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GLOBAL CONNECTIVITY FOR AFRICA

Issues and Options

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Key issues for decision makers

Executive summary

This paper poses and answers the key questions that policy makers in Africa face in relation to cable and satellite projects offering global connectivity.

What decisions must be taken about proposals for cable and satellite systems for Africa?

The promoters of cable and satellite systems primarily want licences and other regulatory permissions. Some, such as the satellite mobile systems (GMPCS), want licences of a new type that may well not fit with existing licensing regimes. Some promoters are looking for investors, but decisions to invest expected to be made by operators and others on commercial grounds.

What developmental benefits can be expected?

The new international telecommunications infrastructure offers greatly improved access to information of all kinds, lower costs of provision of international services and, by creating global coverage, better access to existing national networks. Taking advantage of these benefits will require that restrictions on international access are reviewed, prices of international services are reduced and operating standards of domestic networks are raised.

Which projects are likely to succeed?

It is too soon for experts to say, and it is unwise for Governments to back particular schemes. The number and variety of schemes on offer makes evaluation difficult and a task best left to investors and operators. Regulatory authorities should ensure that appropriate rules are set and permissions sought by promoters are not delayed unreasonably.

Which countries are likely to become regional hubs?

The largest markets in Africa, such as Egypt, Nigeria and South Africa, are likely to become the base for regional service providers for satellite systems. Regional hubs will develop because the volumes of traffic expected on GMPCS are too small for it to be economic to have a service provider in each country.

Should GMPCS systems be allowed to by-pass national networks?

The use of regional service providers also means that it is possible for international calls made via satellite to by-pass the public network in countries without a GMPCS earth station. A prohibition on by-pass by GMPCS is not practical since the systems do not know exactly where each call is being made from. It is not necessary because GMPCS services are being priced at a premium and so are not competing with national operators.

What role is left for regional co-operation in telecommunications at the political level?

Regional co-operation is desirable to ensure best use is made of both cable and satellite projects. But this co-operation can usually happen among operators and other commercial interests. A political framework for regional co-operation is not needed to ensure that the new international infrastructure is built. National regulatory authorities can ensure an appropriate set of rules governs access to and use of the infrastructure in each country, and can co-ordinate their activities to ensure a consistent approach throughout Africa.

Can the new satellite projects achieve universal service in practice?

Global coverage is not the same as universal service. Potential users must also be able to afford to use the service on offer. Calls over GMPCS networks will be charged at a premium to terrestrial cellular services, which are themselves usually regarded by regulatory authorities in Africa as a premium service. Spare capacity on satellite networks is likely to be available for use by fixed operators to extend their coverage in remote areas, but a similar pricing issue arises. Regulatory authorities need to examine whether the gain in service provision is worth the subsidy that will probably be required.

Will the price of international telephone calls fall faster?

The vast increase in transmission capacity in prospect will mean that costs of connecting international calls will

fall further. But these costs are already well below the prices charged for international calls in most African countries. For prices to fall, a change of view on cross-subsidy and on competition in domestic markets is required.

How will the new global networks affect liberalisation of domestic markets?

To allow the GMPCS services to operate, regulatory authorities may need to redefine the scope of existing international and domestic monopolies. But authorising the new cable and satellite projects will not directly encourage liberalisation. Because most of the providers of new telecommunication infrastructure wish to deal with the market leaders, and not to compete with them, their arrival may effectively reinforce existing monopolies. Regulatory authorities should consider the need for rules to ensure non-discriminatory access to international transmission facilities.

How much should Governments charge for licensing new infrastructure?

The promoters of the new cable and satellite projects are not going to generate substantial payments for licences. For example, the GMPCS networks expect to secure only a small market share in each country in which they operate; also they will be using radio frequencies set aside for their use and which have few alternative uses. Regulatory authorities will be able to set conditions in licences which help ensure developmental benefits are maximised.

Global Connectivity for Africa

Key issues for decision makers

1. Introduction

The new cable and satellite projects being promoted world-wide constitute a new dimension to the restructuring of the telecommunications sector. To be able to assess their potential contribution to the sector and the implications for national development, decision makers in Governments, regulatory authorities and operating companies may have to reconsider policies and a range of strategic issues. This paper sets out in summary form the main issues raised by these projects.

2. What decisions are required of national policy makers?

The cable and satellite projects described in the briefing document offer an enormous expansion in telecommunications infrastructure. Many of the projects are limited to offering additional transmission capacity for international telecommunications - most of the cable and some of the satellite projects are in this category. Others offer the opportunity to provide new services, or existing services on a much larger scale and with much higher quality than has been hitherto possible. Several satellite projects also offer a glimpse of the promised land of universal access, though at a cost.

In relation to these infrastructure projects, the decisions being sought from national policy makers are generally of three kinds:

- to grant licences to operate a network or provide a service
- to give other regulatory permissions in the form of frequency assignments, landing rights or planning permissions; and
- to participate in projects as an investor

The need for regulatory approval provides Governments with an opportunity to consider the relative benefits of these projects. The main criterion for assessment of the projects is their potential contribution to economic development. For most projects, the question of participation as an investor is the least important for policy makers, except in the case of countries which retain a state monopoly over the provision of public telecommunication services.

Implementation of the new cable and satellite projects is likely to accelerate or give a new direction to changes already under way in the telecommunications sector. These include changes in tariffs, the private provision of services, regional co-operation in various forms and new modes of operation for international telecommunication services. As discussed below, existing policies may need to be adjusted to ensure the maximum benefits are gained from the new projects. But restructuring is not a necessary condition of securing these benefits.

3. What developmental benefits can be expected?

The cable and satellite projects being examined in this Conference will make a major contribution to the development of public telecommunication networks serving African countries. The benefits to be gained are of three main kinds:

1. Access to information

The availability and quality of access to international telecommunication services is increasingly important in development, as the handling of information becomes central to economic activity. The principal benefit is the reduction in the time required to obtain knowledge or to receive a service. For example, by using the processing power of the World Wide Web, it is possible to reduce the time to obtain specific information from weeks to minutes. The immediate effects are to reduce the cost of gaining access to information and to increase productivity in all sectors that use the new technologies. The benefits from improved access to information are spread so widely through the economy and society that it is not possible to quantify them.

In the longer term, better access to information will mean that much more can be attempted. At a time of rapid innovation in computing as well as telecommunications, it would be unwise to assume that the full potential of the new technologies is known. At present, most users access the Internet via the public telephone network; in future, it may become an effective alternative to it. Today, teleworking is an option available only to few; in future, it will be available in all parts of Africa. Whatever the future evolution of communication services, it is clear that access to greatly enhanced international transmission infrastructure will be a key underlying feature.

The infrastructure projects will improve the access to information and services available to users in African countries. The main source of improvement is the use of digital telecommunications technology. This will facilitate the handling of information of all types; it will also improve transmission quality to the point where distance is no longer a constraining factor in communication. Many of the projects will also offer much higher transmission capacities than have been hitherto available. High capacity transmission is often called "high-speed" or "high bandwidth"; whatever term is used, its availability from user to user is a necessary precondition for many advanced services.

But to secure the benefits of improved international access will require a re-appraisal of national policies. International access has traditionally been restricted, by high prices, by limited capacity, or both. The quality and reliability of transmission over domestic networks is often too poor for data communications to work efficiently. Service providers who specialise in offering access to information have been discouraged.

Tackling these fundamental deficiencies poses a multiple challenge to policy makers in African countries. Options include:

- Adopting a more commercial approach to the financing of investment in networks
- Adjusting prices for domestic services to reflect costs of provision
- Opening up the telecommunication sector to more service providers
- Improving the effectiveness of regulation

2. Improved access to national networks

While principally intended to improve access to international services, some of the satellite services are being promoted as having important developmental benefits in extending access to remote areas. They can do this as a direct consequence of their network design. Global coverage by low earth orbiting (LEO) satellites will mean that infrastructure is placed in the sky over all of Africa. While overhead, the capacity of LEO satellites can only be

used to provide services to the areas being overflown. So, for the first time, universal access to telecommunications will exist. The main issue is then economic will it be practical for users in African countries to make use of the capacity for communications to and from, and within, remote areas?

GMPCS services using LEO satellites are being promoted as providing a super premium service, that is they will offer superior coverage to that provided by existing cellular mobile services which are already priced at a premium. Inevitably, the indicative prices for such services are high. Some users, such as the emergency services and international travellers, will be willing to pay the premium. But most potential users will not be willing to pay so much for ordinary telephony. The business plans of Iridium and Globalstar assume relatively large revenues generated from a small share of the total mobile services market. Where mobile usage is low, spare capacity can be used for fixed services, for example payphones located in areas not connected by lines to the national network.

Initially, such fixed applications will also be priced at a significant premium, and so services provided in rural areas via satellite may not cover their costs. Although more expensive than existing fixed services, LEO satellites will be the least cost solution in some areas. For policy makers, therefore, the question is whether the benefit of using LEO satellites to secure universal access is worth paying for, and how much.

In most African countries, national regulatory arrangements are not yet sufficiently developed to enable such questions to be tackled systematically. It is not known how much subsidy, if any, is implicit in services currently being provided to rural and remote areas. Service obligations are not usually stated with sufficient precision to be costed, nor are specific funds set aside to promote universal service. Even though they pose no competitive threat to the incumbent national operator, independent service providers in rural areas are rarely permitted.

These issues need to be addressed if the potential of the new technologies to improve access to national networks is to be realised. In summary, the regulatory options that are open include:

- To take into account the opportunities for co-operation with GMPCS operators in fixing the service obligations for the national operator or other domestic operators;
- To authorise GMPCS operators to provide fixed services only in remote and rural areas;
- To ensure that GMPCS operators interconnect with the national operator on terms that reflect the commitment to universal service being made by both parties.

3. Lower prices for international calls

Prices for international communications are falling rapidly, but service providers in Africa have been reluctant to follow this trend. The high prices traditionally charged for international calls and circuits have been justified as generating profits that can be put to good use by the national operator in extending domestic service, or by the Government. But as the importance of access to information grows, high prices increasingly act to inhibit economic development. Lower costs of international transmission will enable prices to be reduced and for demand to be stimulated while preserving the profitability of international services. Several related issues are

involved, which are discussed in more detail in sections 8, 9, and 10 below.

4. Which projects are likely to succeed?

Developmental benefits can only be secured if the projects are implemented and are commercially successful. African operators are, of course, also interested in knowing which projects will make the best business partners. Not all the cable and satellite projects being promoted will succeed; several may not even be implemented.

As a rule, policy makers should not try to identify which of the global projects are likely to succeed or endorse particular projects in order to help them succeed. The business plans being put forward by the promoters will be subjected to detailed investigation by banks and other investors, whose collective commercial judgments will sift out those projects which can proceed. These commercial judgments may, of course, turn out to be wrong.

The primary task of policy makers is to create an environment in which sound, well-financed projects can be implemented, and are not prevented from meeting the demand for their services by unnecessary restrictions. Unlike strategic investors, the promoters of international cable and satellite projects do not generally require or expect an exclusive position in a national market.

Those projects which depend on regional co-operation if they are to be implemented may involve Governments or regulatory authorities in making business judgments. The Briefing Document identified a particular issue with some African cable projects: to achieve the scale of traffic necessary to make such schemes economic would require the co-ordinated commitment by operators in several countries of a substantial proportion of their international traffic. For operators to be willing to make such a commitment over a period of years, it would be necessary to have a stable policy environment. Privatised as well as state-owned operators will seek at least implicit approval from their regulatory authorities. RASCOM raises in the satellite field a similar issue as to whether regional co-operation is necessary to achieve certain commercial objectives that also appear to have significant developmental benefits.

Since the same commitments cannot be made to several such regional projects at the same time, decision makers will need to assess the business prospects as well as to consider the policy implications. Essentially, the business judgment required will be:

- will collective participation create the conditions for commercial success?
- is it necessary to ensure the viability of the project?
- are there similar projects on offer that do not depend on Governmental participation?
- can the project be organised in a way compatible with the national interest of each country?

It is beyond the scope of this paper to answer these questions for any particular project. But it may be noted that the sheer number of projects on offer means it is unlikely that the achievement of global connectivity for Africa will depend on regional co-operation.

5. Interconnection issues

How the new infrastructure projects will connect to existing public networks is an important practical issue. In this section, the main issues that are specific to cable and to satellite schemes are examined.

5.1 International by-pass

In most African countries, the national operator s monopoly includes the provision of international interconnection (often termed the international gateway). Control of international gateways serves to prevent high prices for international services being undermined. All international infrastructure projects could, in principle, by-pass national operators gateways and connect to public networks at local level or direct to customers. For the reasons given below, cable and GMPCS projects will not generally engage in by-pass to the detriment of incumbent operators.

But fixed satellite systems would do so if permitted. At present, the use of satellite infrastructure for the provision of international fixed voice telephony is regulated by treaties, of which the most important is that governing INTELSAT (see Briefing Document for further information). So there are no private fixed satellite systems offering public telephone services, and none of the projects reviewed in the Briefing Document depend on being allowed to do so. Private fixed satellite systems provide specialised services (mobile, broadcasting) or the infrastructure for private networks (often termed VSAT networks). Usually, such private networks are limited in the way they can connect to public networks in each country so as to prevent international by-pass occurring.

It is reasonable to predict that the present treaty provisions precluding private satellite systems from providing international fixed voice telephony will be removed once prices for international services have fallen far enough to be considered cost-related. Their primary purpose has been to ensure that INTELSAT and the other treaty organisations could achieve economies of scale. The restriction also prevents the high profits available in international services enabling entry by operators using higher cost technologies. Once prices for international services are cost-related, the restrictions on satellite transmission for public international services (and on the interconnection of private networks) will cease to be necessary.

Several countries, including a few developing countries, have already liberalised the provision of international gateways, while continuing to adhere to the restrictions on satellite transmission referred to above. In countries with highly developed networks, the result has been an acceleration in the rate of fall of prices of international services. In developing countries, the policy aim is usually different. Permission to operate an international gateway typically accompanies an obligation to build domestic infrastructure. With such cross-subsidy, international prices do not fall so quickly.

5.2 Satellite mobile services

GMPCS operators will use a satellite to connect the user to their network. In some mobile satellite systems, all the switching and transmission within the network will be by conventional means (which may include satellite). In others, satellites will be able to switch traffic to each other, that is the GMPCS satellites will be used for network functions as well as for connecting users. As public mobile telephony is a specialised service, the use of satellites for this purpose does not infringe the provisions of any of the treaties.

Satellite mobile services will be provided over networks that are managed on a regional scale. While each GMPCS project has its own arrangements for access, typically a single regional service provider will track the satellites overhead and ensure the connection of calls to the existing public networks of several countries. Regional service providers are likely to be located in the largest national markets, such as Egypt, Nigeria and South Africa.

The use of regional service providers also means that it is possible for international calls made via satellite to by-pass the public network. Should countries without a GMPCS service provider tolerate by-pass, if existing cellular mobile networks in the country are required to use the national operator s gateway? The problem is that it is simply impractical to require international calls made by a GMPCS user in such a country to be routed via the national operator s gateway. The satellite system cannot tell exactly where the user is, and so cannot tell which calls were in fact originated in a particular country. It is also impractical to have a service provider in each country the volumes of traffic expected on GMPCS are too small for it to be economic.

One option might be to set a licence fee for GMPCS which reflects the potential loss of profit for the national operator because some calls by-pass it. But taken as a whole, the activities of GMPCS operators will contribute a modest increase to the international business and profits of existing operators. So the argument that a national operator needs compensation is weak. In any event, it would be exceptionally difficult to determine in advance how much compensation should be paid (see section12 for further discussion of licence fees).

5.3 Cable projects

Connection to a submarine cable is at a landing point, where it is connected to the network of the national operator. Intercontinental submarine cables typically have only one landing point per country and a limited number of landing points in total. Other countries in the region, both coastal and inland, have to connect to the landing point in order to gain access to the services being carried by the cable. Operators in neighbouring countries therefore need to make a joint decision whether and where it is worth having a landing point.

Ownership of a landing point may reinforce an incumbent operator s market position. Few African countries will have more than one. If other international operators are authorised, then, they will need to be assured of access to submarine cables via the landing point.

Because of their size and geographical positions, Egypt and South Africa are likely to be landing points for every cable project connecting African countries round the north coast and the south coast respectively. Telkom SA, in particular, has taken an active role in promoting cables linking southern Africa westward to Europe and the Americas and eastward to Asia. These projects have been integrated with the West African Submarine Cable

(WASC) and would in conjunction with Sea-Me-We or FLAG (which link Europe with Asia via Egypt) provide connectivity all round the African continent. However, while this option would permit fewer African countries to have landing points, particularly along the Indian Ocean seaboard, than would Africa One or the other projects proposing a ring round Africa. If, as seems likely in the immediate future, there is sufficient demand for only one round-Africa cable, there is a choice to be made between connecting as many African countries as possible and direct connections between regional hubs.

5.4 Regional hubs

Both cable and satellite projects, then, are expected to concentrate international traffic at a number of regional hubs. These will tend to be located in the countries which generate the largest volumes of incoming and outgoing traffic. In practice, the use of hubs to transit international telecommunications is already the norm; most countries do not connect directly to more than fifteen or twenty destinations (the largest international routes plus neighbouring countries). The difference in future may be where these hubs are located, with more traffic being transited in Africa and less through the traditional European gateways.

6. Is there a need for regional co-operation in Africa?

For international telecommunication infrastructures, the traditional methods of project organisation and management are co-operative, whether on a regional or global scale. In Africa, RASCOM (satellite), PANAFTEL (terrestrial microwave) and SAT-2 (undersea cable) are examples. These co-operative modes of organisation could continue to be applied to the new cable and satellite projects, but are increasingly being found to be not necessary or not optimal. Three trends in particular can be discerned:

1. projects are being started by groups of private investors who want from Governments only necessary regulatory clearance
2. incumbent operators are increasingly willing to act as customers, without their use of infrastructure being conditional on sharing project risks
3. As noted above, some operators are able to develop as regional hubs serving neighbouring countries.

These developments are part of the overall commercialisation of the telecommunications sector. There can also be little doubt that a more flexible approach to project organisation is necessary to cope with the growing variety and complexity of international infrastructure proposals. In consequence, regional co-operation in Africa is likely to take new, more commercial forms in future in order to contribute to the provision of international infrastructure.

Conversely, the role for involvement at a political level in the provision of regional telecommunication facilities is diminishing. The growing number of international infrastructure providers should ensure that African countries

have a greater choice of means of achieving global connectivity than before. That is, there seems little prospect of external interests being able to monopolise international transmission. The new national regulatory authorities being established throughout Africa can control the terms of participation by operators in cable and satellite projects, and can co-operate to ensure a consistent approach throughout Africa.

7. How will the new infrastructures affect the liberalisation of telecommunications?

Many African countries have already come to accept that users would benefit from permitting private interests to offer public telecommunication services, at least to the extent of limiting the scope of the incumbent operator s monopoly. How will the advent of the new cable and satellite infrastructure affect the liberalisation issue?

While countries with fewer regulatory restrictions on entry into service provision and network operation are likely to benefit more from the additional capacity and connectivity on offer, the cable and satellite projects do not themselves depend on or require changes in basic sector policies. There is already a consensus that data transmission and other computer-related services (often called "value added" or "enhanced" services), and mobile radio services should supplied competitively. Liberalisation of these services also increases the volume of telecommunications traffic and the demand by service providers for transmission capacity, and so has a beneficial effect on the revenues of the national operator.

The critical areas for policy are voice telephony services and public network infrastructure. The cable and satellite projects under review all involve the installation of new infrastructure. Should this new infrastructure also be under the control of the national operator? In general, the reasons for giving national operators a monopoly over domestic public networks do not apply to infrastructure used for international communications. Provision of international infrastructure is profitable and does not require subsidy (see section 10 below).

In the past, the existence of national monopolies has required operators to co-operate in providing links between countries. The entry of private investors into the provision of international links, whether by cable or satellite, provides an alternative means of financing infrastructure. Such entry does not challenge the domestic monopoly of national operators.

This conclusion, while evident for the cable projects, needs to be qualified in respect of the GMPCS services. These will offer direct access to users, by-passing the domestic infrastructure of the incumbent operators. Direct access to satellites for mobile use charged at a premium price will make the services offered more complementary than competitive. The GMPCS operators intend, however, to offer fixed services at lower prices than for mobile services. In principle, these fixed services represent a potential competitive threat. Should this potential threat be of concern to policy makers?

First, as already discussed, private satellite systems, including GMPCS, cannot be used for international fixed voice telephony. Second, it is not yet clear that GMPCS systems can offer an economic form of domestic transmission for fixed services, except in remote areas where the costs of terrestrial networks become prohibitive. In such areas, there is by definition not a competitive issue. Rather, there is an opportunity to extend service to people and places previously denied. Third, if GMPCS systems can in future offer an economic form of transmission for ordinary voice telephony within the country, then this facility can be provided to existing authorised operators. This is likely to be the preferred option of the GMPCS operators themselves, since they will

not have a presence in most African countries. In countries with a regional service provider, mobile services will be the main business opportunity. Fixed service will only be a means of filling spare capacity on the system, and so self-limiting. These arguments tend to suggest that there is not an immediate competitive threat in fixed services from GMPCS systems.

8. Will international call charges fall faster?

Traditionally, international telecommunications has been subject to monopoly pricing, justified on the grounds that excess profits could cross-subsidise the extension of domestic networks. As noted, the virtue of this policy is diminishing as the cost and difficulty of access to information world wide acts as an increasing drag on development. At the same time, the premium pricing of international connectivity is under challenge on narrower economic grounds. As demand for international communications grows and the costs of provision of international circuits continues to fall, the level of call charges at which profits are maximised is falling. Where the provision of telephone services has been liberalised, prices charged for international calls are falling rapidly as a result (by about 9% a year on average). Equally important, countries in which international services are still monopolised find they cannot insulate themselves from the effect on prices of liberalisation of services elsewhere. Call-back operators and resellers who refile can route international calls via a country, such as the United States, which offer low wholesale charges for carrying calls to African countries. For all these reasons, Governments and operators are being urged to rethink tariff policies for international services.

The new cable and satellite infrastructure will intensify the pressures to allow prices of international services to fall, by making available greatly increased capacity. For the GMPCS projects, the extra capacity may be spare, due to the relatively low demand for premium mobile services in Africa. Cable projects make available a high level of capacity for a high total cost, but a low unit cost if the capacity can be utilised. This creates a strong incentive to lower prices, at least at the wholesale level where the capacity is made available to operators.

9. Accounting rates and the costs of international transmission

Normally, lower transmission costs work through to lower prices for international calls only relatively slowly. The first obstacle arises from the method by which costs are shared among operators. At present, the cost of carrying international calls between any two countries is usually shared equally between the operators in each country. The average cost per call minute over the route is agreed in advance by the operators (the accounting rate). Each operator then bears the cost of running its half of the route. An annual payment is also made for any difference between the number of call minutes flowing each way over the route. The operator sending more call minutes than it receives pays for the difference at half the accounting rate per minute. A reduction in costs of international transmission benefits the operators, but does not automatically result in a lower accounting rate. It may take several years for the commercial agreements among operators to be renegotiated.

The pace of change in international call charges is accelerating. Among the reasons is the recognition that growing differences between underlying costs of international transmission, accounting rates and prices charged to users are the main cause of the growth of call-back, international resale and refiling. National operators appreciate that cost-based accounting rates and prices would do much to deter these activities. But in Africa call-back and refiling appear to have relatively small market shares too small to induce operators to reduce prices for competitive reasons. Regulatory authorities are inhibited from forcing down international prices quickly. Apart from the unpopularity of moving to cost-based pricing among residential users, establishing what the underlying costs of carrying international calls are in practice is a difficult matter for regulators. For all these reasons, falling costs can only be expected to result in falling prices for international calls over a period of years and will probably depend on a change in policy to permit more direct competition in international services.

10. What will be the impact on cross-subsidies?

A major obstacle to rapid falls in international call charges is the widespread desire to use profits on international calls to cross-subsidise local services or the extension of the national network to remote and rural areas. On present trends, prices of international services are not falling significantly faster than costs of international transmission. Moreover, lower international prices stimulate demand, provided that deficiencies in domestic networks do not block calls. If capacity is expanded in line with demand, international call charges have to fall a long way before profits are adversely affected. This, at least, has been the experience of operators in North America and Europe. In Africa, where prices of international services are much higher on average, it is probable that lowering prices would increase profits (provided capacity is expanded and revenues recorded are collected). In short, the risk that international services will not be able to cross-subsidise domestic networks in future is remote.

In the longer term, the significance of cross-subsidy is likely to diminish as a result of prospective changes in the capital and operating costs of networks and the increasing variety of means of access to services. The cost of providing local access to services is generally expected to fall as wireless technology is brought into use. The commercialisation of network operations should bring significant efficiency gains. As costs generally fall, cross-subsidies can be unwound without adverse effects on domestic tariffs.

11. Will GMPCS networks compete with existing mobile services?

There are several terrestrial mobile technologies with which the GMPCS operators will have to compete, although the GSM standard for cellular mobile services has been adopted in about half the countries of Africa. Even where the technology has been standardised, it is becoming the norm for Governments to license more than

one cellular mobile operator. Many countries limit the number of mobile operators to two or three, but more could be licensed. While the radio frequency spectrum available for use by these operators is limited, in practice this constraint is not binding at current levels of demand.

The licensing of GMPCS operators does not, therefore, raise major competitive or radio spectrum issues for most African countries, although it may entail a formal modification of announced policy. Iridium and Globalstar are likely to have a positive impact on the businesses of existing digital mobile networks. Both have announced dual-mode handsets; users of these will have universal coverage, while continuing to use existing mobile services when in range.

12. Licence fees how much should Governments charge?

One of the themes of this paper has been that the cable and satellite projects present new opportunities for the provision of transmission capacity and access to new services, pose challenges to national operators and to regulatory authorities but do not compel a fundamental change in sector policies. So, liberalisation of new services will accelerate the benefits from global connectivity, but a Government that is inclined to preserve a monopoly over infrastructure used to provide public telecommunication services can continue to do so while enabling access by service providers to the new infrastructure.

Consistent with this theme, it is not necessary to devise a new method of licensing to deal with these projects. For example, GMPCS operators can be licensed in much the same way as cellular mobile operators. In some countries, the right to use radio frequencies to provide mobile services is effectively auctioned through a competitive tender. This approach is not likely to produce significant proceeds if applied to GMPCS, since the frequencies required by the operators of these services have already been assigned globally and there are no alternative users. Licence fees are therefore likely to reflect the costs of administration. It is of course open to licensing authorities to attach conditions to licences to ensure that the issues raised in this paper are dealt with and developmental benefits are maximised.

Cable projects may require planning permission, but are not usually licensed to operate. For cable schemes, the main regulatory concerns are likely to be related to the position of the incumbent operator. Even where the national operator has exclusivity, the licensing authority may wish to ensure that the operator does not discriminate between rival cable schemes or use its monopoly power to impose unduly high charges for access to them.