

**Computer Networks in Africa:  
From Utopian Discourse to Working Reality**



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“We are moving toward the **21st** century with the very great **goal** of building a Computopia on **earth**, the historical monument of which will be only several chips one inch square in a small box. But that box will store many historical **records, including; the record of how four billion world citizens** overcame the energy crisis and the population explosion; achieved the **abolition** of nuclear weapons **and complete disarmament; conquered illiteracy; and** created a rich symbiosis of **god** and man without the compulsion of power or law, but by the voluntary cooperation of citizens to put into practice their common **global aims.**”

Yoneji Masuda  
*The Information Society*

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“I don’t think the battle lines have **been** drawn, but it’s a real **mistake** to link all **the approaches and attitudes to this new technology into one. If you listen to Tim Leary,** he talks **as** though this will bridge cultural gaps. That’s the most unmitigated bullshit This stuff has no relevance to any issues in the Third World. It’s completely arrogant and self-indulgent and has nothing to do with science.”

– Bill Buxton  
Computer science professor  
University of Toronto

The positions outlined on the previous page are diametrically opposed. On one hand, a hopelessly utopian vision is painted of the computer as saviour of all humankind. On the other, a very **sceptical** outlook is enunciated, of the potential for change enabled by computer networks in the developing world. I believe that there is room for a middle ground to be claimed between these two opposing positions. This terrain would acknowledge both the benefits and limitations of computer technology in the developing world. However, in order to venture into this space, it will be necessary to look at what other kinds of discourses are being enunciated in relation to computer technologies.

The task of this paper is to explore the less-utopian discourses surrounding computer networks in the developing world, and contrast these discourses with the everyday practice of computer networks. In particular, this project will look at how one computer network, **RINAF**, is set up in Africa. The information for this investigation has been culled from various sources across the Internet. The bulk of the information has been provided by men and women working in the field.

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In 1992, the United Nations Conference on the Environment and Development (aka, The Earth Summit) was held in Rio de Janeiro. Out of the conference came the Rio Declaration on Environment and Development: Agenda 21. Agenda 21 is the “non-legally binding authoritative statement of principles for a global consensus on the management, conservation and sustainable development” of the earth’s resources. (The Rio Declaration on Environment and Development, 1992)

In relation to computer networks, Chapter 40 of Agenda 21 urges governments, the UN system, and NGOs to:

exploit various initiatives for electronic links to support information sharing, to provide access to databases; and other information sources, to facilitate communication for meeting broader objectives, such as the implementation of Agenda 21, to facilitate intergovernmental negotiations, to monitor conventions and efforts for sustainable development to transmit environmental alerts, and to transfer technical data.

[RDED, 1992]

The use of computer networks is seen as a vital tool in the strengthening of the capacity for 'traditional information'. This term is not defined in the Agenda 21 document, though the document (chapter 40.11) does exhort UN member states to,

with the cooperation of international organizations,. . . establish supporting mechanisms to provide local communities and resource users with the information and know-how they need to manage their environment and resources sustainably, applying traditional and indigenous knowledge and approaches when appropriate. This is particularly relevant for rural and urban populations and indigenous, women's and youth groups.

[RDED, 1992]

The picture drawn is a compelling one. Computer networks are to be set up to enhance grassroots participation in a global communications network. It is convincing rhetoric such as this which seems to oblige thinkers in the development field to write:

The large proportion of the analysis and recommendations devoted to electronic networking clearly demonstrates an unprecedented understanding by the Earth Summit, that we are not dealing here with just another technology, but with a substantial reformulation in the way people deal with each other on a global scale.

(Bissio, 28)'

This 'substantial reformulation' seems to involve a revolution in the way power relations are to be considered in the coming years: "If information is indeed power in the present-day world, decentralization and networking are the new synonyms for the old utopia we call democracy." (Ibid, 30)

The same type of utopian rhetoric can be seen in the writing of **Hamid Mowlana**. Mowlana (1993) identifies four broad areas of socio-cultural change that occur as a result of computer networks and networking in the area of transborder flow: **decentralization of decision-making and control; technological and cultural heterogeneity, decrease in hegemony, and weakening of the nation state and the public sector.**

In these four categories, **Mowlana** sees the dynamic of computer networks' benefits as not being completely unmediated. For example, he sees a tendency towards centralization and consolidation of the policy planning and organization of organizations and institutions. However, he also argues that the formation of international networks "can allow for a greater participation of separate entities in the decisions and direction of the

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\* Though in my exposé of the utopian rhetoric surrounding computer networks in the developing world, I am to quote only 2 writers, Roberto Bissio and Hamid Mowlana, their writings are representative of the idealistic discourse surrounding computer networking and development. Both writers are renowned in the field of communications and development. Bissio is Executive Director, Instituto del Tercer Mundo (Third World Institute), Montevideo, Uruguay; Mowlana is currently Professor of Communications and Director of the International Communication Programme, American University, School of International Service, Washington, D.C.

organization and work in the direction of decentralization.” (Mowlana, 24)

As well, Mowlana recognizes that the ability to connect a large number of organizations around a single purpose can result in a certain level of homogenization, both at the technological and cultural levels. This trend towards homogenization is countered, he argues, by the diversification of networks by the inclusion of voices from different contexts and cultures, which leads to an overall level of heterogeneity of communications flow.

As for the question of hegemony, Mowlana sees hegemonic interests being threatened by computer networks whose objectives include empowerment and democratization. Mowlana argues that as the number of informed users increases and as these users become part of the decision-making process, the result is a democratization of the power structures.

The fourth dimension of change engendered by computer networks, the weakening of the nation state, results from the ability of computer networks to work outside traditional lines of state power and administration. These networks are often created parallel to the state’s existing communication infrastructure, and are of a non-governmental nature. Therefore, Mowlana argues, there is a potential weakening of the nation state and of the public sector.

At this point, what I would like to do is examine Mowlana’s map of the four areas of socio-cultural change, in relation to a real-life computer network project, the RINAF project in Africa. I have chosen RINAF (the Regional INformatics Network for AFrica) as my site of study as it is a UNESCO-sponsored project (funded by the Italian government) and as

such, is the kind of computer network envisaged by Agenda 21. \* The aim of the RINAF project is to:

- use new information and telecommunications technologies to favour exchanges between African countries;
- remedy the isolation of development and research institutions in African countries and facilitate dialogue between researchers, academics and industrialists;
- develop an operative process for the coordination, integration and upgrading of African networks, as well as exchange with other international networks.

(L. Abba, S. Giordano, S. Trumpy, 1394)

Though RINAF has specific aims which differentiates itself from other development projects in Africa, the way in which RINAF operates, on a technological level, is similar to other projects.

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\* There are other computer networks operating on the African continent by a broad range of different organisations: quasi-state bodies like the Centre for Scientific and Industrial Research in Accra, Ghana; international non-governmental bodies such as the UN Economic Commission for Africa in Addis Ababa, Ethiopia; single large International NGOs like Environmental Liaison Centre International (ELCI) in Nairobi, Kenya; coalitions of NGOs as in MANGO in Harare, Zimbabwe; and autonomous NGO service organisations such as WorkNet in Johannesburg, South Africa. [Mikelsons, 199 2]

The technology used by RINAF is that of FidoNet. \*\* Because of the history of the development of FidoNet\*\*\*, FidoNet technology has been touted as the determining factor in making computer networks decentralized and democratic. The following excerpt from the American Association for the Advancement of Science/African Academy of Sciences Workshop on Science and Technology Communication Networks in Africa, held in Nairobi in August 1992, is indicative of the technologically determinist rhetoric surrounding FidoNet technology:

Yet electronic networking, especially the decentralized Fidonet network, which is predominant in Africa, has spread in an essentially grassroots, i.e., non-hierarchical, manner, from user to user. The -bottom up- approach has been central to the character of Fidonet, and periodic attempts to impose a -top down+ organizational structure upon it have met with successful resistance.

(Schoneboom, Gimbel, and Levey, 1992)

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\*\* The FIDO network (called FIDONET) is an extremely wide spread network based on store and forward capabilities for the transfer of files, texts and mail. Each node has a modem which lets users send or receive mail by logging in, without any charge. Each user can also send or receive files from the node. To give to every user the opportunity to use the network the FIDONET node assigns each user a maximum time limit, after which the user is cut off by the system. Access to the system is in this way similar to that offered by BBS (Bulletin Boards Systems). FIDONET is organized in several regions corresponding to continents. In each region there is a node with the task of storing and forwarding the traffic produced by the entire continent to the other continents. The transmission of mail and files can usually be achieved by the multiple storing and forwarding of files from a system to the nearest one reducing the cost of the calls performed by each system.

\*\*\*FidoNet is known as the "people's network. In 1983, Tom Jennings, a computer programmer, began working-on-bulletin board software that would provide a link between the east and west coasts of the United States using homegrown bulletin boards. His scheme was loosely patterned after the amateur ham radio operators' network. A feature of the Fido software is that individual bulletin board operators can agree to a regular automated exchange of messages between their systems. This results in a web of linked Fido bulletin boards spanning countries and continents. This is collectively known as FidoNet.



This passage begs the questions: exactly how is the FidoNet technology implemented in Africa? Are there local conditions in Africa which might change the way in which FidoNet technology is used?

The limitations of computer networking in Africa may be considered as being characterized by two factors: technological and bureaucratic. Arni Mikelsons' (1992) recognition of these technological drawbacks is grounded in the understanding that Africa operates with a poor telecommunications infrastructure which is not conducive to the development of data communications. Telephone densities are as low as 0.1 percent of people. In the vast rural areas, where 80 percent of the population lives, there is often no access to basic telecommunications facilities.

Specific barriers include:

- poor switching equipment which results in incompatible signaling systems between countries;
- unreliable primary power sources which cause numerous telephone traffic disruptions;
- lack of trained staff to maintain the **networks** and keep abreast of newly emerging technologies;
- inappropriate management information systems for monitoring operational status of the networks;
- insufficient funds for system management and maintenance;
- continuous deterioration of lines due to climatic conditions for which the equipment was not calibrated by the manufacturer.

In light of these technological limitations, Mikelsons identifies four main reasons for choosing Fido in Africa:

- the technology optimizes the use of few, low quality phone lines;
- FIDO software is relatively inexpensive and often free for non-commercial use, running on all low cost computers from floppy disk PC to Macintosh Classic;
- it is becoming very easy to use as programmers continue to refine it;
- its message format is such that information can move between FIDO and multi-line NGO, academic and commercial networks which dominate northern networks.

To a great extent, technological constraints have been minimized with the implementation of FidoNet technology. With error-correcting modems, messages and files are routinely sent successfully even over very noisy public phone lines, although transmission time may be slowed considerably, raising costs. (Schoneboom, Gimbel, and Levey, 1992)

And, where phone lines do not exist, radio technology can be used as information carriers. RINAF uses packet radio technology where phone carriers are unavailable. Packet Radio links form a network developed by volunteers from the world of CB and Radio-amateurs which modulate on radio carriers. (Abba, Giordano, Trump, 1994) In other words, instead of using phone lines as carriers for computer information, radio waves are used to transmit the same information from one station to another.\*\*\*\* Thus, it may be argued that technology can overcome the problems of setting up

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\*\*\*\* Packet radio systems, in both terrestrial and space environments, have the potential to provide the "missing link" of reliable and inexpensive communications from isolated regions. Integration with low-cost landline (telephone)- based systems could dramatically increase connectivity without significant increases in cost. (Garriot, 199 1)

computer networks in Africa. However, there are bureaucratic obstacles which stand in the way of successful implementation of such systems.

The development of computer networks is hampered by nation-states' telecommunications policies. They include policies regulating:

- the import and use of telecommunications equipment;
- tariff structures;
- network traffic and structure;
- the quality of service and management of telecommunications networks;
- regional and international cooperation of telecommunications development.

(Mikelsons, 1992)

The state regulatory bodies in Africa are the national PTT (Public Telephone and Telegraph) utilities. As Garry Garriot (1991) reports, these state-run utilities must be considered when planning trans-national communications systems, especially those utilizing radio technology. In 1986 it took the Relief and Rehabilitation Commission of Ethiopia, a government agency, more than a year to acquire temporary authorization for a three-week demonstration of packet radio in a CARE food program. After its success (the first of its kind ever), the government quashed all further experimentation and a permanent network was never implemented. Similar, though less dramatic, experiences have been logged in other African countries.

One international agency, while implementing a packet network in an African country, decided not to request authorization for its proposed packet radio system, but rather strategized a "fait accompli" situation under the guise of an existing voice radio license. When the system was ready for

inauguration, all the proper individuals were invited to a generous reception and any objection quietly buried. Time and time again, the difficulties and delays in licensing or obtaining temporary authorizations stymie packet radio projects in terrestrial and satellite applications alike. Every country and situation is different.

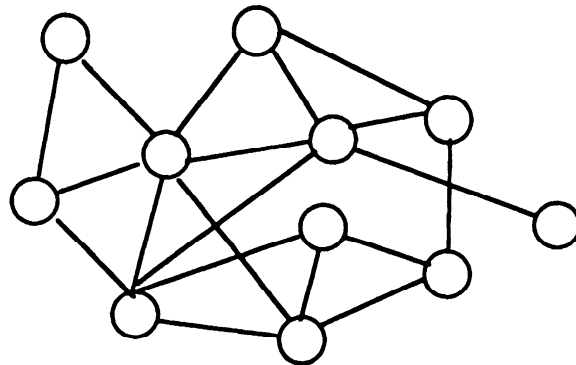
PTTs must also be considered at the local, more mundane level. Many African countries are now installing data line services, also called IPSS (International Packet Switched Services) which use an internationally standardized protocol for data transfer. The PTT – national post office or telephone company is almost always the operator of such a service and usually installs connection points to IPSS in the major cities. This service allows modem users in these cities to make a local phone call, and get on-line to any country with an electronic mail or database service.

To access such a service, the user orders a NUI (Network User ID) from the local PTT. A registration fee, a monthly or quarterly rental, and usage charges to connect to the remote host comprise the costs incurred for this service.

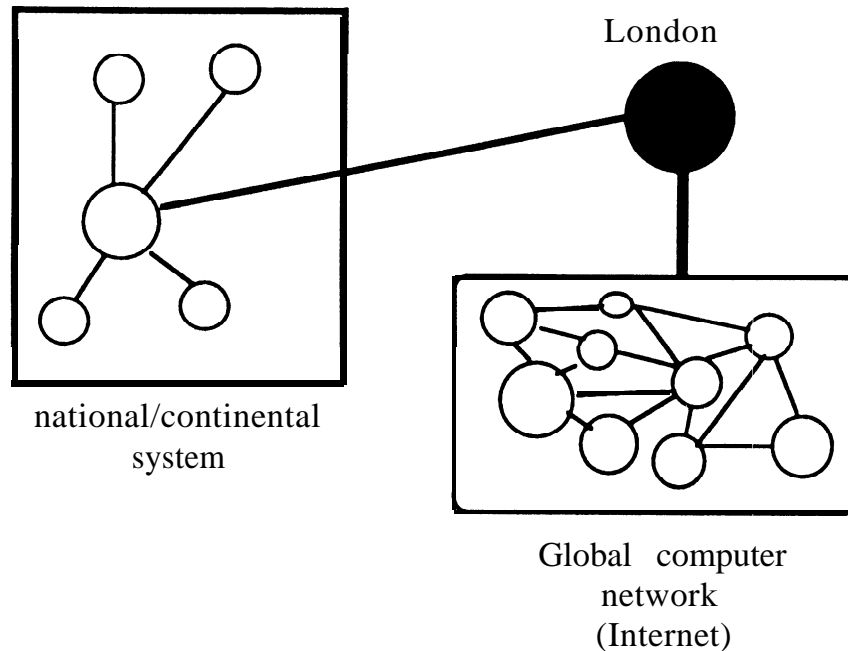
For regular computer network users, this NUI rental usually provides a significantly cheaper option than making a direct dial international phone call to the electronic host. If the host is accessed infrequently, then the cost of an NUI may not be justified. As with a normal telephone call, there is usually a substantially higher usage charge for connecting to a host outside the country than with a host computer inside the country. However, since there are still very few mailbox host computers connected to an IPSS anywhere in Africa, there is really no option but to connect outside the country for mailbox service and pay the high rates, until one of the developing systems becomes connected to packet services .

Rate structures for IPSS are complex and vary enormously from one to country to another. Rental charges for a NUI can vary from \$80 to \$800 a quarter. Some PTT's require the user to rent PTT-owned modems at inflated rates. Even usage charges (which are based on time spent on-line and the volume of data passed down the network) can vary by a factor of two between different PTTs. Typically, the most significant portion for the charge is for the amount of data transferred. Users are charged both to send and to receive data, and this is frequently what makes the service prohibitively expensive. (Jenson and Sears, 199 1)

This intervention on the part of local PTTs is an important one, in regards to the organizational structure of FidoNet in Africa. Here's how a grass-roots FidoNetwork à la Jennings might be conceptualized:



However, with the intervention of the local PTTs, the dynamic of the structure changes, and begins to become less decentralized:



Because it is much less expensive to call into Africa **rather** than call out, phone calls originate from London.\*\*\* This characteristic of trans-national phone communications serves to change the dynamic of this form of communication. Information may flow in both directions, yet the decision of whether/when to initiate this data flow lies in the hands of the operator in London.

This is not quite the model envisaged by Mowlana. His promise of computer networks working to decentralize decision-making and control is undermined by the nature of this hierarchy. As well, there are cultural limitations which constrain the number of informed participants in these networks, and which weaken the threat to hegemony promised by Mowlana.

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\*\*\* London provides a link to a global network for receiving or sending private messages and public bulletins. It is the site of a gateway operating at the Association for Progressive Communication's (APC) London host - **GreenNet**. Through this system users in Africa can gain access to the community of 10,000 NGOs and individuals working in peace, social development and environmental issues who use the APC network.

Garriot (1991) identifies a problem in the way in which networking technologies and information get disseminated in Africa:

Affluent, liberal values emphasize information-sharing, while sharing is anathema in many traditional societies where information is power and the first to get and act on it becomes the most powerful. Information in this context is to be carefully guarded, because sharing it will only give someone else an advantage. To be sure, sharing does occur in such societies, but generally only within tightly-bound sub-cultural or familial groups and friendships. Thus, in an African context, it might be more natural to see fewer bulletin boards and more peer-to-peer links. There is, of course, a universal camaraderie among scientists and scholars that can mitigate somewhat the tendency to hoard information when the “pieces of the pie” – whether economic, academic or whatever – are perceived to be diminishing rather than increasing.

If Garriot is to be believed, then this question poses a serious threat to the promise of computer networks serving as agents of democratization at the grassroots level. If information is to be shared solely by academics and scholars, a less-heterogeneous, more-hierarchical model must be considered when mapping out the operations of computer networks in Africa.

In terms of Mowlana’s fourth dimension of change – the operation of computer networks outside traditional lines of state power and administrations – we have seen how crucial the intervention of state-run PTTs are to the shape and dynamics of information flow in Africa.

Thus, I think that after a more-careful consideration of the actual operating practices of computer networks in Africa, it can be concluded that Mowlana’s description of the four areas of socio-cultural change promised by computer networks is not quite precise enough. This imprecision can be attributed to a tendency to over-valorize the impact of computer technologies. However, this is not to say that Mowlana’s analysis is not of any

value. I believe he has identified four key areas where traditional power structures can be challenged by the development of computer networks, especially where (relatively) low-technology applications, such as FidoNet, can be utilized.



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