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A Research Upon Pattern and Technique of Cellular His In Developing Nations

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Abstract – In numerous improving countries there is a colossal interest for communication and information administrations, however traditional wired framework to actualize them is needing. Wireless communication is simpler and shabbier to acquaint and with keep up, particularly in remote and less developed ranges.

Unique. Wireless computing is a guaranteeing new ideal model for building information systems that permits more terrific adaptability concerning conveyance, expenses, versatility and presentation of data administrations. Then again cordless computing raises numerous testing data administration and database issues because of specialized limitations like restricted data transmission and instability of wireless communication, hey this paper wireless computing is persuaded by introducing its focal points and requisitions. Besides, the developing database issues and flow research themes are examined. This expedites the meaning of an examination venture which will think 011 the design of wireless information systems by accomplishing an interdisciplinary collaboration of databases and wireless communication technology. Assessing the provisions prerequisites and their fulfillment by proposed wireless systems will be an alternate significant a piece of exploration.

INTRODUCTION

Wireless computing alludes to distributed computing systems that are interconnected by wireless connections like radio frequencies or infrared waves. Wireless networks will incorporate radio channels, analog and digital cellular architectures, wireless LAN's and WAN's as well as satellite administrations. Diagrams of wireless data communication technology could be found in [desimone, Nanda 95], [diehl, Held 95], [pahlavan, Levesque 94] and [spaniol et al. 95]. Such an upheaval in communication technology offers ascent to the plausibility that anyone can get any data whenever and anyplace since clients might be liberated from being physically associated with the underlying network. This vision infers that the qualification between communications and computing will keep on ing smudged [katz 94]. In this way, in our time of incorporation of telecommunication networks, multimedia, distributed (database) systems and information roadways there will be no agreeable division between data administration and communication technology issues any longer. For case: is questioning the WWW a database issue, a network issue, a file system issue, a communication issue? [imieliński 95] Wireless computing is an exceptionally adolescent exploration point so there is no standard writing yet but not many overview papers [imieliński, Badrinath 93,94a,94b], [diehl, Held 95], [dunham, Helal 95]. Far more atrocious, a ton of terms and contractions are, no doubt utilized without having a reliable significance over the papers. Accordingly, the wireless computing neighborhood need securing a

binding together perspective of the state of exploration.

Terms like universal computing, roaming computing, versatile computing and decoupled computing are constantly used to depict computing systems quite nearly identified with wireless systems however each one concentrating on a certain property. Universal computing anticipates a planet in which an immense measure of extremely shabby computers is generally spread around all the areas of our ordinary life. Associating that numerous computing apparatuses by a wired network might be a period expending and unreasonable undertaking [katz 94], expediting wireless computing. Decoupled computing means the capability to figure disconnectedly from servers and even communication networks. Successive disengagements thusly are anticipated to be normal in wireless computing since the trickiness of wireless channels alternately the requirement to spare vigor may compel wireless locales to briefly detach from the wireless network [zdonik et al. 94]. Decoupled computing likewise infers to have the ability to change area while being separated. Migrant or portable computing however accept clients to change area while being joined and computing. Subsequently, area administration is much harder than in decoupled computing. Since portable computing is not attainable utilizing accepted altered wired networks we're again to wireless computing. A wireless information system is an information system dependent upon wireless computing which commonly

serves distributed clients and includes database technology.

It is by and large acknowledged that communication and information systems are main considerations for temperate and social advancement, yet at the same time are underdeveloped in numerous advancing countries (Alleman et al. 94, Gardner 94, Meadows 94, Vishloff et al. 94, Ono 96, Thapisa 96). Fiscal, political and administrative issues are a portion of the principle snags to communication system advancement in advancing countries (Ono 97, Ono 96, Anvekar et al. 96, Gardner 94). Then again, the interest for communication and information benefits in advancing countries is expanding (Anvekar et al. 96, Meadows 94), however customary copper wire frameworks are so exorbitant it would be impossible introduce and support in country, less developed ranges (Clontz 94, Ananasso 97, Gilder 95, Ramsay 95, Thapisa 96). Wireless communication systems offer more terrific adaptability in network design, quicker sending, and are more suitable in challenging landscape and atmospheres (Javed et al. 94).

This study has three main contributions: it presents the application of a wireless health care information system in Tanzania, discusses appropriate wireless technologies to implement it, and proposes and evaluates replication management strategies to operate it efficiently at low costs. Section 2 describes the background and characteristics of the application, and highlights the benefits which health care can gain from the information system. Section 3 studies which wireless communication technology is suitable for such a distributed information system. We identify the main requirements of information systems' communication in developing countries and discuss to which extent they can be met by radio and satellite technology. Section 4 argues that wireless information systems need to employ data replication in order to reduce communication costs and to cope with the much lower bandwidth compared to wired networks. Possible replication strategies are evaluated in a simulation model, using the envisioned wireless health care information system as an illustrating example. Further topics are relevant to the introduction of information systems in developing countries (e.g. political, social, cultural and regulatory issues, human resources, education, etc.), but are left to the literature¹ in order to concentrate on the organisational context and technical implementation.

BACKGROUND

In a distributed environment data is imitated with a specific end goal to accomplish shorter reaction times, higher throughput and expanded accessibility and dependability in the event of disappointments. The thought is to place data where it is to be handled and storing excess data at free destinations. In the writing profits of replication are by and large acknowledged and a considerable measure of routines have been proposed for guaranteeing consistency in distributed

systems for the most part concerned with the issue of giving atomicity [ceri et al. 91], [davidson et al. 85].

Shockingly, these calculations either demolish the property of accessibility by synchronous access to numerous destinations or protract reaction times by presenting remote access. One notion to keep away from these issues is regarded as loose coherency which implies purchasing execution and autonomy for surrendering „up-to-date-ness" of the data as far as the requisition can endure it [gallersdörfer, Nicola 95].

The India venture managed database help for an adaptable telecommunication control construction modeling called keen network [gallersdörfer et al. 94]. A distributed database system dependent upon normal workstations was manufactured by glueing together business database systems and Atomic Delayed Replication (ADR) which is a novel strategy for reproduction administration and concurrency control in distributed databases.

ADR is dependent upon the thought of nonconcurrent engendering of redesigns with regulated levels of consistency to attain shorter reaction times and expanded throughput while keeping the likelihood for an adaptable discontinuity and replication design with deference to adaptability [gallersdörfer et al. 94]. The strategies developed in the India venture are a case of how to downsize substantial databases from mainframes to networks of workstations.

A hospital has 100 to 350 couches for inpatients additionally serves outpatients. Alongside the essential therapeutic medications its administrations generally incorporate x-flash, surgery, and so on. A hospital regularly utilizes a few specialists, frequently incorporating masters from abroad because of whom patients are habitually alluded starting with one hospital then onto the next. Additionally, a hospital is responsible for overseeing various health focuses and dispensaries.

A health focus could be seen as a little hospital. It has 15 to 60 quaint little inns less propelled supplies and corrective capacities and additionally less qualified staff. Health focuses are intended to soothe the hospitals, particularly by serving noteworthy amounts of outpatients, however customarily they need to allude patients to a hospital.

A dispensary ordinarily has no quaint little inns no inpatients. Regularly the staff are less qualified than in health focuses. The errand of a dispensary is to inspect and treat outpatients the extent that this would be possible with the learning and supplies nearby, and to either endorse and offer fitting medications or allude the patients to a health focus or hospital.

BENEFITS OF A DISTRIBUTED HEALTH CARE INFORMATION SYSTEM

Installation and maintenance of *wireless networks will be less expensive* compared to wired networks [Gilder 95]. Building a wired network among a huge number of computing sites in a wide area necessitates a lot of effort since miles of wires have to be laid subterranean. This is a difficult task in industrial as well as in developing countries. Many areas in industrial countries are tightly filled up with highways, buildings, railways, private properties, etc. which prevent wires from being laid underground. Additionally, cutting ditches is a time consuming and thus costly piece of work. Wireless links however provide connections all across highways and buildings and their installation does not require any digging so that a *rapid introduction of communication infrastructure* is possible. This also holds for wireless telephony: G. Gilder points out that it does not pay to lay a dedicated copper wire to every household that uses it on average some 15 or 20 minutes a day. Moreover, in rural areas the copper lines cost between 10 and 30 times as much per customer as they do in cities [Gilder 95]. Nevertheless, to the best of my knowledge there is no detailed cost evaluation of wireless information systems in the literature yet.

In developing countries geographical and climatic circumstances do not allow to set up and maintain wired infrastructures at reasonable costs. Jungles, mountains, conservation areas, (temporary) swamps and uninhabited regions are suitable for neither installation nor maintenance of wired connections. Furthermore, heavy rainfalls that wash away surfaced roads will have a similar effect on miles of wire. Consequently, wireless networks seem to be the only affordable and reasonable solution to introduce a (data) communication infrastructure in such regions in a cost effective way.

The field study uncovered a considerable measure of communications between hospitals, health focuses and dispensaries. They concern the organization and information preparing around these offices, and make a distributed health care information system attractive. Such a system will comprise of nearby databases at each one spot which are to be interconnected by a wide territory communication network. The nearby databases, even on their own, could be of incredible profit for the offices since:

- patient related information could be discovered and entered quite rapidly. Regularly, the manually written inpatient cards of released patients can not be found in time of requirement.
- statistics requested by the legislature could be determined immediately, quick and correctly from the databases (rather than physically, moderate and with oversights as frequently found).

- further factual assessments are craved for choice backing, viable administration and regulating of medications, medication medicines, costs, and so on.

- epidemiological interdependencies could be uncovered by assessing the medicinal data.

Basic databases to help certain measurable assessments were designed and conveyed at three teacher hospitals with enduring triumph (Nicola 96). Interconnecting the health offices by a communication network has the possibility to enhance the public health care system:

- on the referral of a patient starting with one spot then onto the next there is generally no medicinal information passed on with him. Joining the neighborhood databases might permit to transmit patient related data to the referral hospital preceding the landing of the alluded patient.

- experience has demonstrated that separated from referrals, patients that counsel a health office have stayed at an alternate hospital or health focus at a past time for an alternate excuse for why. The patient's history is regularly a crucial information for further medicine and could be discovered and entered remotely. The trade of patient related data likewise serves to evade redundancy of examinations and lab tests and subsequently recoveries time and cash.

- epidemiological assessments bode well in the event that they are completed for an entire locale than right for the catchment region of a solitary hospital. A distributed information system will be an important device for territorial or countrywide sickness reconnaissance and supervision of the public health status. A sample of flow investment is the predominance of HIV tainting: assessing the inpatient- and outpatient data might uncover cooperations between HIV contaminations and habitation of patients and also companionships between HIV contaminations and joining illnesses.

Comparable profits have additionally been accounted for in the written works (Hutchison et al. 96, Jayaram et al. 96, Parsons 92, Yacubsohn 95), however basically for streamlined and semi-mechanical countries, especially their country territories. The Stanford University Medical Center claims that wireless and versatile patient information systems can enhance doctors productivity by 30%, empower more customized patient care, essentially decrease health care conveyance expenses and increment patient limit by 30% (Brose 95). The adequacy of patient records receptiveness to backing shared health care methodologies like referrals and counseling in provincial West Virginia/usa has been assessed in (Galfalvy et al. 95). Our discoveries

exhibit that interconnecting nearby health care information systems might be similarly as helpful in improving countries.

DATA COMMUNICATION TECHNOLOGIES FOR DEVELOPING NATIONS

General outlines of wireless data communication innovations could be found in (Desimone, Nanda 95, Diehl et al. 95, Pahlavan et al. 94). The inquiry to be tended to here is, which of the aforementioned innovations are suitable for distributed information systems in improving countries.

Prerequisites : The fundamental necessities emerge from the provision setting:

- wide territory communication
- easy and modest establishment of the wireless network
- low running expense for working the network
- easy operation and support of the network, following there are excessively few administration pros in remote territories of improving countries
- decoupled (not so much versatile) computing (i.e. clients can associate with the system at whatever time and anyplace however don't change their area while being associated)
- sufficient network execution (i.e. throughput & communication delay & accessibility & unwavering quality) to guarantee provision purpose
- the communication system must be expandable to take into consideration numerous locales to join the distributed information system in future

Some of these prerequisites match with the agenda of provincial telecommunication supplies necessities in (Vishloff et al. 94), i.e. they apply to Tanzania as well as to numerous improving countries. The main condition lessens the procedures to be recognized to wireless WAN systems which are by and large Hf/vhf radio methods, analogue and digital cellular architectures and satellite administrations. The greater part of these systems help decoupled computing. Cellular architectures damage the interest of savvy establishment and operation in light of the fact that they oblige a base station to be introduced in every cell which does not pay off in remote territories of low client thickness (Maral 94, Vishloff et al. 94).

Existing wireless information systems in developing countries : The aim of the non profit organizations VITA (Volunteers in Technical Assistance) and SatelLife is to provide low-cost data-communication and information services in developing countries (Vita

97, SatelLife 97). The general approaches of VITA's VITACOMM system and SatelLife's *HealthNet* are similar: Both organisations employ „small" LEO (low earth orbit) satellites, amateur packet radio techniques and conventional telecommunication structures if existent. Neither system provides a global coverage of real time services but delayed store-and-forward data messaging only. This type of service is inappropriate as a communication network for distributed database systems. Hence, radio or satellite systems need to be employed in a different manner.

Packet radio vs. satellite systems : PACTOR and packet radio are digital modes of amateur radio communications², which take a data stream from a computer and send it in packets via radio frequencies to another station similarly equipped (Kenney 97, Leiner et al. 87, Karn et al. 85, Karn 92). Commercial satellite systems such as *Iridium*, *Globalstar*, *Odyssey*, or *ICO-P*, are currently being developed to provide world wide phone services, but they also offer wireless data communication³, e.g. through satellite modems. Since most of the satellite systems are still under development, it is very difficult to predict which system will provide the best quality of tele- and data-communication services at a reasonable price. From the system characteristics we believe that *Iridium* is the most promising satellite system for rapid introduction of ubiquitous communication in developing countries. *Iridium's* crucial advantage over the other systems (except *Teledesic*) is that its inter-satellite link technology will allow service in (developing) countries without any terrestrial wireline infrastructure.

The fundamental preferences of satellite systems over radio are always „guaranteed" throughput, dependability and accessibility, and in addition an extremely guaranteeing future. Particular satellite communication is set to be an a few billion dollar market for a considerable length of time to come where countless clients are relied upon to be served (Javed et al. 96). In this manner, an expert and aggressive advancement will proceed so as to meet the client's requests, to permit low costs, and to strive for a persistently expanding nature of administration. Moreover, the consistent combination with physical telephone networks planet wide - if wired or wireless - will advantageously join a satellite telephone client into the universe of information and communication. Presently an astounding reduction of charges is occurring available of cellular wireless telephone systems. A comparative improvement could be normal for satellite telephones as the amount of clients and the amount of contending organizations develop. Furthermore, the network framework itself is supported by the satellite system driver as opposed to by the clients themselves.

CONCLUSION

In this paper an exploration venture managing wireless information systems for improving countries

was presented. The use of wireless computing thoughts to assemble a distributed information system was persuaded by examining wireless computing profits like low expenses, quick presentation of communication base, more extensive dissemination also participation of clients, versatility and high adaptability. Besides, it was contended that wireless information systems speak to the following consistent venture in the development of information systems.

Acknowledging the present status and what's to come improvement of accessibility, running expenses and nature of administration, we infer that in the transient parcel radio is the most doable data communication foundation for East African countries (and potentially for other improving countries too).

Be that as it may, in the medium- and long haul worldwide satellite systems are the most favourable tele- and data communication foundation for advancing countries. This is a result of their high caliber of administration, diminishing running expenses, joining with existing networks, and their significant part in future communications. As a rule, this perspective is imparted by (Ramsay 95, Chasia 95). Moreover, there is a developing cognizance that the shabbiest technology is not so much the best decision, since by utilising the latest technology, improving countries could "jump" innovative stages followed in numerous developed countries and guarantee that their communication foundation is an intense and solid state-of-the-symbolization, fit to partake in future advancements.

Despite the fact that a pattern from parcel radio to satellite systems could be normal, their regular impediment is a quite low transmission limit contrasted with wired networks. Hence, our methodology to design wireless information systems is to handle the restricted data transfer capacity issue as a rule (through requisition situated replication), while abstracting from other specialized parts of either technology.

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