufacturers can offer sophisticated digital systems. However, in recent times, unprecedented demand for bandwidth, in conjunction with stricter tele-protection response times and overall network availability requirements - primarily due to power network expansion and sophistication of processes - have eroded the ability of these technologies to deliver services requisite to support the utility's mission critical operations and business support services.

3. Utility fibre Optics

Fibre optic cables, more specifically those installed upon HV line infrastructure, effectively address the many limitations normally associated with microwave radio as a transmission medium. Consequently, fibre optic transmission technology - synonymous with international utility telecommunications trends - has become a fundamental design aspect of most African utility's newer telecommunications backbone networks. This development has furthermore, been driven by the continual expansion of electricity infrastructure to meet ever growing public demand, which in turn has also accelerated the requirement for both additional bandwidth and enhanced network availability.

Support for the electricity grid will undoubtedly always be paramount; however, the bandwidth and connectivity required to accommodate the administrative and business requirements of the utility cannot be understated. The services in question are typically bandwidth intensive and include both business and operational applications crucial for the day to day functioning of all facets of the utility (generation, transmission and distribution). This fundamental requirement for additional bandwidth typically exceeds the capabilities of legacy technologies and hence dictates that these services be optically transported.

In addition to the abovementioned operational issues, owning and operating an extensive fibre optic network presents the owner with significant business opportunities. This potentially lucrative prospect stems from the fact that it is not economical to install cables with lower than a twenty-four core fibre count (more typically forty-eight). Moreover, since normally only four cores (two workers and two spares) are required to provide a fully functional telecommunications operational network (with perhaps one or two other pairs required for dedicated services); many spare cores can be made available to public operators to carry their commercial traffic.

4. HV Line Fibre Optic Technology

Wide varieties of optical fibre cables – duct and aerial - are freely available in the marketplace today. Although the laying of duct cables within power line servitudes could be considered feasible under certain circumstances (it is not generally economical and is less secure), the discussion in this document will be focussed entirely upon aerial fibre optic cable technologies, specifically those designed for deployment upon existing and new high voltage overhead power line infrastructure.

These will include the following:

- OPGW (OPTical Ground Wire)
- OPPC (OPTical Phase Conductor)
- Helically Attached (Wrapped)
- MASS (Metal-Armoured Self-Supporting)
- ADSS (All-Dielectric Self-Supporting).

Each category of cable has inherent advantages and disadvantages and hence no single type can be considered universally appropriate. However, most utilities worldwide have opted to install either OPGW or Helically Attached fibre cables on their long distance HV lines. There are many compelling reasons driving these choices, not the least of which include extended life expectancy and little or no impact upon the integrity of the electricity network. Typically, OPGW is more suited to new line construction, whereas Wrap technology offers many advantages when it comes to retrofitting an existing line with a fibre optic cable.

Installation of ADSS cables can also be considered for installation on Distribution HV lines where applicable. Typically, ADSS cables are restricted to HV lines <140 kV and since the cable is normally installed below the conductors, these are more vulnerable to theft, vandalism and environmental incidents (e.g. wild fires).

4.1 OPGW

Optical Ground Wire is a metal cable, which is used to replace the normal earth-wire on an overhead power line. It performs the electrical functions of the earth-wire and carries optical fibres within its structure. The OPGW must match as closely as possible the mechanical and electrical characteristics of the earth-wire it replaces and therefore each overhead line will normally require a slightly different design of OPGW. Characteristics such as diameter, modulus, resistivity, fault current rating and breaking load are all parameters that must be specified within an OPGW design.

New overhead lines are normally built using OPGW from the outset; however, OPGW can be installed on existing lines and this is normally done as part of scheduled re-conductoring works. It is usually un-economic to remove an existing earth-wire and replace it with OPGW simply as part of a communications network build programme. Furthermore, due to fault current sharing considerations, when one earth-wire is replaced with OPGW, the other is usually replaced with an ACSR (Aluminium Conductor Steel Reinforced) wire.

Although the fibre cores contained within the OPGW cable do not add additional load of any significance to an overhead line, the overall diameter tends to be larger than the substituted earth wire; hence, an analysis of towers structures is still required. Furthermore, OPGW can only be used on lines that were originally designed with an earth-wire.

Since OPGW is installed at the top of the pylons, it is un-obtrusive and thus the fibre cores contained within are protected from weather, theft or vandalism by the electrical conductors below.

The international standard for OPGW is IEEE1138.

4.2 Wrapped Fibre Optic Cable (Wrap)

Wrap is a small non-metallic cable, containing optical fibre cores, which is wrapped helically along the earth wire or one of the conductors of an overhead power line. It can be wrapped onto the earth-wire of any overhead line or onto the phase conductor up to 150kV operating voltage.

Wrap is an additional cable not normally included in the design of the overhead line and therefore it does add a loading. However, this is small when compared to ADSS or MASS cables (approximately 10%). Wrapped cables do not suffer from electric field effects such as dry-band arcing in polluted conditions (unlike ADSS) and is intrinsically safe (unlike MASS).

Wrap is unobtrusive and is installed on the earth-wire at the top of the pylons or on the phase conductor – either way it is protected from theft or vandalism by the energised conductors of the power line.

The international standard for Wrap is IEEE 1594. Wrap is known as OPAC – **O**ptical **A**ttached **C**able.

4.3 ADSS Fibre Optic Cable

ADSS (All Dielectric Self Supporting) fibre optic cables are, as the name implies, metal free Kevlar strengthened cables designed to be attached to existing structures such as HV line pylons. The cables are available in both short span and long span versions and represent an extremely economical and rapid means to retrofit existing lines with fibre optic cables. Unfortunately, primarily due to the dry band arcing phenomena, these cables are only suitable for fitment to 132 kV and below lines.

Hence, while normally not appropriate for long distance transmission, ADSS technology is ideally suited to the distribution network. Moreover, due to the inherent lightweight and resultant low loading, the cables can be installed upon almost any structure without the need to add strengthening members. However, it must be taken into account that as these cables are very often installed below the conductors, they are more vulnerable to vandalism and/or environmental damage (wild fires).

4.4 FO Technology Selection

The cost differential between OPGW and Wrap cable is unlikely to be significant and thus other considerations will probably play a larger role in determining the technology ultimately chosen for a particular line. These would include condition of existing earth wire, fault current analysis, requirement to replace companion earth wire, availability of extended line outage etc.

Both options are completely technically viable and have a life expectancy of around thirty years. However, notwithstanding the capability of the wrapped option, OPGW

will generally be the technology of choice. This is mainly attributable to the more robust nature of the cable construction. Furthermore, since the fibre cores are embedded within the earth-wire, and not externally attached, these are afforded a greater degree of protection from the elements and other potential sources of damage.

Illustrations of the fibre technologies discussed are shown in **Figure 1** below.



Figure 1: Shown Clockwise
OPGW, ADSS & Wrap
Fibre Cables

5. Fibre Optic Advantages

The advantages associated with a fibre optic transmission medium are numerous and well documented. Moreover, when installed upon HV line infrastructure an added level of security is achieved thus ultimately supporting the ability to safely visualise and operate the power grid.

Advantages include the following:

- “Unlimited” Bandwidth
- High quality transmission
- Fibre optic signal quality not affected by weather (does not fade)
- 99.999% Network Availability
- Free from regulatory issues - no spectrum licenses required (radio frequency spectrum is globally becoming an increasingly scarce resource and competition in the marketplace is continually fuelling cost escalation)
- Security - attached to HV Lines
- Longer distances between repeaters (currently up to 200 Km)
- Cost effective terminal equipment (capex and opex).

However, while these advantages are indisputable, two distinct disadvantages must be taken into account, these are: 1) higher capital expenditure that is incurred and (2) the longer lead times required to repair a fibre optic cable break and, when these are attached to power lines, fault repair may require that the line is de-energised.

While the increased capital expenditure can invariably be offset against lower operational cost, it is essential that the utility adopt measures to address maintenance and fault repair issues related to aerial fibre optic cables installed upon its HV lines. For instance, a well-designed fibre optic network, which includes sufficient in-built redundancy, will provide the resilience required to almost entirely eliminate this concern. In addition, well-defined temporary repair procedures, together with trained maintenance personnel in place at the correct locations, will most certainly prove to be valuable resources in this regard as well.

6. Fibre Optic Commercialisation Motivation

Development and progress are evident in many industries throughout the world today and similarly the utility industry is generally in a state of transformation - moving toward a more proactive and intelligent business model. Modern operational and business requirements demand a more sophisticated telecommunications network and thus dictate that the utility must invest heavily into fibre optic technology.

In addition to catering for traditional services such as SCADA, mobile data and work management systems, the modern telecommunications network must support the following:

- Smart Grid applications
- Increased utility bandwidth requirements
- Development of grid monitoring and management applications, including asset monitoring, voltage optimization and distribution automation
- Superior reliability, availability and resilience for mission critical services and
- Heightened network security.

Studies have shown that a cost effective fibre core count, for aerial fibre optic cables installed upon HV lines, is between twenty-four and forty-eight; moreover, cables containing these numbers of fibre cores are normally available as standard issue from manufacturers. It has also been shown that cables containing up to forty-eight cores have little or no impact upon the loading capacity of the line. Hence, given these considerations, many utilities have settled upon a forty-eight core count as the cable of choice and only resort to lower counts when the carrying capacity of the line can become compromised; however, this is normally only applicable to LV distribution lines.

Since utility telecommunications network and tele-protection requirements will seldom exceed eight cores, the vast majority are left completely idle - and worse still, this unhappy state of affairs is likely to endure for the lifespan of the cable. This is surely unacceptable, more especially considering the capital investment made by the utility to establish the fibre optic link in the first place.

Utility-owned power lines invariably also link all major cities and many smaller towns; hence, these servitudes are particularly attractive to commercial operators whose only other viable solution is to bury cables alongside roads linking these centres. This remains an expensive and time-consuming exercise and moreover, cables thus installed will always be more susceptible to vandalism and theft.

The unutilised cores within utility owned fibre optic cables are an extremely valuable asset and have potential to generate a significant income stream for the utility with little or no risk to normal utility operations. In addition, the enhanced security normally associated with fibre cables installed upon HV line infrastructure - above the electricity conductors - provides perfect redundancy for a commercial operator's roadside routes; hence, making these even more lucrative.

Furthermore, fibre optic cables installed upon HV line infrastructure give the utility a distinct competitive edge in this market when compared with other more traditional installations. Typically, features exclusively linked with utility owned fibre optic cables will include the following:

- Fibre Cables attached to power lines offer superior security when compared with cables buried in roadside servitudes
- Roadside routes are also costly and involve long lead times
- Fibre cables on HV lines offer exclusivity i.e. near perfect diversity for existing operator roadside routes
- "Tower to Tower" service offerings (T-Offs) can be readily provided
- Long distance power line infrastructure is extensive and includes both national and international routes
- Metro (aerial & duct) routes are in addition available
- Security - secure housing for customer repeater equipment can be provided at substations
- Uninterrupted AC mains supply to repeater equipment is almost always guaranteed
- Can offer tariffs lower than available on buried fibre routes.

7. Potential Customers

The demand for internet services continues to show unabated growth - this is especially relevant to developing countries where very often levels of penetration are, relatively speaking, extremely low. In addition, as the demand for internet services grows, commercial telecommunications operators are continually seeking new and economical means to connect more and more subscribers.

Typically, a utility can consider the following (non-exhaustive) list of entities as potential customers for its excess fibre optic capacity:

- Cellular operators
- Fixed line operators
- Internet service providers
- Banking institutions
- Commercial dark fibre providers
- Commercial broadband service providers
- Government institutions
- LECs (Local Exchange Carriers).

8. Market Entry Principles

An electricity utility, when making its excess fibre optic capacity available to the market, can add enormous value for existing commercial operators by providing a viable, cost effective and secure alternative to their normally buried fibre optic cables. Thus, in addition to serving as a vehicle for the generation of, very often, much needed additional revenue for the utility, the commercialisation of these assets can greatly facilitate the rollout of telecommunications services countrywide.

However, since this is not and never will be utility core business, the intention should not be to compete in any way with existing commercial operators. Even though it is entirely conceivable that a utility, given its telecommunications background, could offer data services, this is a complex market and is probably best left to those entities more qualified. As a supplier of reliable cost effective dark fibre, i.e. a “Carrier of Carriers”, the utility will be perceived by the market as an excellent value add option rather than a competitor, thereby improving prospective business relationships. Furthermore, by being seen as a facilitator of the extension of broadband services throughout the country, the good name of the utility can only be enhanced.

Many utilities throughout Africa have, in recent years, installed a great deal of fibre optic cables upon both new and existing infrastructure. This has naturally resulted in a large volume of excess fibre capacity, which has hereto laid fallow due primarily to regulatory restrictions and/or management reluctance to entertain non-core business ventures. As most environments are becoming more de-regulated, only the lack of experience and perhaps start-up capital is preventing utilities from entering this market.

To alleviate management concerns and inexperience, a utility could very well consider entering into a partnership agreement with an existing commercial entity. Clearly this will involve a profit sharing scheme, or commission based agreement; however, should the correct partner be selected, this arrangement can certainly prove to be mutually beneficial in the longer term.

In any event, some “start-up” capital, to establish the new business, will still be required. This can, however, be minimised by the adoption of a scalable “two phase” business

approach, which is aligned to the SLA (Service Level Agreement) entered into with prospective customers. It is suggested that these phases should incorporate, at the very least, the following aspects.

- **Phase 1:**

- only existing excess fibre cores are leased out without management and monitoring, thereby avoiding large capital expenditure required to install new cables and purchase a management system;
- install customer equipment accommodation at substations and along HV lines as required;
- establish a small dedicated/part time team to run the business and negotiate with commercial partners and potential customers alike;
- ring fence the new business to ensure that revenue collected can be allocated to the expansion of the utility's fibre optic network.

- **Phase 2:**

- purchase and install a fibre management and monitoring system to improve service offered and reduce repair times;
- grow the dedicated business team membership as required;
- expand the fibre optic network and close gaps to grow the business and at the same time enhance the utility's operational private network.

The leasing of dark fibre cores certainly represents the most economical and straightforward means for any utility to enter the commercial telecommunications market and is hence the focus of this document. However, as previously mentioned, a utility operating WDM (Wavelength Division Multiplex) capable transmission systems could also consider entering the bandwidth market by offering wavelengths and/or multiples of 64 Kbit/s circuits. This would appeal to many smaller operators, but experience has shown that, although potentially lucrative, this is a fickle market requiring significant customer interaction and expertise not normally present within a public utility and is hence probably best left to existing market players and potential business partners.

9. Revenue Utilisation

The commercialisation of its fibre optic asset, provided that this is correctly managed, can most certainly result in a substantial additional revenue stream for the utility. Moreover, the question of how these monies are to be allocated needs to be addressed very early within the process of establishing the new business.

Doubtless, many urgent requirements for funding will be prevalent throughout the utility and consequently this will give rise to fierce competition for access to these funds. However, it would certainly be prudent to consider the allocation of the revenue received from the leasing of fibre cores very carefully.

One conceivable, and very plausible choice, would be to allocate these funds to the further expansion and development of the utility's fibre optic network. The benefits of this option would be threefold: 1) increase the reach of the fibre optic network thus growing the customer base and creating opportunities to generate even more revenue from commercial operators; 2) the operational telecommunications network will be improved, thereby improving the utility's ability to monitor and control the power network as well as enhancing internal data services; and 3) additional fibre optic cables will facilitate extension of service to the more remote regions thereby facilitating much needed development and growth.

The creation of a new business unit, with or without an external commercial business partner, or at the very least, ring fencing the new business within the utilities telecommunications department, will most certainly facilitate the separation of this new unregulated revenue from the everyday regulated income and also ensure that it is appropriately spent.

10. Pricing Structures

Utilities seeking to capitalise spare assets, and at the same time receive maximum benefit from this initiative, will be well advised to embrace more than one pricing structure. This will certainly facilitate the accommodation of the many varying potential customer size and requirements that will invariably be encountered when entering the market place. Even though a particular pricing structure may be favoured, the resultant flexibility that will result from adopting more than one structure will help to generate a larger customer base and consequently an improved revenue stream.

A number of distinct pricing structures are prevalent in the dark fibre market place of today. Each of these has inherent characteristics, which are applicable to different market segments; however, three of the most popular structures, typically selected by utilities worldwide, are as follows:

- Cost Recovery
- IRU (Indefeasible Right of Use) and
- Lease

Certain variations within these options can also be implemented

10.1 Cost Recovery

This option considers only the incremental cost incurred by the utility for the installation of fibre optic cables upon its power lines, but can also include the resultant maintenance costs that will follow. Since this philosophy makes no provision for profit when tariffs are determined, it results in the lowest possible pricing scenario.

Since this option will not serve to generate any meaningful income for the utility and can introduce uncompetitive behaviour into the market, it is normally only implemented when forced by legal or regulatory stipulations. To further exacerbate matters, the tariff ultimately applied will probably be dictated, or at the very least heavily influenced, by the regulator and is therefore unlikely serving the interests of the utility.

Hence, considering the many negative aspects associated with a cost recovery model and the fact that little benefit will be derived; this option should be strongly resisted and discouraged, particularly if other more lucrative options can be implemented.

10.2 IRU (Indefeasible Right of Use)

In essence, the term IRU implies the exclusive, unrestricted, and indefeasible right of use of an asset. This constitutes a permanent contractual agreement, between the utility (as the owner of the fibre cable) and the customer (commercial operator), that cannot be undone. The word "indefeasible" means not capable of being annulled, voided, or undone. Thus, in the context of this document, the customer will purchase the exclusive, unrestricted, and indefeasible right to use one or more fibre cores within a fibre cable owned by the utility for any legal purpose, for a specified number of years.

The IRU contract will also generally define detailed technical and performance specifications for the fibres involved. These should specify fibre acceptance and testing procedures, a description of the physical route, operating and performance specifications such as attenuation, Chromatic Dispersion, Polarisation Mode Dispersion and Optical Return Loss. Maintenance and restoration terms are also normally included and all specifications, terms and conditions are valid for the full duration of the IRU contract.

Internationally this would appear to be the favoured option by both utilities and commercial telecommunications operators alike. For a utility, more especially one starting an asset commercialisation business, the large upfront payment received can be used to expand the fibre network and thus benefit both the new business and improve the operational network at the same time. The customer on the other hand benefits from being guaranteed unrestricted access to the fibre cores for a substantial period of time at a lower cost.

The periods of these contracts are normally very long – typically in the order of ten, twenty, or even thirty years, which correspond to the anticipated lifetime of the fibre cable. The long contract periods suit the larger and more permanent operators as not only does this provide network stability and fixed pricing over the term, but is also attractive from tax and accounting viewpoints as the fibre cores thus purchased can be considered a physical asset, which in turn can be resold, traded or used as collateral. In addition, it is often an easier process to obtain financial approval for a once off capital investment, especially considering the substantial savings that are achieved by avoiding installation of the required fibre cable, than it would be for more expensive, escalating operational expenditure over the long term.

Maintenance and co-location charges do not form part of the IRU and are normally negotiated separately as short term contracts paid on a monthly or annual basis. These separate contracts must permit escalation to make allowance for rising labour costs due to inflation etc. The charges applied are usually relatively low and are a function of the fibre route kilometres irrespective of the number of cores involved.

In addition to the substantial injection of capital enjoyed by the utility in this option, the risk of non-payment in the future is completely evaded and administration costs are reduced since the customer is locked in for a longer period. Thus the guaranteed payment for the entire term of the contract, in conjunction with the huge upfront capital payment, far outweighs the only significant disadvantage which is the lower (than a standard lease option) tariff normally applicable to these contracts.

Hence, the positive characteristics of an IRU contract unequivocally enhance the business case for the utility and consequently facilitate financial approval for the commercialisation initiative. The immediate upfront payment provides for much needed capital in the short term; this can ensure funding for fibre cable installations and provide start-up capital required to establish accommodation facilities for customer owned terminal and repeater equipment housing. Thus, this option can surely be thought of as the mainstay of any asset commercialisation business proposal considered by a utility.

Illustrative IRU parameters are shown in **Table 1** below.

Base Price Calculation	Example 1	Example 2
Mark-up	25%	15%
Cable Installation Cost	\$ 32	\$ 30
Return on investment/pair	10.42%	9.58%
Contribution/pair/1,000Km	\$ 6 600 000	\$ 8 600 000
Contract Parameters		
Right of Use Period	10 Years	15 Years
Maintenance Charge/metre/pair/month (separate contract)	\$0,02	\$ 0,013
MTTR	8 Hours	6 hours
CPA / Year (Maintenance Charge)	CPI + 3%	CPI

Table 1 Illustrative IRU Parameters

10.3 Lease

As is the case with any standard leasing or rental agreement for products and/or services, this option requires that the customer pay an agreed monthly or annual fee for the unrestricted use of a selected number of fibre cores for a period of time. To ensure a viable income stream the tariff applied by the utility will usually be calculated beginning with the installed cost of the fibre optic cable and then applying a suitable mark-up. Other parameters that will influence the calculation include the payback period required, prevailing interest rates and the contract period agreed with the customer.

A recurring income stream and generally higher tariffing over the term of the lease are the primary benefits of the lease option; however, since the highly desirable large

upfront payment is not a component, cost recovery and/or funding for network expansion can be curtailed. Despite this limitation, it is nonetheless still recommended that this model be included to cater for certain specific customers. These will more likely be the smaller operators who may struggle to raise the funding required by an IRU model.

Depending upon prevailing circumstances, two variations within this model can also be considered. These are 1) a fixed cost per pair lease wherein an equal pricing per pair is applied irrespective of the number of pairs leased and 2) a declining scale lease whereby a higher tariff is applied to the first pair leased and thereafter subsequent pairs are leased at a lower tariff; furthermore, this can be expanded to include a declining distance based tariff.

Illustrative Lease parameters are shown in **Table 2** below.

Base Price Calculation	Example 1	Example 2
Payback Period	5 Years	7 Years
Cable Installation Cost	\$ 32	\$ 30
Mark-up	10%	5%
Interest	12%	10,14%
Revenue/annum/pair/1,000Km	\$ 780 000	\$ 530 000
Contract Parameters		
Contract Duration	15 Years	5 Years
Discount for 10 Year Lease Period	0%	5%
Discount for 15 Year Lease Period	5%	10%
Maintenance Charge/metre/pair/month (separate contract)	\$0,02	\$ 0,013
MTTR	8 Hours	6 hours
CPA / Year (Maintenance Charge)	CPI + 3%	CPI

Table 2 Illustrative Lease Parameters

The decision regarding the most appropriate option will be influenced by a number of business and operational factors present within both the utility and commercial environment. Typically, these will include the following:

- The number and mix of potential customers
- The number of fibre pairs available for commercialisation
- Cost recovery considerations and
- Fibre pairs on long distance routes that could potentially become stranded.

The major risk associated with the lease option will always be the inability of the customer to pay as time progresses – this is of course completely negated with an upfront payment. However, the inherent flexibility provided by this model can certainly help to grow the customer base and consequently the revenue stream and hence warrants inclusion within the service offering. Furthermore, revenues can also be substantially boosted by means of short-term leases, which are normally charged out at a much higher rate.

Hypothetical leasing tariffs that could be applicable to the South African market are shown in **Tables 3 and 4** below. Please note the tariffs shown are specific to one country and one utility only and could vary enormously in other markets (pricing is shown in ZAR).

Table 3 shows a fixed tariff philosophy wherein pricing for additional pairs is escalated by a factor of the cost of the first pair leased and the only discount applied is that which is dependent upon the period of the contract signed. Pricing for the first pair is calculated by applying the parameters (Example 1) as shown in Table 2. The principal benefit for the customer is that a single pair can be leased at a relatively low tariff, whereas the utility will benefit in cases where the number of customers exceed the available pairs.

Alternatively, Table 4 illustrates a declining scale philosophy. Although the tariff for the first pair leased is significantly higher, subsequent pairs are leased at a much lower tariff. In addition, a substantial contract period discount is applied. This option is particularly attractive when the number of available pairs exceed the number of potential customers, as this will facilitate a higher take up of pairs and thereby improve the return on investment for the utility.

(i) Table 3: Illustrative Fixed Cost Lease in South Africa

Pairs Leased	Contract Period			Tariff Escalation	
	5 Years	10 Years	15 Years	Pair Increment	% Tariff Increase
1 Pair	0,65	0,62	0,59	-	-
2 Pairs	1,30	1,24	1,17	1 to 2	100%
3 Pairs	1,95	1,86	1,76	2 to 3	50%
4 Pairs	2,60	2,47	2,34	3 to 4	33,3%
5 Pairs	3,25	3,09	2,93	4 to 5	25%

(ii) Table 4: Illustrative Declining Scale in South African Market

Pairs Leased	Once-off Charge/ Metre	Contract Period			Tariff Escalation	
		5 Years	10 Years	15 Years	Pair Increment	% Tariff Increase
1 Pair	1,00	1.90	1.20	1.00	-	-
2 Pairs	1,00	2.20	1.42	1.15	1 to 2	15.79%
3 Pairs	1,00	2.50	1.64	1.30	2 to 3	13.64%
4 Pairs	1,00	2.80	1.86	1.45	3 to 4	12.00%
5 Pairs	1,00	3.10	1.98	1.60	4 to 5	10.71%

10.4 Comparison between IRU and Lease Models

Table 5 shown below summarises the main features associated with each of the two recommended pricing options.

IRU	LEASE
Delivers a substantial and immediate cash injection	Generates a recurring revenue
Customers are locked in for longer periods	More suited to smaller operators who cannot make large upfront payments
Attractive to most larger commercial operators	Short term leases can be arranged to attract more customers
Overall income is slightly less	Net lease charges are typically higher
Internationally seems to be the preferred option (similar contracts exist worldwide)	
Desirable for private operators from a tax and accounting standpoint	
Capital injection can facilitate expansion of the utility’s operational network	

Table 5 IRU Lease Feature Comparison

10.5 Fibre Exchange

Lastly, although strictly speaking not a pricing structure, a fibre swapping/exchange arrangement between fibre owners can also be considered. Since an agreement of this nature would more likely be entered into for the mutual benefit of both entities, it will probably take place without any monies being exchanged.

In summary, it is recommended that, for the many compelling reasons already stated, an IRU option be implemented whenever feasible. However, to accommodate the many smaller prospective customers currently prevalent in the marketplace, the utility would be well advised not to disregard the lease option, but rather to include both an IRU and lease option within the basket of services ultimately offered to the market.

11. Pricing Considerations

Notwithstanding the various pricing structures that can be implemented, once a utility has made the decision to enter the market as a commercial service provider, the matter of actual pricing of services merits serious consideration. This is particularly applicable to the rental of dark fibre cores where, due to the many variables that are normally prevalent in this market, pricing can vary enormously.

Issues that must be taken into account when determining the pricing of fibres that will be offered to the market should include the following:

- Dark fibre is typically priced on a per core per metre per month basis for a fixed period of time; the length of which will influence the tariff applied
- Pricing is typically route and location specific, i.e. more densely populated regions will normally command a higher tariff
- Customer demand and cost recovery requirements will influence pricing
- Pricing per metre in metro areas will more often than not be significantly higher than what can be applied to long distance routes
- It should be made clear up front that the customer will be responsible for the connection of their network to the closest point on the utility fibre network
- Co-location, splicing, and rack space charges will be applied on top of fibre pricing
- Maintenance costs – these can be recovered by applying an annual maintenance charge, typically based upon route kilometres and
- Administrative costs will be incurred; hence, it would not be unusual for the utility to apply an up-front fee to cover these costs.

Appropriate pricing eventually determined will be, in all likelihood, a balancing act between attracting customers, realising adequate revenue to justify the effort and cost involved, while retaining sufficient fibre cores to operate the utilities private network (including those required for redundancy).

Rather than to begin with a firm price sheet it is recommended that negotiations with one or two (preferably two) potential major customers be initiated to gain an insight as to what will be considered acceptable. This approach should permit a much clearer impression of market appetite before any commitments are made, and will certainly facilitate the determination of a more feasible tariffing structure.

Although it might be considered accommodating by the utility to enter negotiations with a lower price in mind, this is not recommended. It should be borne in mind that any potential dark fibre customer is saving an enormous amount of money by avoiding the need to install an underground cable – typically in the order of \$ 50, 000 per kilometre. Hence, it is infinitely preferable to begin negotiations with a price somewhat on the high side and then negotiate down if necessary.

Another consideration that should be taken into account when negotiating pricing is the possibility that fibres in some segments may become stranded and thus rendered useless in terms of revenue generation. To circumvent this seriously undesirable occurrence, potential customers should be encouraged to rent the entire route (or ring) as opposed to short sections. This can be realised by perhaps introducing a more favourable per kilometre tariff, which will be applicable over longer distances.

12. HV Infrastructure Risks

The integrity of the electricity grid remains a huge concern for electricity utility management teams, and quite rightly so. This is of course the primary business and the very reason for the utility’s existence; thus, any initiative that has potential to compromise the delivery of electricity to the end customer must be carefully evaluated.

Management approval is undoubtedly a key aspect and of necessity requires a careful and thorough approach given that the proposal is not always clearly understood. Thus, no matter how lucrative the commercialisation of fibre assets can be for the organisation, it is imperative that sufficient steps are taken to assure management that the primary business will be safeguarded at all times.

The first, and arguably the most important consideration, will be the physical separation of the utility operational network and those of the commercial operators. Plainly, this is not achievable within the cable since the fibre cores are contained within a common sheath; but since this portion of the network is largely passive, little chance of interaction exists.

The points where cables terminate – typically at substations and repeater sites -- will be of major concern. Terminal and repeater equipment is required at these points and this of course necessitates access for maintenance staff thereby introducing a scenario wherein detrimental interaction between networks becomes a real possibility.

12.1 Substation Termination

This potentially disastrous situation can however be entirely negated by the adoption of the physical arrangement as shown in **Figure 2** below.

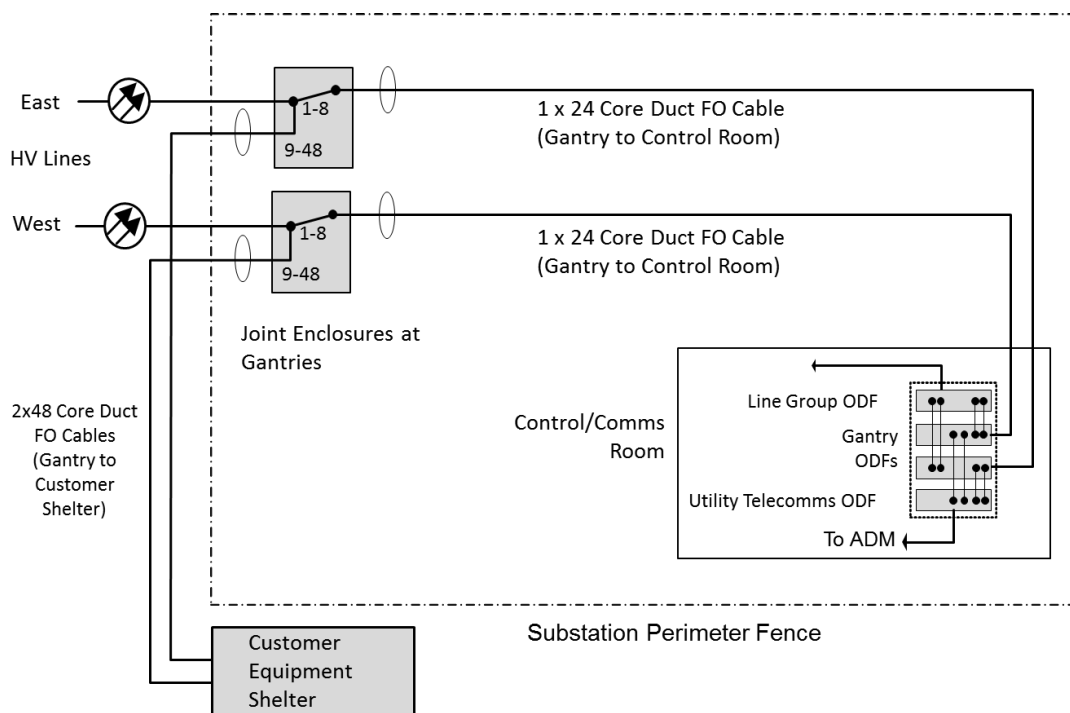


Figure 2: Substation Arrangement to Ensure Network Separation

Physical separation is thus ensured by splitting the cable at the substation gantry (dome joint at repeater sites) and housing terminal and repeater equipment separately. In addition, to ensure that third party maintenance personnel do not require access within a substation, the equipment container housing commercial operator equipment should be established outside the substation perimeter fence. Although, from a security perspective, it may be desirable to locate this container adjacent to the perimeter fence.

12.2 Repeater Sites

In order to be in a position to offer viable long distance routes to customers the utility will need to make provision for the housing of customer owned repeater equipment as well as access to the fibre cable at certain points along the line. Fortunately, as terminal equipment has evolved, the minimum distance between repeaters, required to maintain a successful link budget, has dramatically increased in recent times. This of course reduces cost required to establish repeater sites and, in addition, improves the security of the overall installation.

Unfortunately, to accommodate older and often more standard transmission equipment, it may still be required to establish repeaters at shorter distances – typically 80 to 100 km. However, as the utility network will typically also require repeaters at similar points, these will already exist or at least be planned.

To reduce cost and enhance security, it would be advisable to co-locate customer and operational repeater equipment accommodation. Network separation can again be ensured by adopting a similar philosophy as applied at substations i.e. by housing the equipment in separate containers and splitting the fibre cores at the dome joint on either side. Security for both containers can be improved by locating both within a common perimeter security fence.

This arrangement is shown in **Figure 3** below and illustrated in **Figure 4** on the following page.

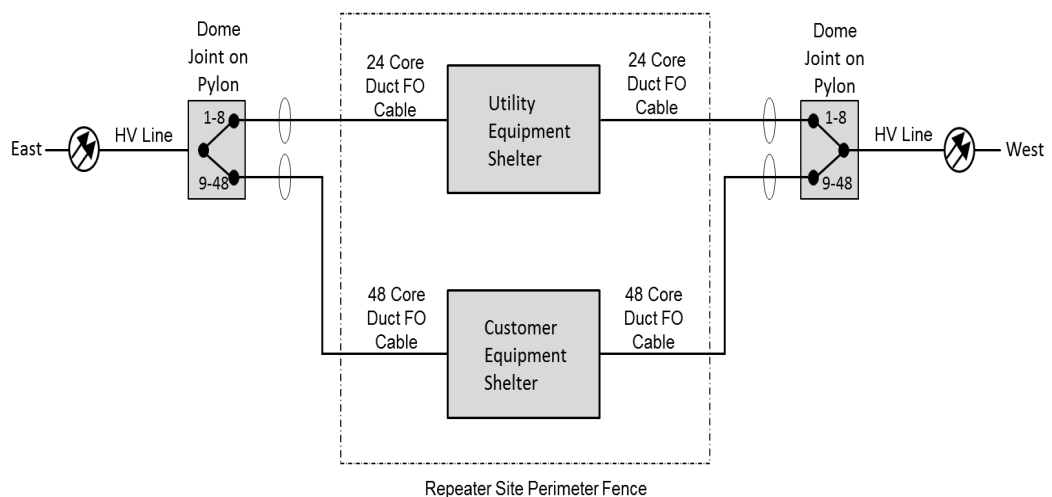


Figure 3: Repeater Site Arrangement to Ensure Network Separation

12.3 General Risks

Furthermore, the good name of the utility must be protected and this will apply equally to commercial operators' perceptions and that of their customers. This typically relates to the availability of the fibre network carried on the utility's HV lines, which can be severely impacted by a mid-span break. Since it is unlikely that a redundant route will be immediately available to commercial users and the often very long time taken to secure a line outage (required to affect a permanent repair), cannot be tolerated, it is essential that temporary repair mechanisms are in place. These will ensure that the fibre up time is kept to a maximum with little or no impact upon the integrity of the power network.

Moreover, the risk of insufficient fibre pairs, due to the occurrence of a major incident, can be mitigated by bilateral agreement with third party operators for access to unused pairs. This aspect should be included within the SLA (Service Level Agreement) instituted between the utility and commercial operator. An SLA, which should be constituted as an unequivocal document covering all aspects relating to services provided, remains the cornerstone of any commercial arrangement and hence, in essence, must ensure the protection of both utility and commercial operator interests.

Another facet that will require consideration is the management of utility owned fibre optic cables. Fortunately, most utilities have well established telecommunications departments in place and these are normally comprised of well-trained and competent personnel who fully understand the requirements of both the operational and commercial networks. Thus, it is recommended that the utility telecommunications division be tasked with all aspects relating to the control, planning, management and maintenance of utility owned fibre optic cables.

Finally, in addition to the abovementioned, it also is highly recommended that a full risk analysis be undertaken beforehand to ensure that all possible risks of compromise are clearly identified, understood and mitigation procedures well defined and documented.



Figure 4:
 Typical Dual Container
 Repeater Site Located
 Beneath an HV Line
 (Image courtesy of
 Eskom & Broadband
 Infraco
 in South Africa)

13. Business Model

Although definitive pricing for dark fibre cores will ultimately be determined by what the market is prepared to pay, it is nonetheless important for the utility to fully understand the costs involved. Perhaps this is not that noteworthy when spare cores, within existing fibre cables, are leased as these have typically been installed to support the power network and any additional revenue generated by commercialisation of the asset simply becomes a bonus for the utility. Even in cases where new lines, equipped with OPGW, are to be constructed, the relatively small incremental cost due to the fibre cable can normally be justified by improvements to the utility telecommunications and power networks that will inevitably result.

However, in cases where new fibre cables are to be retrofitted onto existing HV lines to support and grow the commercialisation business, this topic will certainly become pertinent. Although the work will most likely be carried out by a contractor, via an open tender process, and cable pricing is relatively stable, the derivation of final pricing must take into account the many other variables that will have a bearing. These will include installation costs, overheads, prevailing financial parameters, prevailing market tariffs and ultimately the number of potential customers that can be attracted.

Irrespective of the nature of the fibre optic installation, costs will be incurred to provide accommodation facilities to house customer equipment at both substation and repeater sites. In addition, even though these costs can be recovered via rack space charges applied in addition to the dark fibre rental, these need to be included as capital will be required for their establishment.

Avoided costs, as a result of the new fibre cable, should also be factored into the calculation. These will typically involve paying telecommunications service providers to carry the utility's voice and data services, or alternatively the capital expenditure that will be required to establish other means of communications such as microwave systems, copper cables etc.

Overhead costs and typical values are shown in **Table 6** below.

Overhead	Value
Project Management	12,00%
PMO	2,00%
Planning & Design	3,00%
SHEQ	2,00%
Transport	1,00%
Accommodation	1,00%
HV Line Survey	3,00%

Table 6: Overhead Costs

In addition, it will be necessary to take into account the prevailing financial parameters. Those typically applicable will include the following:

- WACC (Weighted Average Cost of Capital)
- Project Risk Allowance on Capex
- Inflation and
- NPV (Net Present Value).

Benchmark pricing is also an important consideration as many ICT service providers operate across borders. **Table 7** below illustrates dark fibre pricing available from some preeminent operators on the African continent.

Country	Supplier Type	Infrastructure Type	USD Pricing (/pair/km/month)
Kenya	Electricity Company	Overhead Dark Fibre	40
Kenya	Government Network	Underground Dark Fibre	50
Kenya	Private Provider	Underground Dark Fibre	60
Uganda	Electricity Network	Overhead Dark Fibre	100
Uganda	Electricity Network	Overhead Dark Fibre	100
Uganda	Government Network	Underground Dark Fibre	90
South Africa	Private Provider	Underground Dark Fibre – Rural	100
South Africa	Private Provider	Underground Dark Fibre – Metro	400

Table 7: Benchmark Pricing

In conclusion, the development of an accurate business model is a crucial component and hence deserves serious consideration. A precise assessment of potential ROI (Return on Investment) will most definitely enhance the business for any new fibre cable installation proposal and thus can facilitate approval and subsequent allocation of very often scarce funding.

14. Case Studies – African Utilities

A number of the predominant electricity utilities on the African continent are already leasing their excess fibre optic capacity to commercial operators with many others currently in various stages of embarking upon similar business ventures – these vary from initial planning, to issuing tenders for prospective business partners, to setting up the necessary business structures within the utility. Some of the more well-known examples are discussed below.

In Kenya, **KETRACO** (the Kenya Electricity Transmission Company limited) has been granted a Network Facility Provider Tier 2 (NFPT2) license by the Communication Authority of Kenya (CA) to enable the lease of excess fibre to licensed Application and Content Service Providers in Kenya.

KETRACO will eventually have over 4000 kilometres of optical fibre criss-crossing the country, spanning from Mombasa (submarine cables) across to the borders of Ethiopia, Uganda and Tanzania. This will play a huge role in boosting internet usage in Kenya and inter-linking the African continent with unlimited high-speed broadband.

ZESCO (the Zambia Electricity Supply Corporation) began leasing fibre cores when the first phase of its fibre optic project was completed in 2008. This project, named FibreCom Broadband, has covered some 1,700 km and connected most major centres and border areas.

Several service providers including MTN (Mobile Telephone Networks) - the preeminent cellular operator in Zambia; Zamtel (Zambia Telecommunications Company) - the fixed line service provider; the Zambia Revenue Authority and the Communications Authority of Zambia, are already using the ZESCO fibre optic network.

International connection has already been implemented to Namibia and Zimbabwe while links to Botswana and the Democratic Republic of Congo are also planned.

Nampower (The Namibian Power Corporation) is planning to lease spare fibre cores on its transmission lines to an ICT (Information and Communication Technology) (ICT) licensee that will operate the fibre on a commercial basis. The utility has already issued a tender for the appointment of a Namibian ICT service provider, or consortium, to manage and operate its dark fibre. Moreover, NamPower has stated in the tender document that foreign entities, forming a joint venture with a Namibian company, could also respond.

BPC (Botswana Power Corporation) has recently embarked upon an extensive power network expansion programme expansion with all new lines to be equipped with OPGW. Furthermore, a business partner, approved by the BPC board in January of this year, has been identified via an open tendering process. This entity will be responsible for the day-to-day running of the planned fibre optic commercialisation business while BPC will receive a share of the revenue received. BPC is currently waiting for permission from the relevant Ministry to grant permission for the forming of the proposed business venture.

BPC has also recently installed OPGW to the borders with Zimbabwe and South Africa; however, the utilities in these countries are yet to finish their respective installations to complete the international connections.

PowerTel Communications, a subsidiary of **ZESA** (Zimbabwe Electricity Supply Authority) Holdings, is a Public Data Network Operator fully licensed by the Postal and Telecommunications Regulatory Authority of Zimbabwe (POTRAZ) to provide data communications services.

Currently, PowerTel, as a state-owned Internet Access Provider, supplies data services carried on ZESA's powerlines between Harare, Bulawayo and Plumtree; more recently OPGW has been also been installed upon the power line between Harare and Kariba.

ESCOM (the Electricity Supply Corporation of Malawi) has been awarded Carrier of Carriers licence and has installed fibre optic cables on its lines between Blantyre and Lilongwe while another cable is connected to Mozambique and terminated in Maputo. In 2011, MTL (Malawi Telecommunications Limited) set up a leasing arrangement with

ESCOM and now leases capacity from ESCOM to circumvent outages caused by regular vandalism of its underground cables.

In 2007, **TANESCO** (Tanzania Electric Supply Company Limited) deployed a fibre optic network serving ten regions of Tanzania covering 2,050 km i.e. Phase 1 of a broader plan to roll out a fibre network. Financing for Phase 1 was secured through a development loan as well as a grant provided by the Government of Tanzania.

Phase 2 is planned for and in summary involves extending the network to the North West of Tanzania allowing for the opportunity for international fibre connectivity to the neighbouring countries. The total fibre route length for Phase 2 will be around 1,500 km. TANESCO is in the process of securing financing for implementing Phase 2.

The terms of the loan secured for Phase 1 stipulate that TANESCO is required to commercialize the surplus capacity. In 2013, TANESCO issued a tender for expression of interest to operate and manage the fibre optic business through a management contract arrangement.

LEC (Lesotho Electricity Corporation) registered a subsidiary communications company in April 2015 with a mandate to manage the LEC's fibre optic infrastructure on a commercial basis. The subsidiary obtained a communications licence in June 2015 to lease fibre cores and capacity and began operating in October 2015. To reduce risk and avoid the requirement for upfront loan capital to fund new fibre expansions, the initial business model involves the commercialisation of existing fibre cores and subsequent reinvestment of realised revenue to expand the existing fibre optic network.

The LEC subsidiary has, to date, concluded indefeasible right of use and lease contracts with two large telecommunications operators in Lesotho. These contracts include the leasing of existing fibre cores as well as the attachment of third party owned fibre optic cables to LEC's distribution poles. In addition, a number of internet service providers have expressed an interest in bandwidth and negotiations in this regard are currently taking place.

Eskom South Africa arguably owns and operates the most extensive HV line based fibre optic network on the continent. The network, comprised of OPGW (new and old), ADSS and AD-Lash, carries the utility's private telecommunications backbone network and extends to the length and breadth of the country. In addition, many new lines, all equipped with OPGW, are either under construction or in an advanced planning phase.

Despite the eminent suitability of this fibre network to commercialisation, Eskom has not, at the time of writing, taken a firm decision in this regard. Currently, only Broadband Infracore (a state owned enterprise providing broadband services) owns fibre optic cables (mostly obsolete AD-Lash) installed upon Eskom's HV line infrastructure and operates a high capacity national transmission network using these fibre cables.

15. Infrastructure Sharing

While the discussion in this document has been almost entirely devoted to commercialisation of a utility's spare fibre optic cores, other forms of commercialisation of assets in the form of infrastructure sharing should also be considered. This can be termed

passive infrastructure sharing as opposed to active sharing in the form of fibre optic cable sharing and normally will involve servitudes, poles, radio masts etc. owned by electricity, water, gas, oil and railway utilities.

Public utilities throughout the continent have typically been in operation for many years and during this time have installed considerable infrastructure; this includes HV lines, railway lines, water, gas and oil pipelines and sewer systems. In addition, many utilities have also developed extensive private telecommunications networks to support their core operations. These are mostly microwave radio based and hence the established high sites and masts are particularly attractive to cellular operators who view these as an economical means to expand coverage. Sharing of high site infrastructure can extend from straightforward site sharing, whereby the commercial operator will simply rent space on the site and install their own mast and container, to renting space on the utility's mast for installation of dedicated antennae and feeder cables. This second option will of course be dependent upon the loading capacity of the mast and availability of space at the desired antenna orientations. However, either way, it is recommended that the commercial operator install and maintain their own separate equipment container.

HV lines, railway lines, water, gas and oil pipeline servitudes are valuable assets and these, depending upon local regulatory stipulations and legislation, can be leased to commercial operators to expand their fibre optic networks. Commercial operators can thus avoid the very often time consuming and expensive process normally applicable to servitude acquisition and, since the utility servitudes can normally readily accommodate additional cables without unduly impacting the utility infrastructure (provided stipulated precautions are observed), this represents a beneficial option for utilities and operators alike. Moreover, these servitudes, for obvious reasons, invariably link populated centres thereby making them ideally suitable for cellular, bandwidth and even dark fibre service providers.

Electricity utilities can also consider an option whereby commercial operators will be permitted to install fibre cables upon the utility's HV line infrastructure. This will typically be applicable to distribution lines rural areas where, due to reduced operational requirements and lack of commercial customers, it will not be economical for the utility retrofit lines with fibre cables. The commercial operator can benefit from the available servitude and relatively inexpensive installation, whereas the utility will receive an attachment fee and can also negotiate for free access to a number of fibre cores. Similarly, railway operators can offer a, sometimes even more cost effective, attachment option on railway lines where these are electrified.

Civil costs can constitute up to 80% of the cost to establish a new broadband service business. This can very often prove to be the "show stopper" for many would be start-ups and hence, the reduction of this cost can help to proliferate new ICT (Information Communication Technology) businesses, increase competition and thereby improve penetration of high-speed internet services by reducing cost of service to the end customer. A prime example of this would be the installation of fibre optic cables in city centres where, not only the expense involved, but disruptive nature of digging up roads to install cables, can be prohibitive for prospective new operators. Established sewer systems and other pipe and chamber systems owned by utilities can often readily accommodate

fibre cables and, in addition to providing a recurring revenue stream for the utility, offer commercial operators a cost effective means to link customers in city centres without undue disruptions to everyday life.

Electricity pylons are not only suitable for the attachment of fibre optic cables. These can also normally safely accommodate microwave radio antennas and thereby provide a cost effective means to extend broadband services, from the fibre cable attached to the line, to nearby smaller settlements and towns. The avoidance of the need to construct and maintain a radio mast alongside the power line represents a significant saving for the telecommunications operator and will attract an additional attachment fee for the electricity utility.

Images illustrating examples of infrastructure sharing are shown in **Figure 5** below.



Figure 5: Images showing ICT Attachments to Utility Infrastructure

Although passive infrastructure sharing may not be as lucrative for the utility as active fibre sharing, it nonetheless offers many benefits for both utilities and the economy in emerging markets. These include enormous savings accrued due to the reduction in duplication of infrastructure and consequently facilitate the expansion of cellular and broadband services

countrywide – particularly in underserved regions. Governments can also support this philosophy by developing network infrastructure in such a way to facilitate future infrastructure sharing, e.g. by providing fibre ducts alongside new road and rail projects. Furthermore, simplified bureaucracy and the easing of regulatory stipulations will also greatly enable the sharing of infrastructure.

In addition to the commercialisation of fibre optic assets, other forms of active sharing can also be considered: these will typically include radio frequency spectrum sharing (where the utility is not using its allocated frequencies), selling of bandwidth and/or WDM wavelengths as well as other forms of electronic infrastructure sharing e.g. routers, base stations etc.

16. Regulatory Environment

Last but not least, the prevailing regulatory environment in the country is a serious issue with potential to stifle any commercialisation initiative proposed by a public utility. Thus, before any business proposals can be implemented, it is important to fully understand the conditions and restrictions that will be imposed by the country's regulatory authority. After all, compliance with the country's rules and regulations is absolutely paramount and these most certainly cannot be flouted under any circumstances. Moreover, contrary to sometimes populous opinion, the country's legally instituted regulator can greatly facilitate entry into the market provided of course the correct official channels of communication are observed.

As an example, in the Republic of South Africa, the official regulator ICASA (Independent Communications authority of South Africa) has recommended that an IECNS (Individual Electronic Communications Network Service) licence be sought, as this will facilitate business aspirations without negatively impacting licence conditions applicable to existing operational networks.

Currently the PECN (Private Electronics Communication Network) licence applicable to utilities like Eskom entitles the utility to operate their private networks for utility operational and business telecommunications traffic. Although a provision, regarding the resale or leasing of spare capacity to a third party, is made the regulation states that a cost-recovery-pricing model (to be prescribed by the Authority) is to be applied. This, from a business perspective, is clearly a highly undesirable predicament that can only result in greatly reduced income; further exacerbated by bureaucratic delays and will give rise to the distinct possibility that anti-competitive proceedings are instigated.

Thus an IECNS licence (or the equivalent in any particular country) will ensure that spare capacity can be leased at market related prices to any licenced commercial operator and sidesteps being forced to implement some sort of rather vague (authority imposed) cost recovery based tariff. Furthermore, this licence normally entitles an operator access to way leaves without restriction or objection by landowners.

17. Conclusion

While broadband services may not be the panacea for all economic woes currently afflicting the African continent, these remain a powerful catalyst for sustainable economic growth by improving economic productivity and trade flows, and facilitate communication and the exchange of ideas. Furthermore, improved internet penetration serves to be a significant contributor toward economic recovery and consequent general enhancement of the well-being of the populace on many fronts.

Increasing broadband access by 10%, for example, has been found to increase a country's GDP by 1.4%, and one percentage point increase in the number of Internet users correlates with an increase in exports of 4.3 percentage points. Moreover, the availability of high-speed, reliable and reasonably priced broadband Internet is one of the key determinants in foreign direct investment decisions.

Much of the slow growth of broadband services in developing countries can be attributed to the lack of infrastructure, which remains extremely costly to install and hence serves as a major impediment to would be ICT entrepreneurs. Underutilised utility owned assets are arguably the solution to this rather depressing and unfortunately prevalent dilemma on the African continent. And since these are normally somewhat ubiquitous, even in relatively undeveloped areas, it makes absolutely no sense whatsoever not to leverage every possible advantage that can be extracted from these (usually already paid for) assets to improve the lives of all concerned.

Furthermore, the additional revenue earned by utilities, through the commercialisation of assets, will most definitely facilitate the development and expansion of much needed basic services, such as electricity, clean running water and sanitation, into rural and other currently under-serviced regions. In addition, these, in their own right, constitute an indispensable component for economic development and, in addition, bring improvement in education facilities, policing and access to medical facilities in general.

18. Appendices

1) About the Author

Alan Driver has altogether thirty-four years of experience in the telecommunications industry. Twenty-nine of these were spent working for Eskom South Africa in that organisation's telecommunications division, specialising in the planning and design of optical and microwave radio transmission networks. In addition to working in South Africa, he gained experience in both the utility and commercial telecommunications environments by working in other countries on the African continent as well and represented Eskom as a member of the Telecommunications Work Group of the Southern African Power Pool for a period of four years. Alan Driver retired from Eskom in 2015 and currently operates as a consultant for AED Telecommunications Consulting and can be contacted at alan.driver@telkomsa.net .

2) About the AUTC

The Utilities Technology Council (UTC) is a global trade association with more than 400 utility members; dedicated to creating a favourable business, regulatory, and technological environment for companies that own, manage, or provide critical telecommunications systems in support of their core business. UTC has evolved into a dynamic organization that represents electric, gas and water utilities, natural gas pipelines, critical infrastructure companies and other industry stakeholders. Africa UTC is in existence since 1 December 2016 with its head office in Sandton, South Africa. The Mission of AUTC is to shape the future of utility mission critical technologies by driving innovation, fostering collaboration and influencing public policy for African utilities. Any enquiries with respect to membership can be send to corrie.vermeulen@utc.org or visit their website at <http://utc.org/africa/publications/>

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