ePost: networking remote areas

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Abstract: A very large proportion of the world's population, especially the poor and those in remote locations, will not have access to ICT within the near future. If present ICT models are reconceptualised it is possible for those in remote areas to use ICT technologies for communication. Such a reconceptualisation is proposed here, by combining the old concept of paper postal services with mobile technologies, hence ePost.

Keywords: ICT, Information and Communication Technologies, developing economies, remote areas, cell phones, mobile technologies, ICT requirements, Ipv6, ePost

1. Introduction - The problem connecting the world's poor

More than a billion people live in extreme poverty: 20% (1,305,034,052) of the world population (6,525,170,264) live on less than USD1 per day [1,2]. The CIA World Factbook reports that 42% of the world population (2,740,571,511) still works in the agricultural sector, thus typically in rural areas. In developing economies 30% (1,957,551,079) are underemployed or unemployed. Only 15.6% of the world's population (1,018,057,389 -2005 numbers) has internet access, while 26.9% (1,752,183,600 - 2004 numbers) has access to mobile phones.

In 2000 the United Nations optimistically agreed to halve the number of poor by 2015. Within three years the organisation realised that that goal was far too optimistic. This means that the poor will be with us for at least another generation or two. This also means that about half the global population will not benefit from Information and Communication Technologies (ICTs). Even in the most highly developed economies rural communities do not have internet access. The state Alberta (Canada) presently has a project (The Supernet) to provide broadband for rural communities, but such connectivity only leads up to the nearest village, not to individual farmers [3]. The situation is much worse for developing economies that do not have telecommunications infrastructure. Mobile solutions are much cheaper to implement and will be the dominant ICT in developing economies, but will still only cover urban areas.

2. Requirements for using ICT

When the requirements for using ICT are considered, the situation appears even bleaker. The following is based on Steyn [4].

2.1 Skills

2.1.1 Language literacy

According to the CIA Factbook [2] almost a billion people (12%) are illiterate (785,000,000), but an exact definition of literacy is debateable. In Africa more than 80% are illiterate. To make the best of the internet in its present form requires good language skills.

2.1.2 Technology literacy
An ICT device such as a computer or advanced cell phone also requires the technical experience to use the device, and most functions are language dependent. There is thus a double problem in this regard. User interfaces can of course be designed in such a manner as to be not language-dependent, and simple enough even for technophobes to use. Such functionality will remain basic compared to the power available on today's internet.

2.2 Infrastructure
2.2.1 Energy
Developing regions have poor electricity network grids, and supply is also unreliable. Energy to drive ICT is also a problem in any remote area, not only in developing regions. Energy to drive computers would be much more difficult to supply than energy to charge cellphone batteries – cell phones are less power hungry than computers.

2.2.2 Network technologies
ICT networks do not reach all the communities on the globe. Chances that all remote communities will soon be network connected are extremely slim. Even the exceptional growth in cellphone connectivity occurs mainly in urban areas, while rural areas remain unconnected. This situation will most probably last for the next couple of decades.

3. Access
As mentioned above, almost half of global population work in the agricultural sector, which is typically in rural and remote areas. Those are also the least connected areas, and the poorest. Present network models thus make it extremely difficult for a large proportion of global citizens to be part of the interconnected community.

3. The ePost Model
Any ICT solution to network poor and remote communities will need to meet the above requirements. Despite this negative scenario, it is possible to provide a multimedia digital solution for communication purposes among the world's poor and remote. Mobile phones are growing at a rate of 150% to 300% in some developing African countries [5]. This tremendous growth is on one hand due to the initial low baseline, but on the other hand, mobile telephone puts communities in touch at a relatively low cost. This growth, however, is restricted to urban areas.

In order to make the most of the available technologies for developing economies as well as for remote areas, a different ICT model needs to be implemented. PCs can not be the most common access device, and a 24/7 network connection is not going to happen in these locations, which means that there is no immediate access to the internetwork. The solution needs to be a portable device such as a mobile unit, and the 24/7 model needs to be adapted to cater for more off-line functionality.

The following model is suggested. The basic concept is not novel, and was piloted by Paul Rankin and Philips with a dedicated device [6,7]. The project was entitled “Voices in Your Hand.” Over the past few years cell phone technologies have expanded functionality to the extreme. Also, a dedicated device is never as powerful and cheap as a multi-purpose device, in this case a mobile device such as a cell phone. It should be noted that the border between G3 cell phones and PCs has become very blurred. G3 cell phones have more memory than PCs of five years ago, can record voice, photos and video. In a sense a modern cell phone is basically a portable computer with a wide range of functionality.

In the model I propose here a more general device (i.e. the cell phone) provides a better opportunity than the dedicated Rankin-Philips device.

The concept works as follows. A multimedia enabled cell phone, i.e. one that can record sound, take photos and videoclips, can be used on a shared community basis. The device also requires a removable storage disk. A whole village needs only a single such device, and can thus purchase one as community property. Among poor South African commuinities there is an existing practice for shared property. With an ability to cater for multiple users on the same device, all villagers or members of such a community can use the same device to record messages. As members of such communities are typically illiterate, messages will most likely not be typed, but spoken. Once transport is available, or when the disk is full, the "ePostmaster" couriers the disk to the nearest network access point. The courier may use a donkey, camel or llama as mode of transport. At an internet access point the memory of the disk is loaded into the network and distributed to addressees. Replies to remote addressees remain on servers until such time as messages are loaded per village ePost Office.

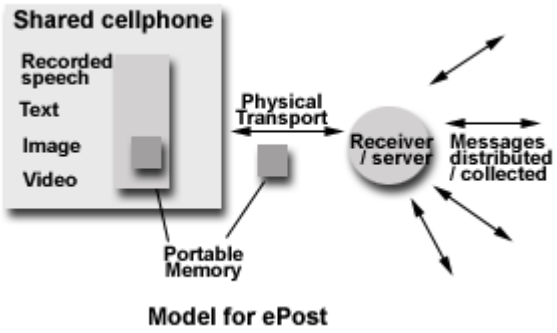

Figure 1.

In this illustration memory is described in terms of removable and portable disk, such as a flash memory card. Once standard cell phones are able to communicate via bluetooth or infrared, and have enough memory for large messages, the couriers ePost "phone" may serve as for temporary storage to transport messages.

This ePost model will allow delayed distributed communication to take place off-line. Multimedia messages can be comunicated to addressees, such as family members and friends. This model is not restricted to personal communication, but could also be used for business, governance and other communication, just as paper post served for all kinds of communication in the past.

4. How ePost would work

Imagine a remote village anywhere in the world. This particular village as a whole has access to a solar energy device, and a single ePost-enabled device or cellphone. It is possible for each villager to record short voice messages, to attach a photo or video clip taken by the phone to the message. The message is assigned an address. If the address of the addressee is not known, it is addressed to the nearest ePost Office, where a clerk would look up the unique identifier in a directory. This would obviously be a paid or sponsored service. When the courier arrives at the village, either by camel, donkey, canoe, llama or even by foot, the memory disk is removed from the phone, and replaced by one containing incoming ePost. The courier may collect several disks on his journey. When a centre is reached with internetworking facilities, the data on the disk is copied to a server that distributes the messages to addressees, and collects messages for the ePost Office of the particular village. The addressee responds and sends the reply, which may lie in waiting at the server until a courier collects the post for that village.

The advantage of this type of communication is that even illiterate people can now communicate without having to travel far to destinations to present their cases. It should be noted

that cell phones are presently used by illiterate users who can enter numbers based on pattern recognition. The model of course also applies to literate communities that are remote from network access points.

5. Requirements of epost

Standard cellphones cannot be used for this system, although present high-end cellphones will already be able to implement this model. The only aspect of the model not presently implemented in the present generation of cellphones is multi-user functionality on the same cellphone device. In this regard a unique addressing scheme is required that allows not only for individuals but also for each organisation, government official, business clerk and so on to have unique identifiers.

5.1 Unique addressing system

IPv6 [8] already allows for enough unique addresses for each individual of the global population as well as for each device to have a unique identifier. Not only such entities require identifiers. Ideally even messages should have unique identifiers so that responses can be directed appropriately.

5.2 Distributing unique addresses

Ideally each individual person should receive a universally unique identity number at birth. No known such global system exists, although IPv6 makes this possible. Units and sections within organisations should also have their unique identifiers so that epost could reach intended addressees.

Ideally the unique addresses of all addressees need to be known to senders of messages. This will not be possible in practice. For example, say a remote villager needs to communicate with a social worker in the nearest large town. How would the villager know the unique address of the social worker? A directory system may be the solution, but illiterate people cannot use them. An intermediate, who is literate is required to look up the addresss. This could either be a literate villager, or an epost master in the nearest large town. No matter where the intermediate resides, there needs to be a directory of some sorts.

5.2 Possible practical solutions

5.2.3 Payment for service

A pre-paid system, known as pay-as-you-go, is used in many African countries for cell phone communication. Users buy credit in advance and can communicate as long as they have enough credit. This system in itself is not as surprising as its uptake by even the poorest of users. It is fascinating that the poor will pay (proportionally to their income) a fortune in order to stay in touch.

The envisaged epost model mimics traditional paper post, but the dominant medium will not necessarily be text. Literate users may use text, but it is most likely that even they may wish to hear the voices of their friends and families, and see photos or video clips. The messages would thus be multimedia, and not be restricted to text. It should be noted that in many cases humans find it easier to explain something verbally, rather than in writing. The writing system seems to require more cognitive energy than talking, which implies that the proposed system should lead to more effective communication.

The “writing” device will not be a pen, but a multimedia recording portable device with external storage capability. The storage medium will not be paper, but a digital storage device. The transport devices will not be mechanical transport but a digital communication network. In most aspects the ePost model thus mimic the traditional postal service, but with added functionality. Like traditional post, ePost implies not in-time dialogue, but time-delayed communication.

6. Conclusion

To enable a very large proportion of the world's population who live in remote areas and also the world's poor to use ICT for communication, an ePost model is proposed that combines the old paper post concept with mobile technology. Instead of using ink and paper, a mobile device is used. Any medium can be used to capture the message: recorded voice, written text, pictures, video. Instead of a paper postage piece, a digital storage device is transported to the receiving post office. By using such a model, multimedia communication can be shared by even the remotest and poorest of communities.

Note: Many thanks to Paul Rankin for sharing his thoughts.

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