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The African Journal of Information and Communication

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Issue 11
2010/2011
Non-Thematic Edition

Learning Information Networking Knowledge (LINK) Centre
Graduate School of Public and Development Management
University of the Witwatersrand, Johannesburg



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EXPLANANTION OF COVER IMAGE

The image of the African basket has been used for manifold reasons, not just as an image of African craft. The basket as a receptacle, a place of storage, a melting pot for the genesis of creation, in this case, knowledge and information. Through the ages, the African basket has served to store the needs of the household, now it stores not just the needs of the nation, but of the entire continent. Baskets have a tradition as having been woven as part of a social activity, with the usage of raw materials to bind together their decorative features and to denote their individual relevance.

These individual design elements and forms each pertain to a particular meaning...

… The element of the image of Africa revolves around the base of the basket in a circular and cyclical manner.

… Particular iconography inherent to the Internet, in this case the social networking icon, denoting active, engaged people as part of an information society in Africa.

… Again networking, trade, the digital economy, linked with people at grassroots level, is used in the iconography of the moving hands - a usage of the free-trade federation logo, which in itself is testament to the emergence of how knowledge and regulations have benefited and empowered and reshaped various economies in Africa.

… Around the top of the vessel revolve different groups within our society; an ebb and flow of inclusion and exclusion with regard to technical access, and their subsequent empowerment or disempowerment as a result of this phenomena.

… At the pinnacle of the image sails the giant cable-laying ship, which provides the foundation for an unseen underwater support system, its cables powering and igniting the quest for information and growth upon the African continent.

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The African Journal of Information and Communication (AJIC), an academic journal accredited by the South African Department of Higher Education and Training, is published by the Learning Information Networking Knowledge (LINK) Centre, Graduate School of Public and Development Management. The AJIC is an annual interdisciplinary journal concerned with Africa's participation in the Information Society and Network Economy. It focuses on Information and Communication Technology (ICT) issues at global, regional and national levels, which have implications for developing countries in general, and for Africa and the Southern African region in particular. It encourages debate on various aspects of ICT policy, regulation, governance, strategy and implementation, with interest in the multiple relationships between technology, the economy and society. It is intended to be both a rigorous academic journal and a practical medium to inform the continent's actors and decisionmakers in government, industry and civil society, across the many diverse areas where information, communications and new media play a role.

The journal is supported by an international editorial board, comprising:
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EDITORS' COMMENT

Tawana Kupe
Faculty of Humanities, University of the Witwatersrand, Johannesburg
Lucienne Abrahams
LINK Centre, University of the Witwatersrand, Johannesburg

NON-THEMATIC ISSUE 2010/2011

This issue of The African Journal of Information and Communication[1] presents a range of articles covering topics on international mobile roaming, competition policy and regulation, electronic government and technological innovation. These articles, focusing on the domains of telecoms and ICT applications, illustrate the range of subject matter that is particular to innovation in ICT on the African continent, and of interest to African scholars.

The first two articles, "*International mobile roaming: progress and challenges in African Markets*" and "*State of competition in Zambia's telecommunications sector*", explore particular aspects of the evolution of telecoms and telecoms regulation. The article "*Servicing advocacy in e-Government*" draws attention to the importance of theorising applications of ICT to development challenges, in order to understand how to ensure effectiveness in e-government; while the article entitled "*Context-aware VoIP congestion control service*" is derived from the authors' post-graduate research and illustrates the necessity of research into ICT applications, their form, content and value.

This university-based journal of African scholarship publishes academic articles under the broad theme of "the Information Society, the Knowledge Economy and development". An Information Society view on the world analyses information access and flows and how these change the character of societies, with effects that may be either empowering or disempowering to particular social groups. The Knowledge Economy is conceptualised as a perspective which explores knowledge as an increasingly dominant factor of production, resulting in the reshaping of societies and economies, mediated by new electronic media.

Published as The Southern African Journal of Information and Communication until 2008, the journal has now evolved into an investigation of the emergence of Information Societies and network-based Knowledge Economies on the African continent. In particular, it will explore the themes of national development and inclusion and exclusion from the global economy. It seeks to investigate an African perspective – drawing on the work of African writers and writers focusing on Africa, utilising the collegial services of an editorial board and reviewers steeped in global knowledge. The journal will publish work from experienced and emerging scholars on both non-thematic and thematic issues with interest in ICT policy and regulation; e-development and e-governance; IP, content and open access to knowledge; ICT, innovation and economic systems; ICT-enabled institutional, social and economic change; infrastructures, institutions, resources and technologies for an African information society.

1 The name of the journal was changed in 2010 from The Southern African Journal of Information and Communication to The African Journal of Information and Communication.

ONE

INTERNATIONAL MOBILE ROAMING: PROGRESS AND CHALLENGES IN AFRICAN MARKETS

Ewan Sutherland

ABSTRACT: . The persistence of high prices for international mobile roaming services, in contrast to falling national mobile prices, has been a recognised item on the global regulatory agenda for half a decade. In Africa, there have been studies and discussions about regulatory options in regional economic groups and in the various networks of national regulators. As yet, there has been no transnational regulatory action. Yet the initiative of one large operator saw the introduction of transnational tariff schemes (ie without a surcharge for roaming), forcing competitors to collaborate in order to respond, if they wished to attract and to retain customers. This has both saved money for consumers and greatly reduced the need for regulatory interventions that might have proved counterproductive. In some countries this type of offer remains impossible, because international gateways are a monopoly, having yet to be opened to competition

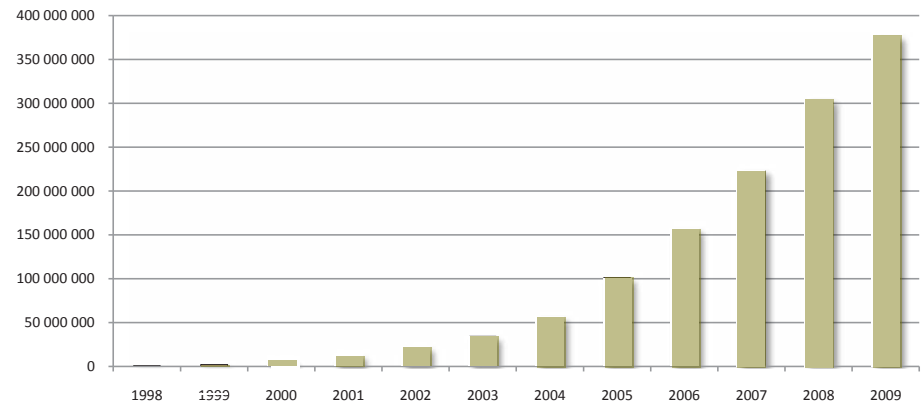
KEYWORDS

International mobile roaming, high IMR charges, African telecommunications sector, regulatory agenda

INTRODUCTION[1]

Recent years have seen remarkable growth in cellular wireless telecommunications in Africa, rising to over 350 million reported connections, equivalent to just over one-third of the population (see Figure 1). The predominant technology has been GSM, with only some 10% being connections using CDMA (CDG, 2010), plus a very few individuals with satellite telephones, supplied by Inmarsat and Thuraya. However, these numbers are significantly and systematically overstated, due to the ownership by many individuals of multiple SIM-cards – with the resulting need to take at least 20% off official mobile teledensity figures (Sutherland, 2009).

FIGURE 1: GROWTH OF MOBILE CONNECTIONS IN AFRICA

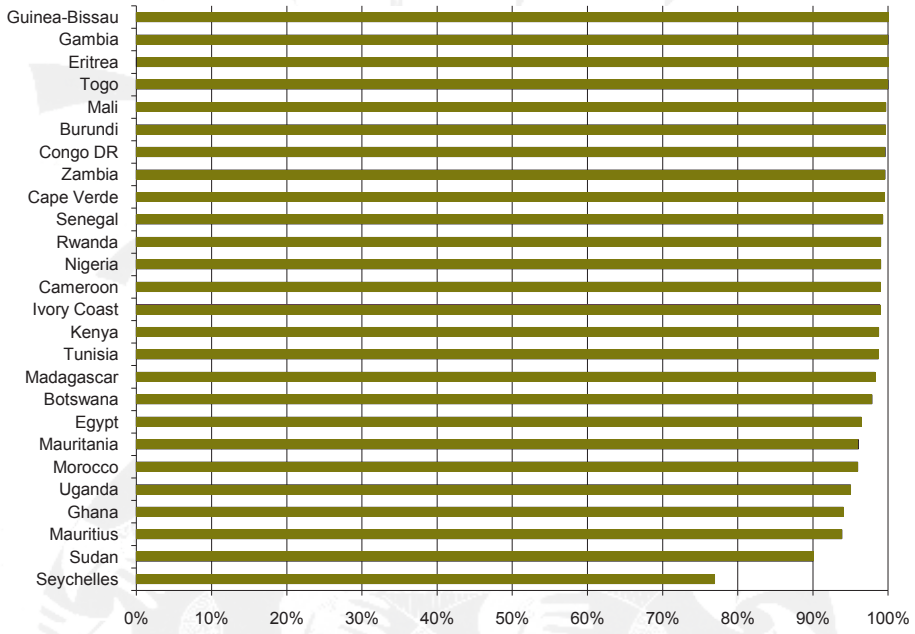


Source: UN, 2010

1 An earlier pre-print version of this article is available as LINK Public Policy Research Paper No. 10.

An overwhelming majority of these customers are pre-paid (see Figure 2). This reflects individuals' low levels of disposable income, their uncertainty about future availability of cash and their lack of experience in the use of credit. Moreover, the operators have access to credit histories for only a tiny minority of their prospective customers, making risk assessment entirely impractical. In contrast, top-ups for mobile phone services are widely available at locations close to customers and in small, affordable increments.

FIGURE 2: PREPAID CUSTOMERS IN SELECTED AFRICAN COUNTRIES IN 2008



Source: ITU, 2009

For Mobile Network Operators (MNOs) in Africa, International Mobile Roaming (IMR) is a very attractive service, both for inbound and outbound roamers. Inbound roaming traffic generated by tourists, business travellers, visiting journalists, government officials and the like can be highly lucrative – even in war zones – with foreigners making expensive IMR calls from airports, hotels and offices. The traffic is paid for by the home MNO in foreign currency and requires no marketing effort, with the only financial risk being fraud control for which procedures are well established (eg accelerated transfer of records) (GSMA, 2007). Outbound roaming appeals to a set of high-spending domestic customers, such as government ministers and business leaders, who wish to use their phones all over the world. To secure these influential customers and to avoid them switching to a domestic rival, operators enter into a very wide range of contracts for IMR, even in countries where the likelihood that the service will be used might seem small. For the predominantly poor customer base the option of paying very high rates for IMR simply does not exist. Instead, they find inexpensive alternatives, of which the most obvious is to purchase a local SIM-card and thus engage in "plastic roaming". This causes inconvenience for colleagues, family and friends, who are no longer able to call them on their usual number.

Africa now has a number of geographically extensive operator groups, recently modified by the acquisition of Atlantique by Etisalat and by the sale of most of the Zain networks to Bharti Airtel (see Table 1). Their geographical scale allows them the possibility to internalise at least a portion of their IMR traffic, except where they cannot obtain their own international gateway. In a few countries there remains a formal monopoly, requiring all international traffic to pass through the incumbent operator. These countries are: Angola, Burkina Faso, Cameroon, Eritrea, Ethiopia, Gambia and Zimbabwe (ITU, 2010).

TABLE 1: GEOGRAPHICAL FOOTPRINTS OF TRANSNATIONAL OPERATORS

	Airtel*	Zain	Lap Green	Millicom	MTN †	Orange	Orascom	Portugal Telekom	Vodafone ‡
Algeria							X◊		
Angola								X	
Benin					X				
Botswana					X	X			
Burkina Faso	X								
Cameroon					X	X	X		
Cape Verde Islands								X	
Central African Rep.						X			
Chad	X			X					
Congo (Brazzaville)	X				X				
Congo (DR)	X			X					X
Egypt						X	X		X
Equatorial Guinea						X			
Gabon	X								
Ghana	X			X					X
Guinea (Conakry)					X				
Guinea Bissau					X			X	
Ivory Coast			X		X	X			
Kenya	X					X			X
Lesotho									X
Liberia					X				
Madagascar	X					X			
Mali						X			
Malawi	X								
Mauritius				X		X			
Morocco		X							
Mozambique								X	
Namibia								X	
Niger	X		X			X			
Nigeria	X				X				

	Airtel*	Zain	Lap Green	Millicom	MTN †	Orange	Orascom	Portugal Telekom	Vodafone ‡
Rwanda			X		X				
São Tomé & Principe								X	
Senegal				X		X			
Seychelles	X								
Sierra Leone	X		X						
South Africa					X				X
Sudan		X	X		X				
Swaziland									
Tanzania	X			X					X
Togo			X						
Tunisia							X		
Uganda	X		X		X	X			
Zambia	X				X				
Zimbabwe									

* Rebranded from Zain.

† Trading as Tigo.

‡ Including Safaricom and Vodacom.

◊ Sold in November 2010 to Wataniya, while other interests are to be merged with Vimpelcom.

Source: Websites of Zain, Millicom, MTN Group, Orange, Orascom, Portugal Telecom, Vodafone, GSM World

Historians and political scientists have frequently commented on and complained about the arbitrary boundaries imposed on Africa by the colonial powers in the 19th century and retained at independence in the 20th century (Touval, 1999; Laremont, 2005). These borders often ignored languages and cultures, many of which were left straddling lines drawn on a map by someone in Berlin, London or Paris. One consequence of this is that people quite naturally cross borders, and wish to continue using a mobile phone service.

This paper examines the overall market for IMR services in Africa. It then considers the "One Network" tariff from the Zain Group and the responses from other operators. The various regulatory initiatives undertaken in the regional economic communities are considered. The introduction of roaming hubs is then examined. Finally, conclusions are drawn and issues identified for future research.

THE ISSUE OF IMR CHARGES

The persistence of high charges for IMR was noted as early as 1999, in contrast to a general decline of mobile charges, in complaints addressed to the European Commission (EC) (Sutherland, 2001). A number of competition law mechanisms were used in attempts to address this problem, with remarkably little success, and despite efforts to identify the problem, provided remarkably few useful insights. Then in 2007 transnational legislation was adopted

by the European Union (EU), imposing wholesale and retail price caps, together with transparency measures (EU, 2009). While politically effective, it was an economically crude instrument, one that further complicated analyses of the markets (Sutherland, 2010).

Rightly or wrongly, IMR has come to be seen as a policy and regulatory problem, rather than as a commercial challenge or opportunity. It became a feature of international policy and regulatory discussions, being raised at regional bodies for Asia-Pacific, the Americas, the Arab states and Africa. It was also taken up at the Organisation for Economic Cooperation and Development (OECD, 2009). It was discussed at the ITU-T in Study Group 3, first in 2002 and again in 2009-10 (ITU-T, 2010). The ITU-D held discussions at its 2006 Global Symposium for Regulators (GSR) and included a chapter on IMR in the 2008 edition of Trends in Telecommunications Reform (ITU, 2008). IMR was also included in the ICT Regulatory Toolkit (infoDev & ITU, 2010). The IMR problem had become part of orthodox regulatory agenda, something that ought to be considered.

However, there has been a poor level of understanding of the economics of roaming, not least because of the shortage of data, especially concerning the operations of wholesale markets. This has delayed and perhaps confounded the identification of a solution to the IMR problem in the form of an intervention in the market.

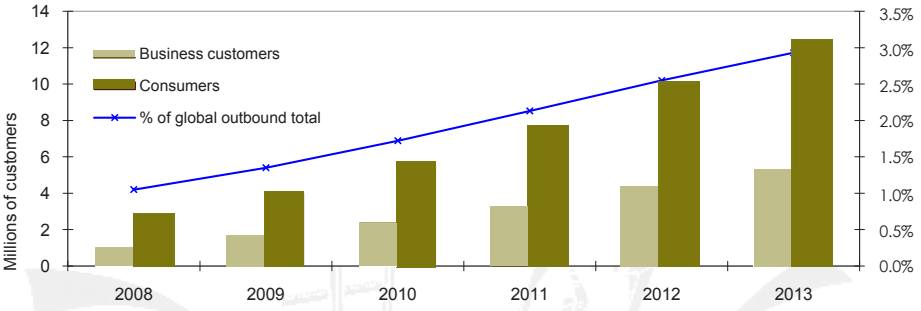
Individual governments and regulators have been caught in a form of Catch 22, being expected to act but being unable to do much that is likely to be other than counterproductive. Collective action requires a legal basis that, outside the EU, does not exist except, conceivably, in free trade agreements.

Thus while the problem of IMR has been recognised, there are only very limited analyses and no solutions. There is no robust and detailed model of roaming markets with which potential interventions can be tested, nor even satisfactory data to construct such a model. Governments and regulators are thus forced to conduct experiments in the real world with very limited certainty of outcomes, something that, understandably, gives rise to hesitancy. This is compounded by the need for collaborative action between groups of governments and regulators in which interests are often poorly aligned.

THE AFRICAN ROAMING MARKET

In 2008, the global market for roaming was estimated to be worth USD24.5 billion, with some 365 million outbound roamers. Of that total, African countries represented only one percent of roamers, though forecast to grow to around three percent by 2013 (see Figure 3). A substantial majority of the African roamers were consumers rather than business travellers, though both groups were forecast to grow.

FIGURE 3: FORECAST OF TOTAL OUTBOUND ROAMERS FROM AFRICAN MNOS



Source: Stainthorpe, 2008

Unfortunately, there are no equivalent estimates for inbound roamers, making it very difficult to assess the market dynamics or to understand the net cash flows. Only when inbound and outbound roamers are both accounted for can the effects of IMR be analysed. Countries in North Africa and some of the Small Island Developing States (SIDS) are likely to have heavy volumes of inbound traffic from tourists and from return visits of migrant workers.

Unusually, there are data for roaming traffic for the Cape Verde Islands. These show the expected preponderance of inbound over outbound traffic (see Table 2). The effects of the global financial crisis can be seen in the sharp drop in traffic in 2009.

TABLE 2: ROAMING TRAFFIC TO AND FROM CAPE VERDE ISLANDS (MINUTES)

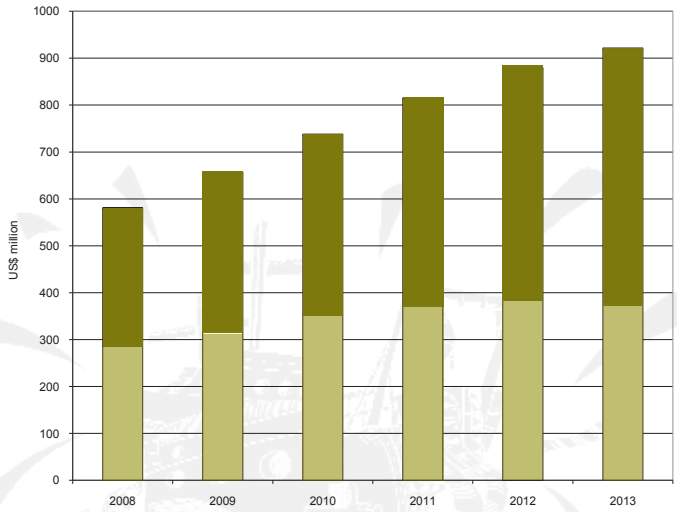
	2006	2007 H1	2007 H2	2008 H1	2008 H2	2009 H1	2009 H2
Inbound	2 460 218	1 228 046	1 263 128	1 345 419	1 345 176	1 619 123	760 166
Outbound	66 537	49 701	62 115	61 287	101 361	490 473	147 901
Net traffic	2 393 681	1 178 345	1 201 013	1 284 132	1 243 815	1 128 650	612 265

Source: ANAC, 2010

Taking the 2005 data on tourists visiting the Cape Verde Islands, some 198 000 visitors (of a total population of 500 000), represented about 13 minutes per visitor over an average stay of 4 to 5 nights. In 2008, outbound roaming represented only 0.1% of total mobile voice traffic, while inbound roaming was about 2.4%, though it was likely to be a higher portion of the international calls originating on mobile networks. Given the higher charges, the revenues would not be in proportion.

The revenues earned by African MNOs from outbound roaming are shown in Figure 4. There are minimal amounts from SMS and data roaming, with the vast majority of the money coming from voice traffic. The forecast growth comes mostly from roaming between countries in Africa.

FIGURE 4: TOTAL OUTBOUND ROAMING REVENUES OF AFRICAN MNOS



Source: Stainthorpe, 2008

Although there are no data on inbound roamers, it is possible to consider the prices they pay, for example, the IMR tariffs charged to visitors from the US. Table 3 shows the prices charged in the summer of 2006, Table 4 and Table 5 for the summers of 2009 and 2010. The same broad pattern applies to all, with a "flat rate" charge, the same per minute rate for incoming, local and international calls. If customers pay an additional monthly fee, usually on an annual basis, lower rates are available. For the most part, the prices are quite expensive, in some cases extremely so. In particular, calls forwarded to Kenya from the US, where the wholesale cost would be a few cents, are charged at USD3.99 or 4.99 per minute. The differences between the tables suggest there is little, if any, competition between the operators in the US and give the appearance that the operators are engaged in an upward price spiral, copying the higher prices of their domestic rivals. Although some of their customers engage in plastic roaming, it would appear not to exert any pressure on the home operators.

TABLE 3: ROAMING CHARGES FOR US-BASED CUSTOMERS IN AUGUST 2006

	Cingular Standard	Cingular World traveler	Sprint	T-Mobile	Verizon Global phone
South Africa	2.49	1.69	1.50	1.49	2.49
Mozambique	3.49	3.49	1.50	1.99	1.29
Malawi	4.99	4.99	-	1.99	1.29
Tanzania	3.99	3.99	1.50	4.99	1.29
Kenya	3.49	3.49	1.50	4.99	4.99

	Cingular Standard	Cingular World traveler	Sprint	T-Mobile	Verizon Global phone
Ethiopia	3.49	3.49	-	-	-
Sudan	3.49	3.49	-	-	-
Egypt	2.49	2.29	1.50	1.99	-

Source: Sutherland, 2006

TABLE 4: INTERNATIONAL ROAMING CHARGES FOR US-BASED CUSTOMERS IN AUGUST 2009

	AT&T Standard	AT&T World traveler	Sprint	T-Mobile*	Verizon Global phone+
South Africa	2.49	1.69	2.49	1.49	2.89/2.29
Mozambique	2.49	2.49	2.49	1.99	2.89/2.29
Malawi	3.49	3.49	3.49	1.99	2.89/2.29
Tanzania	4.99	4.99	4.99	4.99	4.99/3.99
Kenya	3.99	3.99	3.99	4.99	4.99/3.99
Ethiopia	3.49	3.49	3.49	2.99	2.89/2.29
Sudan	3.49	3.49	3.49	-	2.89/2.29
Egypt	2.49	2.29	2.49	1.99	2.89/2.29

* Roaming charges do not include local tolls or long distance charges.

+ The higher rate is the standard roaming plan and the lower rate is the value plan.

Source: Websites of AT&T T-Mobile, Verison

TABLE 5: INTERNATIONAL ROAMING CHARGES FOR US-BASED CUSTOMERS IN AUGUST 2010

	AT&T Standard	AT&T World traveler	Sprint	Sprint with plan	T-Mobile*	Verizon Global phone+
South Africa	2.49	1.69	2.49	1.69	2.49	2.89/1.69
Mozambique	2.49	2.49	2.49	2.29	2.49	2.89/2.29
Malawi	3.49	3.49	3.49	2.99	3.49	2.89/2.29
Tanzania	4.99	4.99	4.99	3.99	4.99	4.99/3.99
Kenya	3.99	3.99	3.99	-	4.99	4.99/3.99
Ethiopia	3.49	3.49	3.49	2.29	3.49	2.89/2.29
Sudan	3.49	3.49	3.49	2.29	-	2.89/2.29
Egypt	2.49	2.29	2.49	2.29	2.49	2.89/2.29

* Roaming charges do not include local tolls or long distance charges.

+ The higher rate is the standard roaming plan and the lower rate is the value plan.

Source: Websites of AT&T T-Mobile, Verison

The net effects of IMR in African countries are very difficult to assess in the absence of data on the inbound number of minutes and the associated revenues. Even the relatively expensive rates charged to visiting Americans cannot be fully evaluated without the wholesale rates paid by the US-based MNOs to their African IMR partners. Nonetheless, it seems likely that the bulk of the profits on IMR calls for visitors from developed countries are retained at home. Moreover, the regulators in developed countries ought to examine IMR tariffs in Africa for evidence of lack of competition on their own retail markets, and conceivably for evidence of collusion.

ONE NETWORK

Celtel was a leading African mobile operator with a substantial geographical presence, often in adjoining countries, built up at a time when the continent was considered much less inviting for MNOs. In March 2005, the Mobile Telecommunications Company (MTC) of Kuwait, announced it had a binding agreement to acquire 100% of the shares of Celtel International BV for USD3.36 billion. In September 2007, MTC adopted the use of the Zain brand (Zain, 2007).

At the end of 2006, MTC launched its new strategy "ACE":

- Accelerating the growth in Africa
- Consolidating the existing assets
- Expanding into adjacent markets.

This was to achieve 3x3x3: "It is the strategy that will make Zain a global player in three stages: regional, international and global, with each stage completed in three years, with an aim of reaching a customer base of 150 million. In essence, with this expansion plan, we aim to achieve in nine years what other companies have taken more than 27 years to achieve" (Zain, 2007).

However, the expansion did not last long and having overextended its reach, Zain sold its African operations, other than in Morocco and Sudan, to Bharti of India for USD10.7 billion in March 2010 (Mookerji, 2010). These networks were rebranded "Airtel" later the same year (Telecoms, 2010).

MSI, subsequently part of Celtel and later Zain, had operations on both sides of the River Congo, in The Democratic Republic of Congo (DRC) and in The Republic of Congo (M2 Presswire, 2002). Although Kinshasa and Brazzaville, the two capitals, are separated by only seven kilometres, telephone traffic between MSI's two MNOs was routed to the respective fixed incumbent operators, which only interconnected in Europe. The costs for this were considerable and had the effect of suppressing demand for calls between the two neighbours. MSI was eventually able to obtain the necessary licences and installed a microwave link across the River Congo in 2002, allowing it to cut its charges by 80% and thus greatly increase traffic volumes. This type of problem was replicated on different scales at many borders in Africa.

In East Africa changes made by the governments gradually liberalised international telecommunications, allowing Celtel and later Zain to own and to interconnect its gateways. In 2004 Kenya joined Tanzania and Uganda in this liberalisation, allowing Celtel to launch reduced rates for calls between the three countries (Zain, 2005). Then in 2006, Zain announced a One Network offer eliminating IMR surcharges for both post-paid and pre-paid customers in East Africa (see Table 6). With all the traffic retained on its own networks, roaming had been fully internalised and with no roaming onto the networks of rivals, there could be no out-payments. A more conventional approach to pre-paid roaming, with high charges and requiring an expensive technical platform, was considered highly unlikely to stop customers switching to rivals.

The One Network offer was gradually extended westward to the Atlantic Ocean, covering an area greater than the EU and becoming available to nearly half the population of the continent. The exception was Zambia, whose government refused Zain its own international gateway, officially for reasons of national security. MNOs there were required to pay the fixed incumbent operator for their international traffic, the government forcing them to support Zamtel in preparation for its privatisation. Instead of One Network, Zain offered its Zambian customers only very limited pre-paid roaming (eg to the UK). Finally, the government relented, allowing competition in international gateways and thus One Network could be offered there (Malakata, 2010).

TABLE 6: THE GROWTH OF THE ZAIN ONE NETWORK

2006	June 2007	November 2007	2009	2010
Kenya	Democratic Republic of Congo	Burkina Faso	Ghana	Zambia
Tanzania	Gabon	Chad	Sierra Leone	
Uganda	Republic of Congo	Malawi	Madagascar	
Gabon		Niger		
		Nigeria		
		Sudan		

Source: Zain press releases

The Zain One Network tariff introduced a special case, which rivals found difficult to copy. If, say, someone living in Uganda has a relative or friend working in Kenya, then if they both use SIM-cards from their countries of residence they must pay for international calls. However, if both use Zain Kenya SIM-cards then the person in Kenya can call the person in Uganda for the price of a domestic call, making a considerable saving (see Table 7). All that is required is a little "juggling" of SIM-cards, to ensure that calls are made on SIM-cards of the same nationality – presumably they would wish mostly to be on a local SIM-card for local family, friends and colleagues.

TABLE 7: PREPAID TARIFFS OF ZAIN KENYA IN 2009 (KENYA SHILLINGS) (ZAIN, 2009)

	To Zain Kenya	To Zain Uganda
Pamoja - peak	7	32
Pamoja - off-peak	3	23
Vuka - peak	8	32
Vuka - off-peak	8	23
Roaming in Uganda	15	15

ZR1 = KES9.75

Source: Zain Website

The One Network offer was extended to data and Internet access in May 2009 (Zain, 2009). Initially, this covered Kenya, Tanzania and Uganda and some countries in the Levant. The Zain One Office tariff allowed the use of GPRS across East Africa. The prices are shown in Table 8, converted into ZAR to simplify comparisons.

TABLE 8: ZAIN ONE OFFICE GPRS TARIFFS IN EAST AFRICA IN NOVEMBER 2009 (PER MINUTE)

	Kenya		Tanzania		Uganda	
	KES	ZAR	TZS	ZAR	UGX	ZAR
Zain Kenya – Prepaid			32.79	3.36	23.96	2.46
Zain Kenya – Postpaid			27.10	2.78	19.01	1.95
Zain Tanzania – Prepaid	365	2.17			417	2.48
Zain Tanzania – Postpaid	292	1.73			333	1.98
Zain Uganda – Prepaid	524	2.10	818	3.27		
Zain Uganda – Postpaid	403	1.61	656	2.62		

ZAR1 = KES9.75 = TZS168.35 = UGX250

Source: Websites of: Zain Kenya, Zain Tanzania, Zain Uganda

The One Network scheme eliminated all IMR charges for both post-paid and pre-paid customers – they simply paid the applicable national rates for outbound calls and received inbound calls free of charge, as if they were at home. Pre-paid customers were additionally able to purchase top-up cards locally to maintain their credit balance. Since customers were almost exclusively pre-paid they would never have paid traditional IMR charges, but would instead change their SIM-cards at the border. It therefore made commercial sense to abandon established IMR charging models in order to avoid customers switching to a rival operator. It also allowed customers access to all of their stored credit and ensured cross-border communications, keeping friends and families connected.

George Held, Zain's Marketing Director for One Network noted, "When we launched it in DRC, there was a surge in customers in Uganda, Kenya and Tanzania because of these cross-border activities, especially the lake area" (The New Vision, 2009).

Zain also offered conventional data roaming using GPRS, with both post-paid and pre-paid tariffs, to a range of destinations (Daily Trust, 2008). This has been presented as a premium service, intended to attract high-spending customers. An even more exotic form of IMR was available through Aeromobile, which provided a roaming service for Zain customers on flights operated by the Emirates airline (Leadership, 2008).

While it has been argued that One Network drove up traffic volumes for Zain there are only vague hints from the operator to support this view, which are undermined by the UN World Tourism Organisation reporting only a few tens of thousands of individuals crossing these borders each year (Gillwald & Mureithi, 2010). Rather, it appears that Zain obtained considerable publicity from the One Network plan, which it used to support the expensive process of rebranding, helping it to attract more domestic customers. It incurred some regulatory costs in negotiating the necessary permissions. One Network also had a significant effect on rivals, which felt it necessary to respond, even if not on the same scale. It needs to be recalled that Zain maintained its conventional roaming business for post-paid visitors, especially those from developed countries. The attractions of the One Network tariff to Zain were a complex mixture; discomfiting rivals, encouraging customers not to switch to rivals and driving up domestic market numbers.

RESPONSES TO ONE NETWORK

The other large MNO groups in Africa, notably MTN, Orange and Vodafone, have all felt themselves to be under sufficient pressure from Zain to respond to One Network. Clearly, Zain anticipated that this would require difficult and protracted negotiations between firms that normally saw each other as competitors.

MTN, a rival pan-African operator, launched a special "low" roaming tariff for its customers based in South Africa, who were charged ZAR5 per minute for both making and receiving calls across the rest of Africa (MyBroadband, 2008). Sending an SMS cost ZAR1.50, while receiving one was free[2]. At the end of 2010 the prices on its partner networks were ZAR5 for a local call, ZAR7 to call back to South Africa, ZAR4 to receive a call and ZAR2 to send an SMS (MTN, 2010).

In 2007, MTN Rwanda launched a seamless roaming service with partners in East Africa (see Table 9) (Highway News Agency, 2007). This allowed customers free roaming between the networks, receiving calls without charge, making calls at home rates and being able to use airtime vouchers purchased from local operators. However, the scheme was modified in 2009, so that customers paid the local rates rather than the home rates (MTN, 2009). While this avoided problems of net payments by the home operator to the roamed operator, where there were price differences, it diminished the transparency of the prices for the customer. MTN brands the service Home & Away, while its partners use the Kama Kawaida brand.

TABLE 9: JOINT ROAMING AGREEMENT IN EAST AFRICA

Country	Operator	URL
Burundi	U-Com‡	-
Kenya	Safaricom*	www.safaricom.co.ke
Rwanda	MTN	www.mtn.co.rw

2 These prices appear very similar to those required at that time by the EU Roaming Regulation.

Country	Operator	URL
Tanzania	Vodacom*	www.vodacom.co.tz
Uganda	MTN	www.mtn.co.ug
Uganda	Uganda Telecom	www.utl.co.ug

Source: The Monitor, 2008

MTN announced preferred roaming in 2008, initially covering South Africa, Botswana, Swaziland and Zambia (The Monitor, 2008). Then MTN said it would introduce a seamless roaming MTN One World for all its operations in Africa and the Middle East by mid-2009 (The New Vision, 2008). In addition to the South African offer described above, MTN One World offers local country rate roaming tariffs in West Africa, but with very different prices depending on both the operator and the country (see Table 10) (MTN, 2010).

TABLE 10: MTN ONE WORLD RATES FOR ROAMING NIGERIAN CUSTOMERS (NIGERIAN NAIRA)

	Ghana	Benin	Cameroon	Liberia	Guinea Bissau	Guinea Conakry	Ivory Coast	Congo
Receiving Calls	15	15	5	35	60	60	25	60
Sending SMS	20	36	74	16	14	21	19	13
Calls to:								
MTN Nigeria	21	51	124	25	41	22	37	31
Nigeria other networks	166	60	124	65	122	85	55	37
Africa, America, Asia Pacific, Europe & Middle East	166	60	124	65	122	85	55	37
Satellite	1 418	2 943	1 813	1 081	784	1 357	1 397	659
Small Islands	367	1,176	124	393	784	374	129	71
WECA MTN Benin	64	51	124	25	41	22	37	31
Other networks in Benin	166	77	124	65	122	85	55	37
WECA MTN Cameroon	51	51	64	25	41	22	37	31

	Ghana	Benin	Cameroon	Liberia	Guinea Bissau	Guinea Conakry	Ivory Coast	Congo
Other networks in Cameroon	166	60	74	65	122	85	55	37
WECA MTN Congo	204	60	124	25	41	22	37	31
Other networks in Congo	166	60	124	65	122	85	55	39
MTN Ivory Coast	36	60	124	25	41	22	37	31
WECA MTN Ghana	21	51	124	25	41	22	37	31
Other networks in Ghana	22	60	124	65	122	85	55	37
WECA MTN Guinea Bissau	79	60	124	25	41	22	37	31
Other networks in Guinea Bissau	166	60	124	65	65	85	55	37
WECA MTN Guinea Conakry	166	60	124	25	41	22	37	31
Other networks in Guinea Conakry	166	60	124	65	122	23	55	37
WECA MTN Liberia	32	60	124	25	41	22	37	31
Other networks in Liberia	166	60	124	33	122	85	55	37

Source: MTN Nigeria Website

In July 2007, Glo Mobile, a Nigerian mobile operator, obtained a GSM licence for the neighbouring Republic of Benin (Okojie, 2008). In May 2009, Glo introduced Two Nations, One Call Rate, with no roaming charges between the two countries, aimed primarily at local travellers with a view to locking them in (Ukodie, 2009). The only rival to have

licences in both countries was MTN, engaged in creating more complex roaming tariffs without surcharges.

In 2009, Orange offered a special rate when roaming from Uganda to Kenya. Incoming calls were free, while local calls and calls to Kenya are UGX420 per minute (KES15.63 or ZAR1.60). That compared with an on-net rate in Uganda of UGX270 and off-net rate of UGX310, while calls from Uganda to Kenya are UGX420.

Orange created a zone of West African countries in 2007, comprising Guinea, Guinea Bissau, Ivory Coast, Mali and Senegal, with reduced prices for roaming (see Table 11). The operators offer limited pre-paid roaming, but extensive post-paid roaming (Orange, 2010).

TABLE 11: PRICES IN THE ORANGE ZONE OF WEST AFRICA IN 2009 (XOF OR FCFA)

Home country	Countries	Local	Call home
Ivory Coast	Orange Zone	177	177
	Orange rest of Africa	500	1000
	Europe	500	2000
Mali	Senegal	150	150
	Guinea, Guinea Bissau, Ivory Coast & Niger	150	150
Senegal	Guinea, Guinea Bissau, Ivory Coast, Mali & Niger	150	150

XOF1000 = ZAR17.00

Source: Websites of Orange, Orange Mali, Orange Senegal

In comparison with Zain, the responses appear piecemeal but pragmatic, focusing on what can be delivered and what is significant. Ovum has noted that the volumes of traffic being generated and the revenues won and lost by such deals did not seem very significant (Obiodu, nd). Nonetheless, when faced with a non-roaming offer a significant group of customers who are nomadic or migrant or whose family and friends are nomadic or migrant see the benefits and move to or remain with operators offering beneficial tariffs.

REGULATORY INITIATIVES

Following the investigation launched by the European Commission in 1999, the persistently high charges for IMR came to be perceived as a "regulatory" issue, one that was more likely to be solved by an authority than by the market. A number of regional economic groupings joined the EC in seeking out a solution. Some terminological confusion may have been caused by the EU Roaming Regulation, which is a transnational statute, adopted under the European Community Treaty, its connection with regulators being instructions to them to collect data.

In 2005, the African Telecommunication Union (ATU) and the African Development Bank (AfDB) began a project for a single African SIM-card (East African Standard, 2005). Subsequently, the ATU indicated it would "Develop a regulatory framework for the implementation of cross-border networks and pan African services such as regional roaming" in the period 2008-09 (Africa, 2006). While still considered a work item, no progress has been made for some years.

The Economic Community for the West African States (ECOWAS) has taken various steps to harmonise policies and regulations in order to facilitate regional integration of ICT markets. It adopted a road map for regulatory harmonisation and regional mobile roaming (ITU, 2006). As of 31 July 2005 there were 268 roaming agreements made by 23 of the 42 West African Operators (Sanou, 2005). At that time, in three countries not a single operator had a roaming partner in the ECOWAS area. For post-paid customers, heavy security deposits were required, between USD340 and USD1 500, while even pre-paid customers faced one-time charges of between USD19 and USD47. There was one innovative marketing offer, with Telecel, present in six countries, called @SIM, in which the customer was given one SIM-card for the home network and others for the networks to be visited.

WATRA (the association of regulators) organised a feasibility study jointly with ECOWAS, on roaming and interconnection in the region (Ndukwe, 2003). This concluded that pre-paid roaming was a "honeypot" for operators, if they could provide an IMR service (Aihe, 2007). Conferences on roaming were held in 2007 and 2008. However, this work subsequently ground to a halt, with its focus shifted to cutting costs for international calls within West Africa.

The Southern Africa Development Community (SADC) addressed roaming charges through a Home and Away roaming initiative by ministers in 2007. In November 2008, the Communications Regulators' Association of Southern Africa (CRASA) discussed the SADC Home and Away Roaming initiative. It then created a Regional Alliance Task Team (RATT) with representatives from:

- SADC Secretariat
- CRASA
- GSM Association Africa
- Southern Africa Telecommunication Association (SATA)
- SADC Parliamentary Forum.

Its primary task was to investigate possible mechanisms to reduce the high charges for IMR within the region, with a view to a final decision to be taken by SADC Ministers. CRASA hired consultants to undertake an impact assessment of its roaming initiative, whose report was discussed at its meeting in early 2010 and published later that year (Analysys Mason, 2010). It noted the usual strange variations, and sometimes a lack of transparency, in prices, largely attributed to high wholesale prices, though complicated by problems with international gateways and exchange rate fluctuations[3]. Additionally, there were technical problems, including poor quality of service.

3 There may also have been concerns by some MNOs about the creditworthiness of other MNOs.

The regulatory approaches to IMR have been less than productive. Possible penalties or interventions have been seen by MNOs as highly unlikely to be imposed and thus failed to convince them to act. Moreover, the capacity for any one country to regulate is limited and many already have a transnational commercial offer from Airtel/Zain or from a rival. Indeed, it has been commercial actions and reactions that have driven down IMR prices and consequently it has become progressively more difficult to justify an intervention, requiring complex work on regulatory impact assessments. The real challenge would be to develop a regulatory intervention that would build on the One Network approach, for example by widening its scope, adding more MNOs or by encouraging MNOs to create a roaming exchange or spot market.

OPEN CONNECTIVITY

Established in 2005 by the GSM Association, the Open Connectivity (OC) programme was intended to facilitate easier and faster outbound roaming agreements for MNOs, helping new and smaller operators increase the scope of the IMR service they offered their clients. With more than 700 operators, the traditional bilateral approach was claimed to have reached its limits. Within the OC framework a number of hubs would provide access to multiple IMR partners via a single commercial agreement; ultimately these are expected to interconnect through peering arrangements (see Table 12).

TABLE 12: OPEN CONNECTIVITY COMPLIANT ROAMING HUBS IN LATE 2010

Company	Country	Website
Aicent	US	www.aicent.net
BICS	Belgium	www.bics.com
Comfone	Switzerland	www.comfone.com
Link2one	Luxembourg	www.l2one.com
Orange	France	www.orange.com/wholesalesolutions/pagesinv/valeurs2.jsp
Syniverse	US	www.syniverse.com
United Hubbing	UK	www.unitedhubbing.com
Vodafone	UK	www.vodafone.com

Source: GSMA Association, Open Connectivity Programme

For example, Rwandatel struck an IMR-hub deal with BICS, giving it access to 535 networks worldwide through Proximus, the mobile subsidiary of Belgacom (Rwandatel, 2009). Rwandatel customers were to be issued with SIM-cards with both Rwandatel and Proximus International Mobile Subscriber Identities (IMSIs). Where Rwandatel has no bilateral roaming agreement, then the SIM-card would automatically present the roaming customer as being from Proximus, becoming a virtual Belgian, to use its wider set of IMR agreements. The deal is not bilateral, so that Rwandatel does not immediately benefit from incoming roaming customers or lower prices – these must still be negotiated bilaterally.

While the hubbing arrangement appears to open the way to easier access to outbound roaming, there is no evidence that it reduces prices. Indeed, even where a hub has access to regulated wholesale roaming prices in the EU, there appears to be neither a legal obligation nor any obvious commercial incentive to pass on the lower price to non-EU operators. Competition between the hubs appears to focus on increased coverage for a few high-spending outbound roamers, rather than on reducing prices.

CONCLUSION

Visitors to Africa who elect to use the roaming service from their home mobile network operators can maintain their usual telephone number and remain connected. They have to pay heavily to do so and any local African wishing to call them has to pay the international rate to call their home network. If visitors give up their home number and roam instead with a SIM-card acquired locally, they can save considerably on the charges, but then have to advise colleagues, family and friends of a new and temporary number, plus they should periodically check their home voicemail. Likewise, Africans with post-paid subscriptions who leave the continent will pay very high roaming charges in order to remain in seamless contact, perhaps being asked to pay a substantial deposit for the privilege. Alternatively, they too can switch to local prepaid SIM-cards with the associated lower charges, but at increased inconvenience.

Prepaid roamers have a more limited choice – largely because of the costs they are not offered a service in more exotic locations. Each operator has typically set up one or two dozen bilateral deals with operators in major travel destinations, usually with neighbours, significant trading partners and, especially, the former colonial powers. The importance of these arrangements is difficult to assess, since there are very few data on the levels of use of pre-paid roaming.

The Open Connectivity initiative by the operators simplifies some wholesale arrangements for roaming. This means that customers should have access to a wider range of networks and to advanced roaming services, though it has done nothing to reduce prices.

While the European Commission was able, if ill-advised, to block the introduction of transnational tariffs without a roaming surcharge, Zain did this in Africa without hindrance (EC, 2002). Where rivals saw the need to respond in order to retain customers, they have done so, though generally on a smaller scale and on specific and commercially important routes.

The vast majority of individual Africans cannot afford expensive roaming rates, at several dollars per minute, whether post-paid or pre-paid, so that it is reasonable for mobile operators to abandon traditional IMR charges. A prerequisite is that each operator be allowed its own international gateway, with which it can make deals within a corporate group or with commercial partners. Moreover, it does not preclude charging high wholesale roaming rates to operators in developed countries, which easily pass these on to their customers, admittedly with a large and seemingly increasing mark-up by the foreign partner.

The failure to form a wholesale roaming market remains something of a mystery. With international voice telephony and Internet traffic there are intermediaries and aggregators to

facilitate smaller and niche market players. There appear to be significant structural obstacles and, possibly, anti-competitive practices that impede the formation of such a market for roaming services.

There is nothing to stop operators such as Orange and Vodafone giving African customers a secondary IMSI, for example from one of their European networks, to allow them access to the low regulated roaming rates. While this might increase their competitiveness on the retail market it seems to be considered unlikely to generate a sufficient number of new customers to overcome lost revenues.

While regional economic groupings and associations of regulators have taken an interest in high IMR charges, they have yet to achieve any significant results. They have not even coordinated the introduction of national measures that are known to work:

- Requiring the sending of an SMS with IMR prices on arrival abroad
- Capping retail prices for call forwarding
- Capping spending to avoid "bill shock".

There are concerns that interventions might further distort the poorly understood market dynamics. Further detailed study of the economics of IMR markets is required to ensure a level of understanding that is sufficient to evaluate policy options. Minimally, this requires the collection of considerable data from the operators.

Work at the African Telecommunication Union (ATU) and in West Africa ground to a halt because of the complexity of the problem, the poor alignment of interests and the opposition of the operators. The recent study for CRASA illustrated the complexity of the problem, including the lack of data.

The scope for further research is considerable. On one level the retail prices charged by non-African operators require further study to understand why they appear to be rising. On a very practical level, survey work with Africans crossing borders would help to explain attitudes towards costs and behaviour, in particular ownership of SIM-cards from foreign operators. Surveys of tourists and business travellers from developed countries would also provide insights into their communication needs and their willingness to pay very high prices. It would be helpful to map flows of visitors within Africa onto the various special tariffs and to identify any remaining obstacles to offers of roaming without surcharges. With the growing adoption of mobile broadband, analyses of the prices for, and the use of, data roaming are becoming increasingly important. The activities of the economic groupings and of their regulatory groups require further analysis, in order to better understand the roles they can usefully play in the governance of transnational telecommunications markets, their requirements for capacity building and any improvements that can be made to institutions and procedures.

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Two

STATE OF COMPETITION IN ZAMBIA'S TELECOMMUNICATIONS SECTOR[1]

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Abstract: Zambia, situated in the Southern African region, has a population of 13 million and GDP in 2009 was estimated at ZMK61.1 trillion or approximately USD12.8 billion. Economic composition of GDP by sector is 40.2% services, 38.2% industry and 21.6% agriculture. GDP growth averaged 4.8% in the decade between 1999 and 2009, with strong performance in the construction, mining and agricultural sectors. However, as a services-based economy, growth is constrained by, inter alia, slow emergence of a competitive telecommunications sector that can provide the platform for the national and international flow of information and communication required for further rapid advances in economic development. This article reviews the state of competition in Zambia's telecommunications sector, with due attention to the fixed line and international gateway, the mobile telephony and Internet markets.

KEYWORDS:

Competition policy, competition law, telecommunications sector reform, consumer welfare, Zambian telecommunications sector

INTRODUCTION

The Zambian telecommunications sector has been subjected to competition since 1997 when the first privately owned mobile cellular enterprise entered the market. This was Telecel Zambia, taken over in 2006 by MTN. The entry followed economic reforms commenced in 1991, the first since the notable "Mulungushi Reforms" of 1968 on the nationalisation of industry. While liberalisation was embraced, influential government officials prevailed over the state to retain 100% ownership of the state-owned Zambia Telecommunications Company Limited (Zamtel) for almost 15 years after the beginning of the privatisation process. Zamtel was hardly a cash cow – its survival was based on a small number of fixed landlines and a vociferously protected international gateway monopoly. The greatest customer for Zamtel was government, which was also its largest debtor.

Zambia's liberalisation of the economy from 1991 spelt trouble for Zamtel, not because it was facing competition per se, but because its operations were dogged by old technology, lack of recapitalisation and a larger workforce than the leaner private sector entrants, which would include Zamcell, later renamed Celtel, then Zain, now Airtel.

As with many public enterprises that exhibit sentimental rather than economic value, local interest in the telecommunications sector in Zambia concerned the wealth and health of Zamtel, just as at a certain time, discussing Zambia's public transport system was not possible without mentioning the United Bus Company of Zambia (UBZ), despite its chronic financial woes,

1 This article builds on previous articles prepared by the author in collaboration with the then Communications Authority of Zambia (now Zambia Information & Communication Technologies Authority – ZICTA) in 2008, as well as a paper that was presented to the Multi-Year Expert Meeting on Services, Development and Trade of the United Nations Conference on Trade and Development, Geneva, 17- 19 March 2009.

notoriety for lack of time-keeping or "no-shows", and accidents on inter-town routes. Similarly, discussing the privatisation or breaking the monopoly of companies such as Zamtel was an emotional socio-political issue with public outcry over what would happen to the country if such a "big" company was sold, especially to foreign owners. Calls for protecting Zamtel from competition were based on the fear that Zamtel was "not ready for competition". There is, however, little doubt that the development of the telecommunications sector in Zambia has been driven by a degree of competition, which has resulted in greater benefits for the consumer, particularly with respect to the Internet and mobile telephony.

The benefits of liberalisation to Zambian society have been immense, compared with the limited value offered by the closed fixed-line and international gateway markets. Thus, despite public sentiment, the Government of Zambia took a bold decision to dispose of 70% of Zamtel equity to LAP Green of Libya in the first quarter of 2010. The Government simultaneously and effectively removed the Zamtel monopoly over the international gateway. While the fixed-line market has offered little attraction for private sector participation, the liberalisation of the international gateway and the reduction of licence fees to USD350 000 immediately attracted new entry. With such entry, the Zambian public had a very rare treat when they saw reductions in international calling rates by as much as 70% (*Zambian Economist*, 2010; *Lusaka Times*, 2010). This perhaps is thought-provoking empirical evidence that policy makers, regulators and the opinion leaders may need to count the cost to consumer welfare arising from any protectionist tendencies in the ICT sector.

This article looks at the state of competition in Zambia's telecommunications sector. The article provides an overview of the relevant telecoms and competition legislation; looks into various sub-sectors of the broader telecoms sector and reviews the state of competition in these sub-sectors. It argues that (a) while competition in telecommunications markets is generally regarded as necessary for social welfare, the Zambian landscape has been slow to adapt to competition, and (b) now that an agenda for change is being more clearly articulated in policy and legislation, regulators should more actively pursue the objective of promoting competition in the fixed line, international gateway, mobile telephony and Internet markets.

A PERSPECTIVE ON COMPETITION IN TELECOMMUNICATIONS MARKETS

A careful analysis of the variables that affect competition in a multi-billion dollar sector is a process that any country should take seriously. A proper analysis of what makes markets work and how the various factors of competition affect market development is an important aspect that should be fostered in any study of the telecommunications market in Zambia. This process goes beyond price regulation and promoting competition through licensing. A number of studies, including the report on the Status of Competition in Canadian Telecommunications Markets (CRTC, 2004) have acknowledged that assessing the state of competition in a market is not a simple matter. Collection of information related to telecommunications markets, including market size and market share, is a first step in order to monitor the status of competition.

Factors that determine the study or analysis of competition include the market definition, market concentration ratios, barriers to entry, substitutability, countervailing power and dominance, ie determination of market power and/or significant market power. This approach is also used in the European Union as adopted in the *Commission guidelines on market analysis and the assessment of significant market power under the Community regulatory framework for electronic communications networks and services* (EU, 2002).

The Organisation for Economic Cooperation and Development (OECD) has noted that "the telecommunications industry has been transformed by increasingly vigorous competition in an environment of rapid change" (OECD, 2001, 1). As new technologies emerge and markets expand, firms need to connect to each other's networks. Hence, the OECD (2001, 1) argues that "the most complex questions facing regulators … are frequently focused on the conditions of access of one network to another's network". Opportunities for competition in underdeveloped markets depends on the demand for new services, the economies of scale and scope that emerge over time and the technological innovations introduced. In order to grow a particular market for telecommunications services, governments may require mandatory access and interconnection arrangements, but may use different approaches to set the "financial terms of access" (ibid.). Access prices should reflect the underlying mechanisms that might be used to recover fixed costs, in other words access prices should be cost-based (Mason & Valletti, 2001). These are key issues for regulators.

MARKET POWER AND DOMINANCE

OECD (2002) offers reasons for regulation, as do Bar & Borrus (1997), including promotion of universal access to telecommunications services and fostering competitive markets for telecommunications services in order to ensure good quality of service, advanced services and efficient prices. Key matters for the attention of regulators include preventing abuses of market power and other forms of anti-competitive behaviour by dominant firms, creating the environment for network investment and protecting consumer rights.

With respect to transport infrastructure, though the principles would apply equally to telecommunications infrastructure, the UN (2001, 180) argues that the concerns of competition authorities and infrastructure regulators with respect to promoting competitive markets are focused on established operators that have market power. Firms without market power are simply not able to cause serious problems in the economy or in the sector. If they raise their prices above market levels, for example, they will simply lose customers and profits. In general, market power is defined as "the ability of a firm to raise prices above competitive levels, without promptly losing a substantial portion of its business to … rivals …" (Infodev, nd, 24). This practice can occur to such a degree as to make market participation unprofitable for other parties or new entrants. Factors frequently considered in determining whether a firm has market power include vertical integration, barriers to market entry, market share, pricing behaviour, profitability (Intven, 2000, 5-11; 5-12). In particular, effective access to advanced telecommunications can only be possible with the removal of barriers to entry, including lowering the costs of entry, thus potentially leading to the maximisation of social welfare (Carlton & Perloff, 2005; Blees, Kemp, Maas & Mosselman, 2003).

Where there are barriers to entry, their importance depends on the circumstances. They are likely to be less important when there are multiple incumbents with varying characteristics and interests, when technological change is rapid and when potential entrants are established firms with a presence in related markets. To the extent that incumbent firms are able to take advantage of the existence of barriers to entry to engage in exclusionary behaviour, remedies may be sought under the Competition and Fair Trading Act 18 of 1994 (Cap 417) of the laws of Zambia.

A firm controlling essential telecommunication services can exhibit certain dominance traits in the market, more so when it owns the international gateway system, as Zamtel did. The refusal to supply scarce facilities or resources required by a competitor is an anti-competitive act. More so, it is an abuse of dominance where the dominant firm, by virtue of controlling an upstream essential facility such as the telecommunications backbone, may be able to push up the price of a scarce input to the point where entry in the downstream market is unprofitable. The Canadian Competition Bureau (2001) argues that such approaches "may be profitable to the dominant firm(s), despite the higher price it also pays for the input, because it avoids the dissipation of profits that (any new) entry would bring".

Refusal to deal with a prospective entrant in signing interconnection agreements and/or co-location of equipment necessary to enter and grow in the industry at lesser cost is an instance of abuse that may also need to be checked in the Zambian telecommunications market. "Simply making competition possible by the existence of rights to resale or to build and operate facilities is not enough…" (Bar & Borrus, 1997).

RESPONSES TO MARKET DOMINANCE

While there are many possible responses to market dominance, regulators need to carefully select among the range of mechanisms that may or may not revolutionise the telecommunications industry and aid in the reduction of high market concentrations and abuse of dominance. In the absence of effective substitutability, owing largely to behavioral rather than structural impediments, there would be little if any effective competition in the mobile telephony subsector in particular.

LEGAL FRAMEWORK FOR COMPETITION IN ZAMBIA

The Competition and Fair Trading Act, No 18 of 1994 (Cap 417), was the first legislation in Zambia that defined dominance and highlighted certain conduct in which a dominant firm, so identified, could not engage. Under Section 2 of Cap 417, "monopoly" was defined in the context of "dominance", as follows:

A dominant undertaking or an undertaking which together with not more than two independent undertakings –
a) produces, supplies, distributes or otherwise controls not less than one half of the total goods of any description that are produced, supplied or distributed throughout Zambia or any substantial part of Zambia; or
b) provides or otherwise controls not less than one-half of the services that are rendered in

Zambia or any substantial part thereof (Government of Zambia, 1994).
From the above definition, the elements could be dissected to enable us to understand a monopoly undertaking as:
(i) a dominant firm, which has at least 50% market share in Zambia or a substantial part of it (ie unilateral market power);
(ii) an undertaking which, with not more than two independent undertakings, has a combined market share of at least 50% (ie combined market power as in the case of collusion).

Dominance or monopoly power may be exercised by a single firm or two or more independent firms acting in concert by colluding to have similar or complementary marketing strategies. Any firm acting singularly with at least 50% market share is deemed to be a monopoly and/or a dominant firm. Equally, dominance and/or monopoly standing would be inferred where firms agree to have the same market price, same distribution channels, packaging, etc to the exclusion of other firms. These combined practices are commonly referred to as "cartels", "horizontal restraints" or "horizontal arrangements" and are prohibited under Section 9 of Cap 417.

There are generally two tests in the determination of dominance. The first is a quantitative test, which is a per se determination based on the market share of a firm. For instance, Cap 417 in Zambia defined the structural test with a 50% threshold. In a relatively concentrated market, a 40% market share could be considered to be a dominant market share in effect. This is because the conduct of the firm may indicate that it does actually exercise characteristics of a dominant firm regardless of its market share. There is always a dispute on market shares and their computations, consequently competition law jurisprudence has tended to focus on the behavioral test, which is a rule of reason determination based on the actual behaviour of a firm in a defined product market. Thus a firm may argue that its market share does not give it the necessary market power to act independently of other market actors. The rule of reason thus allows the determination by a competition authority to go a step further and consider each case on its own merits. Section 2 of the Competition and Consumer Protection Act No. 24 of 2010 (Government of Zambia, 2010) has since clarified this through defining "dominant position" as a situation where an enterprise or a group of enterprises possesses such economic strength in a market as to make it possible for it to operate in that market, and to adjust prices or output, without effective constraint from competitors or potential competitors. Section 15 further adds a second test where there is a presumption of dominance at 30% market share.

The practice of competition law has emphasised the need to decipher instances of abuse or misuse of market power, as opposed to mere dominance. Section 7(2) of the Competition and Fair Trading Act required[2] enterprises to refrain from specific acts of anti-competitive behaviour, including predatory behaviour, discriminatory pricing and discrimination in terms and conditions, bundling goods and services and collusion.

2 All the terms used in this section except for "dominance" are not defined in the Act. A useful guide for definitions is the G*lossary of terms used in EU Competition Policy - Antitrust and control of concentrations.*

THE ZAMBIAN TELECOMMUNICATIONS MARKETS

Few studies on the telecommunications sector in Zambia have reviewed the state of competition. Generally, there are four principal markets, being the landline (fixed/terrestrial) and the international gateway markets and the mobile telephony and Internet markets. Telephone ownership was restricted to 0.3% of rural households, while only 8% of rural households had access to a public phone within a walking distance of five kilometres, compared with 95% for urban households. Virtual monopoly service provision in multiple service markets severely limited the access expansion rate for most of the decade from 2000 (World Bank, 2006).

Zambia has a population of 12.9 million and GDP is estimated at K61 trillion or roughly USD12.8 billion (AfDB, 2010a, 388-389). In the decade 1999 to 2009, it has shown consistent growth at an average 4.8% per annum (AfDB, 2010b). The geographic telecommunications market covers the areas where there is a concentration of the population and business, being principally the areas along the railway line joining the Copperbelt in the north through Lusaka in the central region to Livingstone in the south. There is also the emerging "New Copperbelt" area around Solwezi in the North West Province.

Despite promising penetration growth rates, Zambia is still behind regional standards with regard to providing access to telecommunication services for its citizens. The sector is characterised by limited access to infrastructure services, with only three lines per 100 people and stagnating fixed-line penetration rates.

It is evident that Zain dominates the mobile telephony market in Zambia and under the competition law, is actually legally enjoying a monopoly position. On the other hand, Zamtel enjoys absolute monopoly in the fixed landline segment of the market and, until recently, in the international gateway market. There used to be arguable concerns that the structural advantage of Zamtel was a source of market power, which was then used to deny equitable access to certain backbone infrastructure in telecommunications. Zamtel no longer exercises any such dominance, since the entry of Zain/Airtel. In addition, the lack of interconnection regulations for some time in the sector has also led to instances of abuse by dominant operators in the sector, where they have used this to frustrate the completion of calls emanating from other networks. This has however been rectified through the passing of interconnection guidelines under the ICT Act of 2009. ZICTA commissioned Price Waterhouse Coopers (PWC) UK to carry out an ICT Cost of Service Study in 2009. Following this, ZICTA issued guidelines following sections 41 (5), 47 (2), 48(3) and 50 of the ICT Act (Chalwe, 2010).

THE FIXED LANDLINE MARKET

By 2000, household fixed-line penetration was approximately 5.6%, while "the average annual growth rate in teledensity of 3.7% … barely kept up with the population growth rate of 3%" (Kakubo, 2000). IP telephony was not allowed in Zambia and international voice telephony was the monopoly of the PSTN operator until mid-2010. Tele-density in Zambia, similar to other countries, is higher than average in urban areas. In four major cities, tele-density reaches 2.01 per 100 persons, though average teledensity has not increased significantly since 2007, with estimates of 0.77 fixed-line subcribers per 100 inhabitants and 22.6 mobile subscribers per 100 inhabitants (AfDB, 2010b).

The fixed landline market (PSTN) was a privileged monopoly of the state-owned Zambia Telecommunications Company (Zamtel) Limited. The evident lack of a proactive competition policy in this market until 2009/10 was a historical phenomenon and had a cost-based rationale. Historically, the state-owned Post and Telecommunications Corporation (PTC) Limited was the sole supplier of telecommunications services in Zambia. With 100% funding from the State Treasury, PTC put up the key backbone infrastructure in the industry. The PSTN infrastructure has suffered from systematic vandalism, a lack of recapitalisation and a lack of productive and allocative efficiencies, while mobile telephony has become an effective substitute. In Zambia, the installation costs for fixed telephony are relatively low, more so with the introduction of the prepaid TelZ fixed landline service. However, the historical lack of a focused market development strategy has seen this market grow more slowly than the mobile telephony segment.

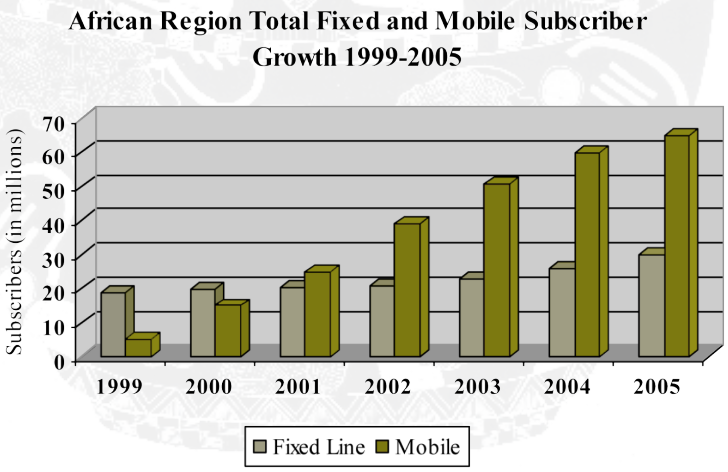
THE INTERNATIONAL GATEWAY MARKET

The international gateway market in Zambia was opened to competition in 2010, when the government reduced the licence fee from the previous USD18 million to USD350 000. Within a week of the reduction, private firms MTN and Zain, entered the market and announced a reduction of international call rates by as much as 70%. As noted by the Zambia Competition Commission (2008), lack of private sector entry led to very high international call tariffs, as well as lack of investment in modern and more efficient technology in the international gateway system.

THE MOBILE CELLULAR MARKET

The mobile telephony market has grown tremendously in Zambia and in Africa generally. Mobile telephony is the fastest growing segment of the telecommunications sector. As Graph 1 shows, the mobile market has outgrown the fixed-line market in Africa, from about four million subscribers in 1999 to 65 million subscribers in 2005, while fixed-line growth moved from 19 million to 30 million subscribers over the same period (ITU, 2008).

GRAPH 1: AFRICAN TELECOMS SUBSCRIBER GROWTH



Source: International Telecommunication Union (ITU), April 2008.

Mobile telephony appears to have grown at the expense of the fixed line because of the relatively easier set-up process, as well as the convenience of using a mobile phone. There are also numerous technological advantages to mobile telephony – a mobile phone offers a personal directory of contact details, the short messaging service, mobile Internet and even access to mobile payment systems.

The Zambian mobile market has witnessed competition since the 1999 entry of Zamcell, renamed Celtel, then Zain (and renamed Airtel). Zain was the largest mobile operator in Zambia and had more than two million customers as at 30 June 2008, providing coverage to 71% of the population and offering a range of voice services, international roaming, pre- and post-paid subscriptions, SMS and mobile Internet to individual, corporate and SME customers (Zain, n.d.). The following figures give a snapshot of mobile market shares as at 2008:

Table 1: Zambia mobile market shares

Service provider	Subscribers as at 31.12.07	Market share	Subscribers as at 30.06.08	Market share
Zain	1 956 976	78.9%	2 040 014	76.1%
MTN	262 186	10.6%	452 799	16.8%
CellZ	261 225	10.5%	190 069	7.1%
Totals	2 480 389	100%	2 688 882	100%

Source: Communications Authority Zambia (CAZ), April 2008

Zain had registered phenomenal growth, having entered the market in 1999 after CellZ (the Zamtel Cellular) and MTN (then Telecel). An aggressive entry marketing strategy at the time when GSM was introduced, assisted by a less capitalised Zamtel Cellular and MTN, would appear to have jolted Zain to an unprecedented market growth from 0% at point of entry to 76% 10 years later.

The Internet market

The Internet has been described as one of the most influential technologies of the century. This is because it has completely redefined the concepts of communication and information exchange. Zambia first became connected to the Internet in 1994 through a slow leased line to South Africa with about 250 users, many of whom were academics and medical staff. Over the past 10 years, the Internet has changed dramatically and has become an exceedingly influential and indispensable tool to businesses and individuals alike. The three main challenges related to the growth of the Internet in Zambia have been identified to be insufficient or less developed communication infrastructure, high cost of delivering Internet bandwidth and high cost of computers and related communication accessories, though import duty has been lowered.

By 2008, Zambia had seven licensed Internet Service Providers (ISPs) and the market has generally been open to new entrants due to the large untapped and perhaps yet to be Internet-enlightened market. Out of the seven, one is owned by the recently privatised Zamtel, while the others are privately owned. Statistics show that few Zambians are accessing the Internet through a broadband connection:

Table 2: Internet market shares as at 30 June 2008

ISP	Subscribers		Subtotal	Market share
	Dial up	Broadband		
Africonnect	0	1 600	1 600	9.6%
Zamnet	4 540	1 222	5 762	34.6%
Zamtel	6 415	157	6 572	39.5%
CopperNet	655	586	1 241	7.5%
UUNET	372	118	490	2.9%
Microlink	310	502	812	4.9%
Real Time	0	150	150	1%
Total	12 292	4 335	16 627	100%

Source: Communications Authority of Zambia (CAZ), 2008

The majority of Internet subscribers have generally been institutional subscribers, while the market is yet to capture the individual household on a mass scale. Compared with countries in the region, Zambia's Internet usage is low, with approximately 816 000 subscribers out of a population of nearly 13 million in 2010, while Zimbabwe had 1.4 million Internet users in 2010 or 11.4 users per 100 inhabitants (ITU, 2010, 106).

MARKET CONCENTRATION

MARKET CONCENTRATION IN FIXED LINES

The fixed-line operator has enjoyed a monopoly position with no competition restraints of any sort. The development of this part of the telecommunications sector has remained unexplored by the private sector. The market concentration is 100% monopoly, with an Herfindahl-Hirschman Index (HHI) of 10 000.

MARKET CONCENTRATION IN THE INTERNATIONAL GATEWAY

Since June 2010, the gateway has been effectively liberalised, but new market shares are yet to be compiled. If the mobile telephony market shares are to be used as a measure, then the market share for international calls may be in favour of Zain/Airtel – more so when roaming is factored into the profile. Zain/Airtel has a wider roaming network than MTN and CellZ. However, if we take the traditional view, the fixed landline has ordinarily been the business line, as well as the line for international calls. The mobile telephony providers have reduced their international call rates by as much as 70%, which, depending on market response and use, may become as inexpensive as the fixed land line.

MARKET CONCENTRATION IN MOBILE TELEPHONY

There appears to be high market concentration in all countries in the mobile telephony market. As noted in the table below, Canada's national HHI for mobile wireless telecommunications services in a market with three carriers is lower than the HHIs of some countries with four carriers, and is almost identical to the Netherlands, which has five. The HHI can also be

expressed as a fraction and inverted to yield what is known as a numbers equivalent. This is the number of equal-sized competitors that would yield the observed HHI. Canada is closely bunched with a large number of countries with a numbers equivalent around three. Hong Kong, the US and the UK are much less concentrated, while Norway, New Zealand and Switzerland are much more concentrated. In many markets, the fourth and sometimes even the third carrier have relatively small market shares and are thus regarded as minor competitive forces (McFetridge, 2008).

TABLE 3: CONCENTRATION OF DEVELOPED COUNTRY MOBILE WIRELESS MARKETS

Country	Number of carriers	2 - Firm concentration ratio (CR)	HHI	Numbers equivalent
Norway	2.0	100.0	5 508	1.8
New Zealand	2.0	100.0	5 016	2.0
Switzerland	3.0	81.8	4 627	2.2
Belgium	3.0	77.0	3 65	2.7
Canada	3.0	68.9	3 400	2.9
Netherlands	5.0	73.4	3 396	2.9
Singapore	3.0	71.8	3 372	3.0
UK	5.0	49.1	2 257	4.4
US	4.0	51.5	2 016	5.0
Hong Kong	5.0	44.6	1 606	6.2

Source: Merrill Lynch Global Wireless Matrix 3Q, 2008

For the Zambian concentrations, the HHI for Zain of 5 791in June 2008 showed a fairly monopolised market, with the other incumbents offering more "niche" than mainstream competition, although for strict application of HHI, it falls short of the 10 000 index required for a monopoly existence.

TABLE 4: MOBILE MARKET CONCENTRATION (HHI CALCULATIONS)

Service provider	Market share (31.12.07)	Herfindahl Hirschman Index (HHI)	Market share (30.06.08)	Herfindahl Hirschman Index (HHI)
Zain	78.9%	6 225.21	76.1%	5 791.21
MTN	10.6%	112.36	16.8%	282.24
CellZ	10.5%	110.25	7.1%	50.41
Totals	100%	6 447.82	100%	6 123.86

Source: As compiled by author based on data from Communications Authority Zambia (CAZ)

With an HHI level of over 6 000, of which the largest proportion is attributed to one player, the market does not enjoy significant competition, as there is a dominant market player who acts as a guide to other players in terms of price and product offers.

In this view, the three-firm market concentration ratio shows a concentration of 100%, which was an indication of a highly concentrated market with little if any effective competition to Zain/Airtel. Celtel, the forerunner to Zain, had grown to be the dominant firm in the sector, and with the change-over to Zain enjoyed a decisive market control of 76% by 2008. This, however, has been changing since June 2010 when the interconnection regulations became effective. The mobile cellular market, which started off as a monopoly and then became a duopoly, is theoretically an oligopoly, but from a competition point of view, it is characterised by monopolistic competition.

MARKET CONCENTRATION IN INTERNET

The Internet market has been relatively competitive compared to other segments of the telecommunications sectors, as shown in Table 5:

TABLE 5: INTERNET MARKET CONCENTRATION

Internet service provider (ISP)	Market share	Herfindahl Hirschman Index (HHI)
Zamtel	39.5%	1 560.25
Zamnet	34.6%	1 197.16
Africonnect	9.6%	92.16
CopperNet	7.5%	56.25
Microlink	4.9%	24.01
UUNET	2.9%	8.41
Real Time	1%	1
TOTAL	100%	2 939.24

Source: Communications Authority Zambia (CAZ), 2008

The Internet service market is the most competitive of the four main product markets in the telecommunications sector. By 2008, Zamtel controlled almost 40% of the market, while Zamnet controlled about 35% of the market. While an HHI of 2 939 shows a market that is highly concentrated, this development is still a move in the right direction, noting that in 2002, four firms had a market concentration ratio of 100%, while presently the four-firm concentration ratio (CR4) is 91.2%. While this is still high, it is a trend that should be fostered, more so with the presence of the niche broadband service entrants.

Zamtel has perhaps managed to hold such a high market share due to the integrated nature of its fixed landline telephony service provision, combined with the internet subscription. The success of Zamnet in the sector shows the first private mover advantage and the brand loyalty attached to Zamnet (also applicable to Zamtel). Africonnect, CopperNet and the other ISPs appear to be niche players who are trying to break into the mainstream market through offering broadband services.

BARRIERS TO ENTRY IN THE ZAMBIAN TELECOMMUNICATIONS MARKET

STRUCTURAL BARRIERS TO ENTRY

Electricity is crucial to sustainable access to telecommunications services. About 39% of Zambia's population resides in urban and peri-urban areas, chiefly in Lusaka and the Copperbelt area, while about 49% of the urban population and a meager 3% of the rural population have access to electricity (Central Statistical Office, nd). This leads to an overall national electrification rate of less than 20% of the country's roughly two million households – mainly in the urban areas. About 61% of Zambia's population lives in scattered rural areas, living on almost a third of the income for urban areas. Furthermore, ICT service providers have focused their areas of coverage along the main rail line from Ndola to Lusaka and from there on to Livingstone, leaving a large fraction of the population without access to these services.

These characteristics of the economy partly explain the urban-rural disparity of ICT penetration for the fixed, mobile and Internet sectors. Structural barriers have historically been high in fixed telephony, as well as in the international gateway (due to seemingly high opportunity costs), where such barriers prevented investment and thus competition was frustrated for many years.

ADMINISTRATIVE, LEGAL AND REGULATORY BARRIERS TO ENTRY

The fee structure in the telecommunications sector does not appear to contribute to reduction of the sunk costs in the industry. For instance, the requirements, in 2006, by the then Communications Authority of Zambia, for the fourth mobile service provider to pay a non-returnable application form cost of ZMK300 million, approximately USD 63 296, was queried by some stakeholders. They questioned whether this figure was intended to limit the number of applicants – more so that the public policy objective at the time was to allow Zambian owned firms to operate a fourth mobile service provider.

CREATING A PROGRESSIVE GROWTH PATH FOR THE ICT SECTOR

A number of shifts are observed to have taken place in the telecommunications sector, which have helped shift the industry in Zambia in recent years, 2006 to 2010:

(i) The adoption in 2006 of the national ICT Policy, which is pro-competitive, reflects an extensive consultative process and provides a basis for revitalising the sector. Zambia's ICT Policy has been developed in close coordination with other sectors and in alignment with other national development plans.

(ii) The drafting of legal frameworks, The Information and Communications Technologies Act, No. 15 of 2009 (Government of Zambia, 2009a) and The Electronic Communications and Transactions Act, No. 21 of 2009 (Government of Zambia, 2009b), which are comprehensive and are expected to improve the transparency and predictability of regulatory interventions.

(iii) The decision to liberalise the international gateway by removing prohibitive and anticompetitive measures in the international telecommunications segment, in order to allow existing service providers to participate and compete alongside Zamtel.

Historically, free and fair competition has met some form of resistance in the telecommunications sector. From a policy point of view, it was viewed with mixed feelings for many years, ranging from national security concerns to outright protectionist tendencies, even where the welfare losses far outweighed the protectionist gains.

For almost 12 years, there was fragmented regulation of the ICT sector in Zambia, involving the Zambia Competition Commission, the Communications Authority of Zambia, and the practically "self-regulated" Zamtel. There was a "new deal" in the ICT sector in 2010, following the implementation of two complementary policies and promulgation of two complementary laws. The national ICT policy and the competition and consumer protection policy have provided a detailed policy landscape for the furtherance of the development of ICTs in Zambia. The ICT Act has repositioned the former Communications Authority of Zambia to become a more robust and dynamic Zambia Information and Communication Technologies Authority (ZICTA), while the Competition and Consumer Protection Act has transformed the Zambia Competition Commission into the Competition and Consumer Protection Commission.

The national ICT policy envisions Zambia as an "information society", ie a country where ICT has been fully exploited, is part of everyday life and is an enabler of socio-economic development. It also proposes that Zambia become a "knowledge based economy", ie "where ICT is extensively used to enhance the knowledge of society in general so that higher human capital brings improvement to the economy" (MCT, 2006). The key strategies aimed at achieving these new forms of society are evidently to attract new entry and investment in the telecommunications sector.

With the privatisation of Zamtel, the State is no longer an active player in the ICT sector. However, it is possible that there may be a recurrence of protectionist tendencies through lobbying government to promulgate certain regulations, laws and policies that protect incumbent players from prospective competition, notably foreign competition. There are conflicting views on whether welfare gains may be maximised by limiting the number of entrants in a sector or whether welfare gains may equally be maximised through an open competition approach. With a history of competition phobia in the Zambian telecommunications sector, it is not surprising that there exists a statutory instrument (SI) that appears to be at variance with ICT, investment and competition policies.

Statutory Instrument No 111 of 2009 (SI), issued under the ICT Act of 2009, has "reserved" entry into the mobile telephony market in Zambia for a period of five years, effective December 2009. With a growing population and labour force, the market for mobile and fixed landlines in Zambia is not saturated. The development of any market is evidenced by the entry of new players in a particular sector. Investors do not enter into markets they have not studied and where they consider their returns would not be achieved.

The essence of regulation should be to promote business entry, growth and socio-economic development by controlling and prohibiting anything that prevents such development. While it is necessary to have powers to regulate industry, such powers should not be unfettered and

should be amenable to an impartial judicial organ. Regulation should have a two-fold approach – regulation through the state and self-regulation. For example, the Competition and Consumer Protection Commission (CCPC) and the Zambia Information and Communication Technologies Authority (ZICTA) can jointly, or through consultation, develop guidelines for what critical information service providers should disclose as part of their customer service .

Progressively, ZICTA has devised a programme to educate consumers on the latest developments in the ICT sector. It has promulgated guidelines and policies, including how consumers might test to verify whether their provider is providing the type of service that it promises to deliver. This is commendable. It is trite that regulation should equally ensure that there are incentives to measure network performance and monitor whether it matches the promises of broadband providers. Given the vigilance of many ICT users, it is likely that complaints will be presented to institutions such as CCPC and ZICTA, where performance deviates in practice from what was promised, requiring action from regulators.

In looking for a balance between minimising government intervention and ensuring certainty and predictability in the application of competitive safeguards, a broad trend toward a converged approach to competition policy has emerged. In most countries, principles traditionally associated with competition law have been imported into the telecommunications regulatory framework. To different degrees, these have included principles of market definition and a focus on dominance (ITU, 2002). Telecommunications regulators have often applied broad-ranging rules or regulations that apply either to the entire industry or to certain categories within it. These regulations are typically applied ex-ante and are precise in setting the parameters of acceptable market behaviour. They range from explicit retail price control to the determination of access terms and conditions. These trends are slowly being understood in Zambia. Where there is concurrent jurisdiction, as in the Zambian case, telecommunications regulations would have to be realigned with the objective of facilitating competition, and where they are not, they have to be amended or removed.

PROMOTING AND ENHANCING CONSUMER WELFARE IN ICTs

All key stakeholder government, quasi-government and non-governmental agencies need to work together to ensure effective protection of consumers and facilitate the healthy development of this market. Consumers are an effective force in checking any potential abuses of market power by service providers.

On the consumer protection front, the reality today is that most consumers are not well informed about the state of their telecommunications service and, to the extent that network providers engage in any forms of prioritisation (or blocking of particular applications), consumers are generally unaware about the existence of such prioritisation. Increasingly, technologies are being developed to prioritise different forms of Internet traffic and carriers are likely to adopt such technologies. From the consumer perspective, it is critical that they be informed about the relevant offerings and are thereby placed in a position to demand particular levels of performance.

Disclosure is an important aspect of transparent telecommunication services provision. For instance, the nature of broadband Internet access is not always clear to consumers and there would appear to be a lot of leeway to exploit those consumers. It may be necessary to intensify efforts to develop appropriate consumer education and consumer protection enforcement strategies.

Disclosure is about making public information that increases consumer understanding in relation to the service being provided and promoting markets in which consumers are aware of quality of service issues. Quality of Service (QoS) in both content and context is critical. Information on off-peak and peak-time rates, the cost to the consumer to make a mobile phone call per second or per minute, may also be critical to enhancing consumer satisfaction.

CONCLUSION

Since the liberalisation policies of the early 1990s, there have been great strides made to ensure that the Zambian ICT sector does not lag behind, and in many ways growth has been exponential, more so in the mobile telephony and Internet sectors. Where there has been reluctance towards competition policy, growth has not been evident, for example in the fixed landline market and, prior to 2010, in the international gateway market.

There is greater need now, in this highly dynamic and volatile industry, for competition-friendly policies, laws and regulatory approaches. The adoption of national ICT, competition and consumer protection policies by the Zambian government in 2006 and 2010 have been major milestones that have impacted greatly on the recasting of laws with respect to ICTs, competition and consumer protection.

In the context of the Zambian government's resolve to create jobs and maximise tax income, competition can provide a self-regulatory and self-adjusting mechanism to ensure growth through introducing new market entrants and innovation by incumbent firms, thus broadening the tax base. Government should therefore be wary of a strong lobby from incumbent players whose interest is to restrict market entry and entrench their market positions to a level where they engage in predatory conduct to frustrate new entrants.

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Three

SERVICING ADVOCACY IN E-GOVERNMENT: SMALL BUSINESS DEVELOPMENT SERVICES IN CAPE TOWN

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ABSTRACT: Small businesses are widely regarded by national and international bodies, including the South African government, as an "engine of economic growth". However, much available evidence suggests that establishing a new small business in South Africa is difficult because of a lack of appropriate support. The research reported here sets out to examine the actual support that has been available, and the viewpoints of both the support service providers and the intended beneficiaries – small business owners and managers. It was found that government-based support services were predominant in the minds of small businesses and other involved parties, and that much of the interest in these services was based on accessibility via the Internet, a form of electronic government service. However, despite claims of success by e-government service providers, it is found that many small businesses are not aware of available support services, and that, where they are known, there is scepticism about the benefits of engaging with them. As the problems have been found to be centred around a lack of awareness of available services, this article reports on a possible solution, based on a concept referred to here as Servicing Advocacy.

KEYWORDS

Small business development, e-government support services, adequacy, awareness, advocacy.

INTRODUCTION

"For every [South African] small business that closes … 6-8 jobs are lost" (Business Times, 13 January 2008)

The above statement evidences the importance of the small business sector for South African economic development. An organised effort to support small businesses began in 1995, when the new South African government introduced a White Paper on national strategy for the development and promotion of small business (DTI, 1995), acknowledging the importance of this sector and committing itself to the establishment of a number of supportive mechanisms.

THE CONTEXT: SUPPORT FOR SMALL BUSINESS DEVELOPMENT

Since then, it has been found (Mitrovic, 2009) that a variety of potential sources of support exist for small businesses, principally based upon:

- Seeking advice from other businesses (usually at a cost);
- Working with community-based organisations (within the community in which the small business operates, at very low cost or no cost at all);
- Appealing for help from government (typically, seeking development finance as well as advice, at no cost).

Because small businesses often cannot afford expensive professional consultants and community-based support varies widely and involves many variables, it was decided to focus this study on Internet-based government support services for small businesses. Indeed, government is highly visible, and its actions are closely observed and of particular interest to all. There is a rising level of interest in "e-government", within which small business support services and other initiatives are to be found (HPG, 2000; Hägglund, 2001; Heeks, 2002; CEC, 2002; OECD, 2003).

The decision to focus this study on Internet-based government support services is further justified by the South African government's commitment to the so-called "Information Society" (Mbeki, 2001). Many South African government departments have developed Internet-based services, including the Small Enterprise Development Agency (SEDA), the Smart Cape project, and Batho Pele (DPSA, 20008) – "bringing the front office of government closer to the people". In South Africa, e-government has been intended to improve service delivery to citizens and businesses, but – as in the specific case of support services to small businesses – this has not always been the outcome (Bytheway, 2004; HICTE, 2003).

THE PROBLEM: E-GOVERNMENT SMALL BUSINESS SUPPORT SERVICES

A review shows that there are clear perceptions of difficulty and failure to deliver the expected benefits of Internet-based small business support services (hereinafter referred to simply as "support services") – there are even problems in making the existence of these services known to the intended beneficiaries (Irwin, Clarke & Kenyon, 2001; SBP, 2009). Additionally, research shows a very high failure rate for small businesses, ranging from 70% to over 80% at the national level (Baard & Van den Berg, 2004). While recognising that there are many reasons for business failure, some of which are irredeemable, this high failure rate strongly indicates a need for more effective support. It raises questions about the breadth and depth of available informational web services (Ponnekanti & Fox, 2002; Hart, Doherty & Ellis-Chadwick, 2000; Gallouj & Weinstein, 1997), and about the varying needs of different kinds of small business. It challenges our fundamental understanding of the nature of the relationship between small businesses and those agencies that are established to assist them, and it has been interesting to find that service providers did not seriously monitor or assess awareness of their existence, their usefulness or the outcome of their support efforts (Mitrovic & Bytheway, 2009).

This picture of difficulty justified an investigation of the empirical evidence and an attempt to understand more clearly the problems and opportunities involved in making support services more effective through the use of electronic government.

APPROACH TO THE STUDY: GROUNDED THEORY

It might be expected that there would be existing theories that would assist in designing the study; however, no directly applicable theories were found that were able to accommodate the key features of the study: government-provided services, for small businesses, using the Internet to promote business development.

Some loosely related work was found. For example, there are early exploratory studies of small business Internet commerce issues (Poon & Swatman, 1998), there is a theory of the small firm

(Di Tommaso & Dubbini, 2000) and a theory of application service provision (Smith & Kumar, 2004); studies of service delivery and the new economy (Beyers, 2002), the business value of e-government for small firms (Thompson & Rust, 2005), and electronic services infrastructure for community development (Jutla, Feindel & Bodorik, 2003).

However, these loosely related theories presented a dilemma: should the research proceed by means of a detailed examination and adaptation of these extant theories, or should it set out independently to develop a new theory? An extended review of options was undertaken, for example: action research, network action research, interpretive hermeneutics, and case studies. Most interestingly, email discussions were initiated with international experts and an open research seminar was held, at which the specific option to use grounded theory methods was proposed, defended, discussed, and ultimately agreed upon. Essentially, this approach offered the advantage that it accommodates and controls complexity and uncertainty in the phenomenon under study (by working at different levels of abstraction), and also accommodates the different interactions between humans and between humans and technology. It also lays the foundations for further work that can set out to test and validate the theory or theories that emerge.

It follows that there is no detailed examination of the existing literature presented here. In accordance with grounded theory methodology, an empirical study always precedes an extensive literature review in order to avoid seeing empirical data "through the lens of earlier ideas" (Charmaz, 2006: 165). Other components of grounded theory practice are also applied in this study (Glaser & Strauss, 1967; Glaser, 1978; Strauss, 1987; summarised in Charmaz, 2006: 6-7):

- *Simultaneous involvement in data collection and analysis;*
- *Construction of analytical codes and categories from data, not from preconceived logically deducted hypotheses. In contrast to the type of hypotheses that are used to test already existing theories, the grounded theorist produces hypotheses from empirical data that can be tested by others;*
- *Use of the constant comparative method, which involves making comparisons during each stage of the analysis;*
- *Advancing theory development during each step of data collection and analysis;*
- *Memo writing to elaborate categories, specify their properties, define relationship between categories and identified gaps;*
- *Sampling aimed toward theory construction, not for population representativeness. However, in the manner of grounded theory research, there is a commentary on related literature at the end of this article.*

The study from which this paper is drawn (referred to here as the "main study") began in November 2005 and was completed in March 2008. Data collection was undertaken initially by analysing three websites belonging to government agencies. This was followed by 58 interviews: seven with the service providers' representatives and 51 with small business owners and managers. Two hundred and twenty-eight individual first-order constructs (quotations) were identified within the interview content that led to the development of 109 concepts in five main

domains, classified at six conceptual levels. A number of subsidiary studies have emerged since then, of which the work reported here was one. The list of the examined service providers and small businesses is given in Table 1.

TABLE 1: LIST OF RESEARCHED SERVICE PROVIDERS AND SMALL BUSINESSES CITED IN THE MAIN STUDY

Small businesses	
Accounting services	Hairdressing salon
Advertising agency	Health shop
Architect contractor	Internet development company
Business consultancy 1	IT company
Business consultancy 2	Management consultant
Car wash services	Marketing company
Cell phone workshop	Plastic products company
Crêche	Retail company
Electrical workshop	Shoe repair workshop
Engineering company	Software company
Financial services	Tourist agency
Funeral services	Trading company
Furniture trading company	Gardening services
Service providers	
Real Enterprise Development Initiative (RED Door)	Small Enterprise Development Agency (SEDA)
Smart Cape – the project of the City of Cape Town aimed at provision of ICT-based services	

This paper now summarises the results of the main study, and then identifies the single domain that we are concerned with here: the role of advocacy in addressing the inadequate awareness of electronic-government support services in Cape Town. The data collected for the study is presented here in a synthesis view, and used to elaborate new concepts that can be applied to the problem.

MAIN FINDINGS: ADEQUACY, AWARENESS, ADVOCACY

Based on available anecdotal evidence concerning the lack of effective, Internet-based, small business development support, the main study set out to identify the cause of and possible solutions to this phenomenon. The main findings revolve around the identification of gaps in the perceptions held on either side of the service (the provider side and the beneficiary side), and presentation of a detailed understanding of the origins and nature of those gaps.

SERVICE GAPS

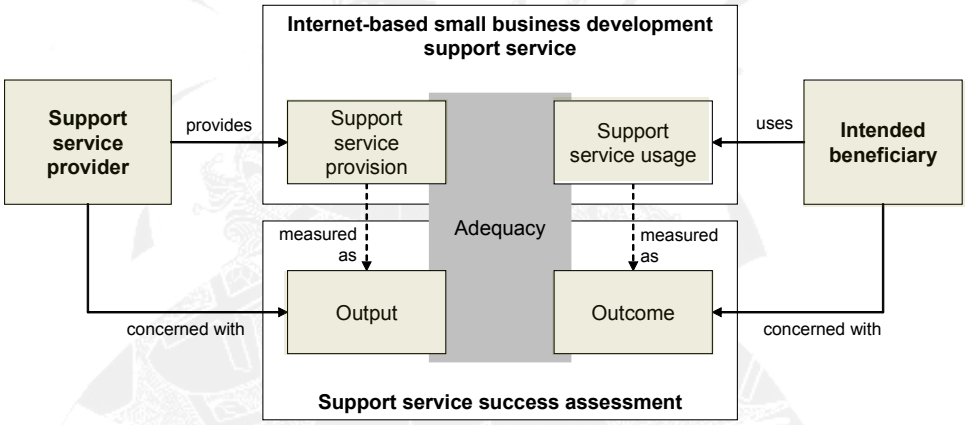
Interviews with intended service beneficiaries confirmed that they were not benefiting from available support services, despite the service providers' public declarations of success. It became clear that this significant difference of opinion arose from the different perspectives of the two role players: service providers were primarily concerned with measuring success

according to outputs (for example, the number of businesses that had enquired and the number of questions that had been answered), whereas the intended beneficiaries were only concerned with outcomes (the net benefit, in terms of business turnover, for example profitability or market share).

ORIGINS OF THE GAPS – THE ISSUE OF ADEQUACY

As it became clear from a review of the data that the services supplied were inadequate (as measured in terms of outcome or benefits to the intended beneficiaries), it was possible to postulate a high level concept – adequacy – in order to characterise the problem and provide a basis for more detailed analysis. The arrangement of ideas at this stage is shown in Figure 1.

FIGURE 1: THE SERVICING ADEQUACY GAP



Starting with the high-level concept of adequacy, the next task was to examine its nature and to find a more detailed understanding that might lead to possible service improvements. Adequacy is, of course, a very broad term that needs to be examined for more specific components that make it more meaningful in the context at hand.

[Note: At this stage, it is necessary to formalise the terms used here to refer to the emerging concepts. Italicised text with initial capitals will be used here to identify the concepts without ambiguity, and so (for example) we will refer to "Service Advocacy", not to "service advocacy". This style will be used in the discussion that follows].

UNPACKING ADEQUACY: FROM AWARENESS TO ADVOCACY

Further analysis of the data showed a range of sub-concepts, of which the most important attribute of electronic government small business support services appeared to be Awareness of these services. These findings show that the concept of awareness has at least four principal facets, indicating existence of its sub-concepts. These sub-concepts are accordingly named as (Mitrovic & Bytheway, 2009):

- Awareness of Service Existence
- Awareness of Service Usefulness
- Awareness of Servicing Outcome
- Awareness of Servicing Limitations

It was clear from the main study that small business people were generally not aware of some or all the above aspects of available services – prompting a question: How can awareness be increased? In business, there is usually strong attention to "marketing" in order to ensure awareness within a marketplace, but that is hardly an appropriate term for the promotion of government services. What is needed is the involvement of some kind of intermediary, and this prompted the emergence of the concept of Servicing Advocacy – an advocate being a more general and more acceptable term for someone (or something) that would work in the gap between providers and beneficiaries to increase awareness and promote engagement.

Some early evidence of such advocacy could be seen on the service providers' websites: all service provider websites provide links to other websites that are potentially useful for small business development. Hence, to some extent the providers see themselves in the role of "advocate", for example: "…selection of important business support links for your small business; which include places which provide training, mentorship and networking" (RED Door, 2006)

However, further research disclosed that there was no organised cooperation between different service providers, and there was no clarity that would assist small businesses, only an increased level of confusion – unbridled advocacy leading to bewilderment? "No, we have no official participation in designing or supplying services to small businesses. We just think it would be convenient to give our users links to other organisations that can help them … our resources are limited and we can help only that much …" (Project manager, local government service provider).

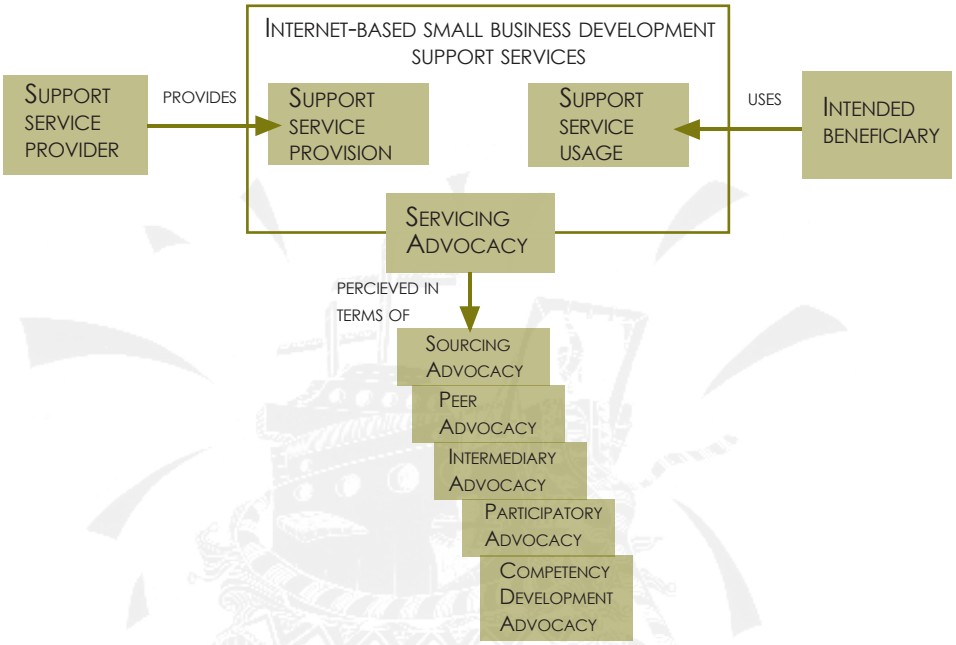
This need for a more universal, negotiated advocacy was found while looking from the service standpoint (rather than the beneficiary standpoint), therefore it was provisionally classified as Service Provision Advocacy.

From the beneficiaries' standpoint, there was evidence that despite the potential for bewilderment they had received advice, but it came mostly from other small businesses, their "peer group" . For example, the owner of the hairdressing salon said: "… they have their business running for ages… it is good to know how they are doing their job …"

This "received advocacy" was provisionally named as Service Usage Advocacy. The existence of these servicing-related advocacies indicated that they can form part of a higher concept, which can help in understanding how to increase awareness of electronic small business development services. This concept was named here as Servicing Advocacy and it subsumes the ideas of Service Provision Advocacy and Service Usage Advocacy. With this new concept at hand, the interview data and other material was re-examined and analysed in order to more fully understand the composition of this higher-level concept of Servicing Advocacy.

The concepts and sub-concepts established by this means are summarised in Figure 2 below. The paragraphs that follow present a commentary on the five subsidiary concepts that emerged from this re-examination: Sourcing Advocacy, Peer Advocacy, Intermediary Advocacy, Participatory Advocacy and Competency Development Advocacy.

FIGURE 2: SERVICING ADVOCACY AND ITS SUB-CONCEPTS



DISCUSSION

These five sub-concepts are now discussed in three stages, in terms of their:

- Origins (forming the origin of the higher level concept of Servicing Adequacy);
- Conceptual characteristics (becoming characteristics of the higher level concept of Servicing Adequacy);
- Possible ways of achieving them (thus achieving an adequate level of Service Advocacy).

ORIGINS

The origins of the components of Service Advocacy – the sub-concepts – are to be found in the content of the interviews. The paragraphs that follow provide an overview of what was found, for each of the five sub-concepts.

SOURCING ADVOCACY

Although some service providers claimed that their services were provided as a "one-stop shop", this research showed otherwise. The identified service providers' limited capabilities to provide a complete "one-stop shop" to small businesses, arising from their inability to supply all possible useful services on their own, was the origin of the concept of Servicing Advocacy.

The incapacity of service providers to do so was related to their limited resources. For example, one of the project managers of the local government service provider stressed that they always have a staff shortage, explaining that "…we do not have enough skilled people …

we are forced to outsource many activities… our resources are limited…". As a consequence, the service providers have to offer links to other resources that are potentially helpful for small business development. These links are named as sourcing links, and the action associated with them is named Sourcing Advocacy.

PEER ADVOCACY

Peer Advocacy has its origin in the need of service beneficiaries to understand and emulate the success achieved by their peers. Some even look to medium and large enterprises for ideas. For example, the owner of a hairdressing salon, explaining her wish to emulate her peers' success, said: "…they have their business running for ages… it is good to know how they are doing their job and who helps them…". Three other interviewees, gathered in the workshop at the Cape Chamber of Commerce, had a similar idea, stating that they were there, among other things, "… to learn from each other by giving and receiving advice of where to get [developmental] help …". Further evidence for the concept of peer advocacy was the service beneficiaries' insufficient trust in the government-based service providers. This distrust led to a need for alternative sources of help – one of them being their peers. Thus, this type of advocacy is named Peer Advocacy.

INTERMEDIARY ADVOCACY

Having sufficient expertise was a matter of concern for all: service providers and small businesses. The lack of sufficient expertise forces them to reach out to external sources of expertise and appropriate advice, a case of Intermediary Advocacy. External sources include academics, research institutions and consultancies, all of which are naturally interested in research and in publishing reports that advocate effective evidence-based approaches to particular servicing practices. Intermediary Advocacy occurs when the advocate advises one or both of the two parties: service providers and service users.

PARTICIPATORY ADVOCACY

The evidence makes clear that the service providers are not fully aware of the service needs of beneficiaries, nor are the beneficiaries fully aware of the existence or usefulness of the services provided and their own capability to use them. When presented with this finding, both the providers and the beneficiaries agreed that they should participate in each other's activities in order to develop services more appropriate to needs and opportunities. For example, service providers can invite service beneficiaries to participate in the service design process (eg discussing a particular type of electronic service or suggesting certain delivery methods). On the other hand, service beneficiaries can invite service providers to help them in acquiring knowledge and skills essential for adequate use of the services provided. Where there were attempts, from the service providers' side, to engage small businesses in service design, it appears that these attempts never moved beyond the embryonic phase, admitted one service provider manager "Not too many people participated in those sessions". These ideas about mutual participation are embraced here in the concept Participatory Advocacy.

COMPETENCE DEVELOPMENT ADVOCACY

The evidence shows that there are more fundamental problems with Internet-based services: many service beneficiaries in Cape Town were not able to use the technologies, the services provided, or both. The view of one owner of a financial services business was heard, with

different variations from other interviewees: "…many small entrepreneurs that I meet here [at the Chamber of Commerce] are not able to use computers…never mind provided services…". Service beneficiaries need appropriate competences if they are to benefit from these support services, as do service providers. This shows a need for the development of appropriate competencies in the provision and usage of these support services. It also shows a need for advocating the development of these competencies, which is named here as Competence Development Advocacy.

CHARACTERISTICS OF SERVICING ADVOCACY

The identification of a single high-level domain (Adequacy), the realisation that it depends upon a single prerequisite (Awareness) and that the prerequisite can be positively influenced by another concept (Advocacy) – is interesting but very abstract. The identification of five sub-concepts that elucidate Servicing Advocacy is helpful, but hardly sufficient to be useful in practical terms. It is necessary to press on still further, to identify properties or characteristics that can form the basis of a method with which to evaluate services, and render them more effective.

This has been done by means of further analysis of the interview data. Servicing Advocacy can be characterised by a number of lower-level "conceptual properties" – by which we mean properties that can be measured, and that will form the basis of an achievable evaluation method. Properties were sought that could be reviewed in order to make an overall assessment of Servicing Advocacy. They come from an analysis of the data relating to the five sub-concepts. Finally, in order to give a context for measurement and assessment, some comments are also provided here on Manageability – the overall capability of all concerned to understand what is needed and deliver it.

TABLE 2: BASIC CONCEPTUAL PROPERTIES OF SERVICING ADVOCACY AND ITS SUB-CONCEPTS

Conceptual property	Potential for measurement and evaluation
Sourcing Advocacy: Common Incidence Permanent Accessibility Scope Modifiability Limited Reliability Technology-based Participatory Initiating	**The first sub-concept is Sourcing Advocacy.** Appearance of sourcing links (Common Incidence) on the website of all service providers and 24/7 accessibility (Permanent Accessibility) of these links was possible by using on-line (Technology-based) advocacy of services of other providers. Advocating other than own services represents a kind of (not pre-arranged) participatory approach to the servicing (Participatory Initiating). However, possibilities to modify (unannounced) the scope and content (Scope Modifiability) can cause limited reliability of the provided services (Limited Reliability). Analysis of these factors would provide useful indicators of the actual state of play and the advocacy subject-matter.
Peer Advocacy: Ad hoc Incidence Multiple Sources Spontaneity Networkability Serendipitous Incidence Success Emulation	**The second sub-concept is Peer Advocacy.** Not trusting the service providers sufficiently, small businessmen in Cape Town spontaneously preferred to obtain advice or to advocate useful developmental sources (in their experience) and thus try to emulate the success of their peers (Success Emulation). These interactions often occur serendipitously, spontaneously and in an ad hoc manner. Access to many of their colleagues (Multiple Sources) is enabled by all kinds of social networks (physical or technology-based). Examining, for example, quality, intensity or subject matter of these factors can help service providers in achieving adequately designed and provided electronic small business development services.
Intermediary Advocacy: Flexibility Multiple Sources Multi-facilitating Participatory Need Fluctuation Awareness Dependency	**The third sub-concept is Intermediary Advocacy.** As it was found that the lack of expertise is equally affecting service providers and beneficiaries, involvement of external experts is inevitable if an adequate level of electronic small business services in Cape Town is to be achieved. The various intermediaries (Multiple Sources), bringing multidisciplinary expertise (Multi-facilitating), can be flexibly deployed (Flexibility) and also can facilitate participation of various stakeholders (Participatory). Assessing the extent of needs for this kind of advocacy (Awareness Dependency) would be useful to determine changing needs (Need Fluctuation) for assistance. It can also help in determining the profile of intermediate consultants ("advocates") to be engaged.
Participatory Advocacy: Inclusiveness Application Flexibility Multiple Sources Initiating Influencing	**The fourth sub-concept is Participatory Advocacy.** In order to increase awareness of beneficiaries' needs and the providers' servicing capabilities, Participatory Advocacy is concerned with suggesting cooperation between at least these two main stakeholders – but also inclusion of other stakeholders such as consultants, academia, or government officials (Inclusiveness, Multiple Sources). For example, small business can "advocate" their servicing needs by physically meeting service providers or using ICT (eg email, Internet), which adds to flexibility of applying this advocacy (Application Flexibility). Assessing beneficiaries' needs and the providers' servicing capabilities, the "advocate" can help in initiating new useful services (Initiating) or influencing changes in existing services (Influencing) that will meet changing developmental needs.

Conceptual property	Potential for measurement and evaluation
Competence Development Advocacy: Multi-stakeholder Involvement Service Stakeholder Competency Inclusiveness Multiple Sources Need Fluctuation	**The fifth sub-concept is Competence Development Advocacy.** As the competence of service providers to supply adequate services and the capabilities of small businesses to effectively utilise these services was found to be questionable (Service Stakeholder Competency), it is proposed that involvement of various stakeholders (Multi-stakeholder Involvement) can bring much needed (diverse) "advocating" expertise (Multiple Sources). If appropriately assessed, this inclusive multi-stakeholder and multidisciplinary involvement (Inclusiveness) can help in determining (awareness of) changing competence/capabilities needs (Need Fluctuation). Consequently, this can help in supplying more adequate service and more effective use of these services for small business development (Servicing Adequacy).
Manageability: Thinking Planning Acting Checking	**There is a general need for manageability.** It is necessary to introduce some level of manageability into the provision of services. Providers do not recognise that Service Adequacy gaps derive from a failure to undertake basic management steps to: find out what is needed, operationalise appropriate capability and measure the outcomes. The traditional management cycle of "thinking", "planning", "acting" and "checking" would be applicable here. Much of what has been found in the data indicates "acting", with little prior "thinking" or "planning", and virtually no "checking". This conceptual property of Manageability applies across the whole domain of Servicing Advocacy.

ACHIEVING SERVICING ADVOCACY

It has been shown that Servicing Advocacy is grounded in an ability to source what is needed to create the service, to design appropriate services through proper participation, to work with peers and with intermediaries in understanding how to access and use the services and to develop the requisite competencies to do so. We therefore find that assisting providers and small businesses to achieve the required outcomes is not straightforward, and is not just a matter of advocacy. However, advocacy is at the centre of what must be done and may be found in different forms, as has been shown through chambers of commerce, government support services or other communities of interest and practice.

Much of this sort of action focuses on the participants' awareness, willingness and ability to communicate. By communicating well, using the principles of Servicing Advocacy, service providers will develop awareness among service beneficiaries and both parties can then understand expectations and capabilities more clearly. This simple expression of what is required is not new, but the detail that underpins it is based upon an extensive survey of current practice that justifies further examination of the affordability and effectiveness of the steps that emerge from this kind of analysis.

We are commonly reminded that "you can not manage what you cannot measure". What this study provides is a structured view of Servicing Adequacy and its constituent parts;

in each case quantifiable characteristics are now available, derived from the extensive measurable evidence gathered in the main study. In attempting to improve Servicing Advocacy, the present levels of Sourcing Advocacy, Peer Advocacy, Intermediary Advocacy, Participatory Advocacy, and Competence Development Advocacy should be evaluated from the perspective of service providers and beneficiaries, using the conceptual properties developed here as indicators.

The conceptual property of Manageability is particularly important, since project managers must attend to all tasks in an organised manner. Particular managerial attention should be paid to technology-related and organisation-related limitations. In essence, much of this depends on the availability of pertinent information, and it can be concluded that an adequate information management system is essential for achieving adequate Servicing Advocacy, Servicing Awareness and, ultimately, an adequate electronic small business support service (Servicing Adequacy).

CONCLUSION AND REFLECTION: SERVICING ADVOCACY IN E-GOVERNMENT SUPPORT SERVICES FOR SMALL BUSINESS

SOLVING THE PROBLEM

At the start of this paper a solution to the problem of making electronic government support services work well was promised, and this has been achieved through the development of a hierarchy of concepts, starting with Adequacy, progressing through Awareness and culminating in an examination of what Advocacy means and how it can be realised as a key to achieving support services for small business development. This study has led to an understanding of what it is we should measure, in order to manage small business support services.

Achieving an adequate Servicing Advocacy requires that the sub-concepts of Sourcing Advocacy, Peer Advocacy, Intermediary Advocacy, Participatory Advocacy, and Competence Development Advocacy are all adequately achieved. By attending to the 28 conceptual properties of these sub-concepts, and by introducing the basic principles of good management, it will be possible to assess Servicing Advocacy, identify areas requiring remedial action, and take appropriate steps to bridge the gaps that became clear at the start of this work.

While the introduction to this article indicated that there are a variety of sources of small business support, it selected Internet-based government support services as its focus. In order to achieve more effective support services for small business development, the attributes and relevant sub-concepts elaborated here can be incorporated into the design of electronic government systems for small business support services. In addition, the conclusions that are drawn here may or may not be applicable in a wider context. However, in the course of the study the reliance of the government on external providers of specialist services has become apparent. For this reason, it is considered possible that the results will be applicable in any commercial context where electronic media are used.

USE OF GROUNDED THEORY

For many concerned with research, the use of grounded theory remains contentious, especially in the sense that the detail of prior work, as might be seen in the academic literature, is effectively ignored until the end of the theory development. It is in the nature of grounded theory to pay minimal attention to existing research literature at the start, but it is necessary to come back to the question of existing theories and models before drawing conclusions. For the purposes of this study, the literature was therefore reviewed in two phases:

- The first phase occurred before the start of the empirical study, and was concerned with understanding the issues faced by small businesses in Cape Town, searching for possible sources of small business development support, and deciding on a suitable research method. This helped in determining the research problem and deciding how to approach to the work.
- The second phase of the literature study, as prescribed by grounded theory methodology, occurred after the empirical research was completed. The purpose of this phase was to compare the empirical findings of this study with other contemporaneous work and to position the results in relation to existing theories where this might be possible, and useful.

COMPARISON WITH THE CONTEMPORARY LITERATURE

Although the term "advocacy" is not new, the literature reviewed did not return any instance of this term used in servicing (in general) or electronic servicing (in particular). Discussions with selected academics familiar with servicing issues have acknowledged that the term "advocacy" is used in gerontological research regarding services for older people. In some countries, so many services are made available to the elderly that they become confused. The advocacy role is recognised as one that can ensure they receive the particular services that they need. Some such research has been reported (Dunning, 2005; Robinson, 2006; Miles, 2007), but only loose association with this research was evident. An exploration of how the term "advocacy" was used by other disciplines failed to return a relevant result. Thus, comparison of the concept of Servicing Advocacy with similar concepts from the pertinent literature was not possible.

The review of the pertinent literature corroborated the uniqueness of this concept, since no use was found of the term "advocacy" or "Servicing Advocacy" in work addressing general servicing topics and themes, or in more specific work concerned with Internet-based servicing. However, this study has elicited that:

- The concept of Servicing Advocacy is brought into existence;
- It is relevant to electronic small business development services;
- It can be deconstructed to the level of specific conceptual properties that can be measured, understood, and evaluated, in order that support services can be managed and improved, whether through electronic government or other electronic media.

SUMMARY

Given the very high importance of small businesses within the South African economy, the evident failure rate of these businesses and the South African government's commitment to develop a so-called "Information Society", it is of great concern that support services intended to assist small businesses are not effective and do not encourage their participation in the Information Society. This paper has addressed the problem and identified a means to evaluate

and improve the management of support services by introducing the concept of Servicing Advocacy. It has elaborated a number of attributes and sub-concepts which can be incorporated in the design of next-generation electronic government.

The significant gap between the perceptions of success held by the service providers and the perceptions of poor outcomes held by the intended beneficiaries requires effective provision and use of support services that are adequate for their purpose. This in turn depends on awareness of their existence, their usefulness and their limitations, which can be addressed by means of the concept developed here and named Servicing Advocacy. Since similar concepts were not found in the pertinent literature, these ideas can now be reviewed, critiqued and amended, and refined for the benefit of managerial practice and further academic research.

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CONTEXT-AWARE VOIP CONGESTION CONTROL SERVICE

ABSTRACT: IP networks can have difficulty coping with delay-sensitive VoIP traffics during emergency situations caused by fires and related disasters. During emergencies there is a huge increase in voice and video traffic, causing a huge strain on the network. The strain on the network is as a result of both essential and non-essential traffic. In such crisis situations, calls originating from or destined for rescue personnel, such as doctors and police, are considered essential. Any other calls from eyewitnesses and the public are considered non-essential, since they degrade the quality of service for the emergency response teams by consuming the scarce network resources. Providing the rescue team with the quality of service that they require necessitates network access restriction for non-essential traffic. In this paper, the authors present a voice and video service that uses Context-Awareness and Semantic Web technologies to restrict network access to privileged users during crisis situations. The service monitors the network for crisis conditions, enables the network to respond appropriately when a crisis occurs, detects the end of the crisis and reverts to its default state.

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KEYWORDS
Call admission control, context-awareness, ontology, semantic web, web ontology language.

INTRODUCTION
Technological advancements, liberalisation, privatisation and progress in telecommunications regulation have ensured enormous growth in telecommunications markets in most African countries. For instance, the growth of Voice over Internet Protocol (VoIP) is very significant. VoIP, a technology that enables transmission of voice and data over packet switched IP-based networks, has recently become a popular means of transmission of voice and video traffic over IP networks. This is due to the cheaper option that it provides for phone calls, the flexibility of running a large number of "virtual users" through each network socket, the efficiency of combining phone calls with business data, the aspect of easily managing and maintaining the system since it is software, not hardware, based, and its support on both wireless and wired networks. The original design of VoIP was to support only voice traffic but recent developments have seen other real-time traffics such as video supported over the same platform. As the traffic is in real time, the IP platform on which VoIP is used should take care of the delay sensitive nature of both voice and video traffic. The work presented in this paper uses Semantic Web and Context-Awareness technologies to control congestion in VoIP networks caused by crisis/ emergency situations.

Emergency situations such as earthquakes, floods and volcanoes occur frequently on the African continent. During such emergencies there is a huge increase in voice, video or data traffic causing enormous strain on the network. The strain on the network is as a result of both essential and non-essential voice, video, and data traffic. In such crisis situations, calls originating from doctors, hospitals, rescue workers and emergency experts/professionals are considered essential to the rescue mission. Any other calls from the public and eye-witnesses are considered non-essential, since they degrade the quality of service for the emergency response teams by consuming the scarce network resources. The scarce network resources can be allocated fairly to the rescue team by restricting network access for non-essential traffic, thereby ensuring good quality of service for the rescue teams.

Semantic Web enhances the current web in a manner to enable computers to process the information presented on the World Wide Web (WWW), interpret the information, aggregate and combine the information from the web in a way that assists humans in finding the required knowledge (Ankolekar, Krötzsch, Tran & Vrandecic, 2008; Battle & Benson, 2008). This technology is intended to form a vast distributed knowledge-based system in the same way in which the WWW forms an immense distributed hypertext system. It is seen to dramatically change Information Technology (IT) applications such as knowledge discovery, enterprise-scale data integration, knowledge management and service-oriented architectures.

A Context-Aware system uses context to provide services or information to the user. It also takes into account the network nodes' context when carrying out network and application related computations and resource allocations (Jean & Galis, 2005). In a Context-Aware system, the context of the user is determined by the user's identity, location information, status, goal, behaviour and specific wishes. The context of computing resources is determined by network connection status, context of supported services, availability and demand of resources, and computing capabilities of various resources. Context-Awareness and Semantic Web technologies can be applied to develop a service that takes over call admission control from the Session Initiation Protocol (SIP) server during crisis situations on VoIP networks.

This paper is structured as follows: a discussion on related work on call admission control, context-awareness, and Semantic Web; presentation of the design of the proposed Context-Aware VoIP Congestion Control Service; presentation of laboratory test and simulations results; and conclusions and highlighting of future research areas.

RELATED WORK

IP networks are traditionally designed to support a best-effort service, with no guarantees on the reliable and timely delivery of packets (Houck & Meempat, 2002; Gao, Cai & King, 2005). This traditional design supports non-real time applications such as email and file transfer, which are characterised by bursty traffic, high bandwidth demands and insensitivity to delay, and delay variations. VoIP requires timely packet delivery with low delay, jitter and packet loss values. In this section, we look at related work on VoIP call admission control, application of Context-Awareness and Semantic Web.

A. VOIP CALL ADMISSION CONTROL

A significant amount of research has been done on call admission control in VoIP networks. Algorithms, frameworks, and schemes have been proposed as a result. Surveys have also been conducted on existing algorithms to determine their performance in call admission control. In Estepa & Estepa (2008), an algorithm is proposed that can be applied in admission control to determine the bandwidth reservation required to guarantee delay and loss in packet-switched multiplexer node for VoIP traffic. The algorithm demonstrates a significant improvement in accuracy as compared to current on–off-based approaches such as fluid model and Markov Modified Poisson Process (MMPP)-based solutions.

Other channel-aware scheduling algorithms such as maximal rate (MAX) and proportionally fair (PF) are considered in Chung & Chiu (2002) with the objective of meeting the loss and delay requirements in VoIP packets. The PF algorithm is modified to support VoIP service in the CDMA2000 system. The designed frame structure shows that the PF scheduling with the proposed frame structure works well for contending VoIP packets. Further, a dynamic admission control scheme for scheduling services defined in the 802.16 specification is looked at in Wang, He & Agrawal (2007). The scheme provides the highest priority for Unsolicited Grant Service (UGS) connections. Bandwidth borrowing and degradation are employed by the scheme to maximise bandwidth utilisation. An evaluation of the scheme shows that it can guarantee the blocking probability of each class of services.

A measurement-driven framework for admission control in wireless networks is presented in Sheriff, Aravinda, Acharya & Belding (2008). Simulation results show that the proposed scheme works well to provide Quality of Service (QoS) requirements to real-time applications such as VoIP but does not address the challenges of mixed traffic network or make control admission robust enough to handle all network and traffic scenarios.

Other research works, such as Chung & Chiu (2002), show how to support QoS for VoIP by integrating SIP and 802.11e. Some adjustments and enhancements are also suggested to 802.11e to facilitate VoIP traffic over the wireless LANs. The adjustment helps in improving the network performance but does not address the handoff problem where QoS is a concern. Other proposals include Wei, Kim, Kashyap, & Ganguly (2006), where the notion of an interference capability model that can be used to design a Call Admission Control (CAC) algorithm to address the call admission control decision problem for VoIP calls on a mesh network is defined. Simulation results show that the CAC algorithm provides fewer than 20% incorrect decisions for different sizes of a multi-hop linear topology.

Early research carried out on call admission for various types of networks generally shows that a CAC algorithm satisfying QoS requirements for most types of networks has not been availed (Gao, Cai & King, 2005). In Houck and Meempat (2002), a methodology for call admission control and load balancing for VoIP services is presented. The framework is only applicable for packetised VoIP networks that support Diffserv. The framework does not address cases where multiple service provider networks are connected together. It only assumes that the entire network is a single Diffserv domain owned and operated by a single service provider. It also assumes that QoS within this network is the key item to manage.

A VoIP-based Voice over DSL (VoDSL) is proposed in Ram, DaSilva & Varadarajan (2003), with an architecture that provides QoS guarantees comparable to QoS offered by Asynchronous Transmission Mode (ATM) in the DSL access network. Both regular and premium service categories for voice traffic are supported by this architecture. The architecture also supports a best-effort service category for data traffic by using a weighted fair queuing algorithm to schedule voice and data packets for transmission over the link. It also employs a control mechanism, admission control by implicit signalling, which takes advantage of the application layer signalling by mapping it to the IP header. An evaluation of this architecture shows that it can provide QoS comparable to that provided by the Voice over ATM (VoATM) architecture.

B. APPLICATION OF CONTEXT-AWARENESS TECHNOLOGY

Context-Awareness has received attention in recent years and has been employed in developing location-based services such as enquiry and information services, community services, traffic telematics, fleet management and logistics, mobile marketing and mobile gaming. These services require constant tracking of their users to compute context and deliver relevant information to the users. Also, some search engines and systems use Context-Awareness to deliver relevant information to their users. For example, a system called Jimminy searches for information based on a person's physical environment, including location, people nearby, time of day and subject of conversation (Jones, 2005).

Building Context-Aware systems and services is a very challenging task, owing to the fact that contextual information is so dynamic in nature. The challenges related to gathering or sensing, modelling, storing, distributing and monitoring context justify the need for proper architectural support. Costa (2003), in her thesis, proposed a generic and configurable services platform architecture to support Context-Aware applications. The context platform enables dynamic deployment and management of a variety of Context-Aware services and applications. The platform also defines a subscription language used by applications and services to configure the platform to react to a given correlation of events involving contextual information. Web services are also used as a technology to enable the interactions of the platform with its environment.

Jean and Galis (2005) developed a voice service over IP that combines the capabilities of programmable networks and context awareness. The programmable Context-Aware voice (CAV) service enables VoIP services to cope with crisis situations. CAV involved simple privilege allocation and logic to deal with crisis. Also, the project was carried out only for VoIP. Recent migration of other real-time applications such as interactive video onto the IP platform requires an all-inclusive service that copes with VoIP crisis situations.

C. APPLICATION OF SEMANTIC WEB

Matheus, Kokar, Baclawski & Letkowski (2005) describe a Situation Aware Assistant (SAWA). SAWA is based on Semantic Web technologies and facilitates the development of user-defined domain knowledge in the form of formal ontologies and rule sets. In SAWA, Matheus, Kokar, Baclawski & Letkowski (2005) simply describe the functional building blocks of their system without elaborating on the technical software architecture of their system. It is not quite clear how the system addresses the challenges posed by the streaming nature of situation awareness and the cross-cutting role of ontologies. In another work, carried out by Chen, Finin & Joshi

(2003), the Context Broker Architecture (CoBrA) does not discuss the aspects of scalability and reusability in their ontology-driven system architecture for pervasive context-aware environments.

In his thesis, Sotoodeh (2007) addresses the problem of interoperability between information technologies employed for emergency management. He addresses technical interoperability, organisational interoperability, and interoperability aspects of Semantic Web technologies employed. Technical interoperability is concerned with message formats, whereas semantic interoperability is concerned with the semantic technologies and definitions employed. Organisational interoperability is concerned with organisational practices and procedures. In his thesis, he describes a disaster ontology consisting of methodologies for development and evaluation of disaster ontologies and guidelines for utilisation of the disaster ontologies in practice.

Baumgartner, Retschitzegger & Schwinger (2008) address the challenges induced by the streaming nature of situation awareness and the cross-cutting role of ontologies as a technology for developing situation management systems. In their work, they develop domain-independent software architecture for situation awareness that tackles the problems of the cross-cutting nature of ontologies and the streaming nature of situation awareness, with the objective of leveraging scalability and reusability of the software components involved.

Oracle Database 11g (see www.oracle.com) is an example application that supports Resource Description Framework (RDF), RDF Schema (RDFS), and a Web Ontology Language (OWL) data management. This provides an integrated, secure, scalable, and efficient platform for semantic data management. Application developers can define a set of terms (ontologies) and relationships between data and metadata, hence adding meaning to them. The powerful technologies in Semantic Web can be used to develop applications to supplement the current admission control mechanisms.

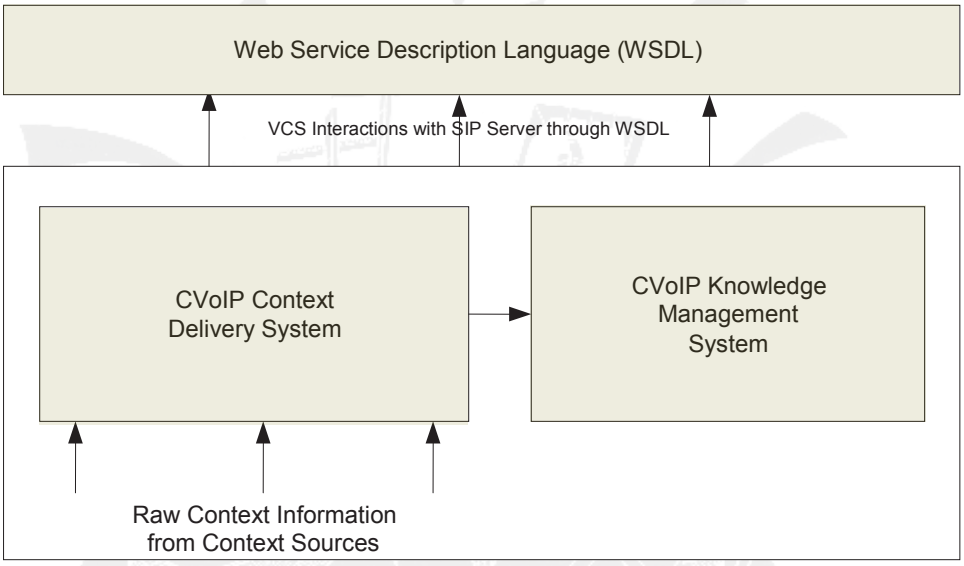
DESIGN OF THE CONTEXT-AWARE VOIP CONGESTION CONTROL SERVICE

This section describes the architecture of the proposed Context-Aware VoIP (CVoIP) Congestion Control Service (VCS). We highlight the core components of the service, followed by detailed definitions of the architectural design of each major component. The technologies employed are also briefly explained. We further illustrate how the service detects and executes during crisis situations.

Figure 1 highlights major components of VCS. The service relies on context information collected from the VoIP service provider's network to detect a crisis and execute during crisis situations. The architecture of VCS therefore consists of a Context Delivery System that constantly collects, aggregates, and disseminates context information. Context information is provided by the service provider's equipment such as bandwidth manager, SIP server, application server, media server, and access gateway. Another major component of VCS is the Knowledge Management System, which acts as the nerve of the system during crisis situations. Also, a web interface is required to describe potential interactions with

web services. The two major components of CVoIP, CVoIP Context Delivery System and CVoIP Knowledge Management System interact with the service provider's SIP servers through a web service interface defined by Web Service Description Language (WSDL).

FIGURE 1: MAIN COMPONENTS OF VOIP CONGESTION CONTROL SERVICE



The internal architectures of the components highlighted in Figure 1 are constituted by sub-components such as context providers, context dissemination mechanism, context consumers and ontologies. The discussion therefore provides a detailed description of each component in the sub-sections that follow. It also highlights the importance of employing Policy-Based Service Management (PBSM) to govern how the various network and service components should act when certain conditions prevail within the network.

D. VCS CONTEXT DELIVERY SYSTEM ARCHITECTURE

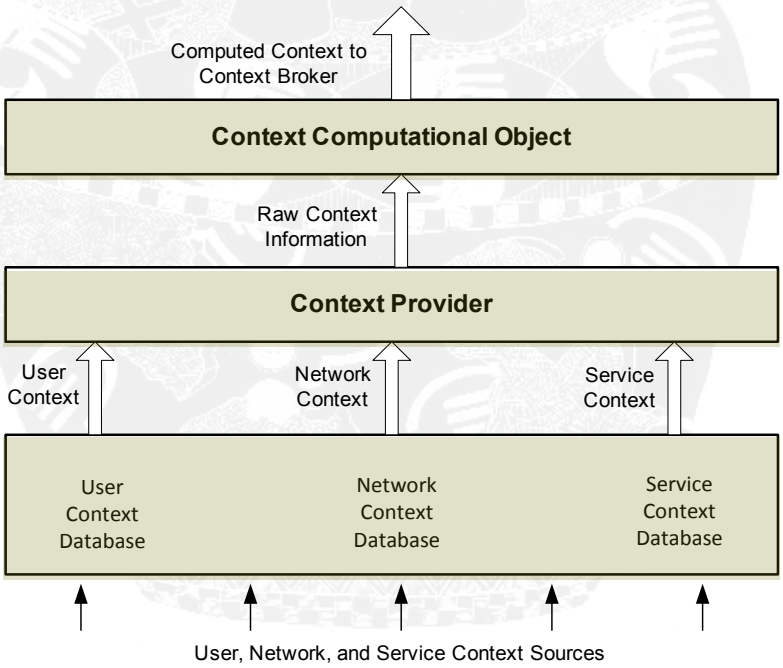
For context-aware services to adapt to their environment they need to constantly access information about it. This is achieved through context management, which deals with the collection, aggregation, and dissemination of aggregated context information. There are several raw data sources through which context information can be collected. The collected data is processed into the required meaningful context information. The processed information is then disseminated to different applications and devices situated in various locations of the network. All these processes are handled by the Context Information Dissemination System (CIDS). CIDS consists of context providers, context dissemination mechanisms and context consumers.

Context providers are the various entities located in diverse locations within the network that provide context information to the Context-Aware system. The provided information is processed and distributed through the dissemination mechanism that simply ensures that the processed context information reaches the context consumers. Context consumers are the applications and devices that use the disseminated context information.

For VCS, we consider three major categories of context information: user context, network context and service context, as highlighted in Figure 2. User, network, and service context databases act as temporary storage locations for raw context information acquired from the various context sources. The Context Provider retrieves the context information stored in these databases through push and pull requests. The Context Provider also acts as the source of raw context information for the Context Computational Object (CCO), which aggregates and filters the received context information to produce complex context information. This information is readily availed to the Context Consumers through the Context Broker.

The User Context Database (UCD) contains User Context Information (UCI) consisting of user name, profession, sub-ID, crisis password, location, priority level and preferences. This information is available from the user profile database and the SIP server located within the service provider's network. Network Context Information (NCI) is composed of different pieces of information available in different network locations. These pieces of information have to be extracted from the VoIP service provider's network equipment and used to create a general network view.

FIGURE 2: CONTEXT ACQUISITION AND PROCESSING



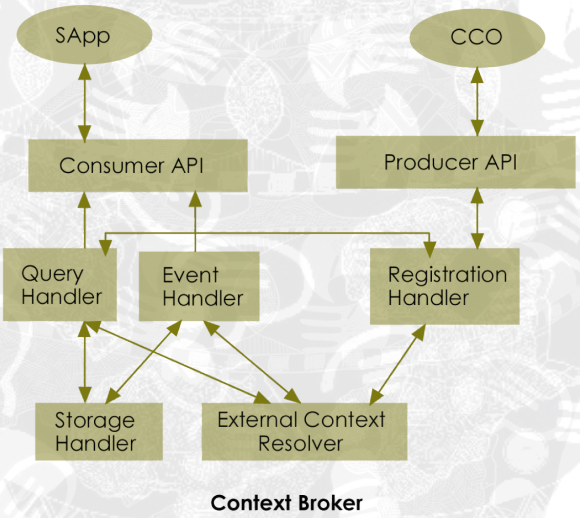
The VoIP service provider's network consists of the network elements such as call agent, media server, access network, access gateway, application server, signaling and trunking gateways. These components of the service provider's network provide the required network context for VCS. NCI consists of bandwidth, load, delay, SIP server ID, network domain ID, link states, node states, latency, jitter, loss, and error rate. NCI is the basis upon which a crisis situation is detected, which dictates that the network resources need to be managed in a different way. Contention or competition for resources is resolved by denying a given user category access.

Service Context Information (SCI) consists of service type, service priority, and minimum and maximum bandwidth allocated to the service. Under normal network operations the SCI is determined and assigned by the service provider. During crisis situations, the priority level and bandwidth are dynamically assigned by VCS, hence this determines which type of service is allowed during those situations.

CONTEXT DISSEMINATION

The context dissemination mechanism is achieved through the Context Information Dissemination Brokers. These brokers collect context information from the various context providers and disseminate the collected information to the context consumers. The brokers provide the interfaces through which the context providers publish their information and the context consumers access the provided context. This is achieved through the consumer and producer Application Programming Interface (API) as highlighted in Figure 3. The performance of the different delivery mechanisms determines which one to apply. This is guided by the achievable efficiency, scalability, and latency.

FIGURE 3: CONTEXT BROKER ARCHITECTURE



Context consumers are Semantic Web Applications (SApp) and services which interact with the system through the web service interface. These applications provide the system with network

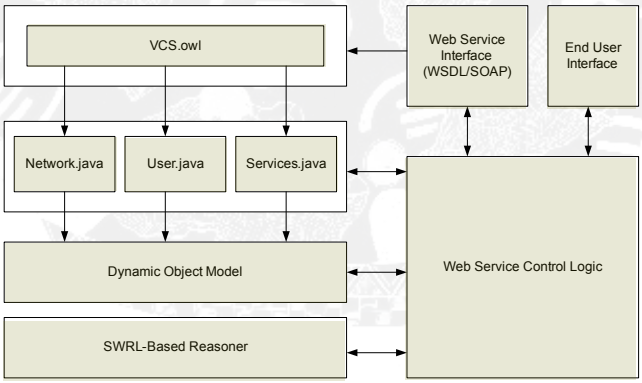
knowledge through which network resources are managed during crisis situations. The SApp deployed in the crisis area provides the SIP server with information on which calls to admit during crisis situations. The application executes by terminating all non-essential calls to and from the crisis domain and only allows privileged users access. This application stops executing when the crisis is over and relinquishes call admission control to the SIP servers. The inputs or the code in this application uses context information generated by the CCO to authenticate network access by validating user crisis access codes and priorities.

Context consumers make requests for context information to the context broker through the consumer APIs as highlighted in Figure 3. The Consumer APIs enable context consumers to access context through pull requests or push events. Also highlighted in Figure 3 is the producer API, which acts as the interface that enables context providers to deliver their produced information. The query handler resolves pull requests issued by the context consumers and triggers the external context resolver for non-local context. The event handler resolves push requests issued by the context consumers and also implements the APIs that enable the context consumers to subscribe for context events. Registration handler is the mechanism through which context producers register context data items. Storage handler retrieves context information from the context sources, stores the retrieved context, updates it, and disseminates it as required. The external context resolver is triggered whenever context is not locally available.

E. VCS KNOWLEDGE MANAGEMENT SYSTEM ARCHITECTURE

VCS Knowledge Management System consists of an ontology-based knowledge management system, SWRL-based (Semantic Web Rule Language) rule reasoner, a dynamic object model, Web service control logic, Web service interface, and user interface as highlighted in Figure 4. The ontology-based knowledge management system consists of hard-coded knowledge about the domain of VCS ontology, which comprises various classes that determine the behavior of the VCS application. The SWRL-based reasoner provides the required intelligent behavior of VCS, whereas the Web service logic controls all the system interactions. Also, the dynamic object model provides an extension to the VCS core ontology concepts about specific class events. The web service interface is achieved through the use of the Simple Object Access Protocol (SOAP) as well as WSDL.

FIGURE 4: KNOWLEDGE MANAGEMENT SYSTEM



The VCS ontology-based knowledge management system is realised through a set of tools for developing and maintaining OWL ontologies and tools for defining the rule sets. It allows VCS administrators to do offline maintenance and define new rules. The tools include an ontology editor, a consistency checker and a rule editor. Below is a brief description of each tool.

ONTOLOGY EDITOR

Ontologies are formally specified using modelling languages. The formal specification ensures proper processing and automatic operations on ontologies. Formal Semantic Web representation languages that can be used for expressing ontologies include OWL, Web Service Modelling Language (WSML), RDFS, Darpa Agent Markup Language (DAML), and DAML+ Ontology Interchange Language (OIL). These languages support the description of classes, instances of those classes, the relationships between them and the constraints on their usage. The chosen language should not limit the development of the ontology and should allow full expression of all the distinctions that we require. For this work we use OWL as the ontology language, because OWL is well defined through a formal set of semantics and the existence of a variety of automated systems to process OWL documents. The semantic interoperability of OWL also ensures that OWL-based systems and services can exchange and share context knowledge. Also, OWL is a World Wide Web Consortium (W3C) standard, which is more expressive compared with other ontology languages such as DAML+OIL, RDF, and RDFS.

RDF is the basis of OWL language. Since RDF is XML-based, any text or Extensible Markup Language (XML) editor can be used for the development of OWL ontologies. We use Protégé as the framework for building the VCS OWL ontology. Protégé is a general purpose ontology management system and provides OWL plug-ins for constructing OWL classes, properties and restrictions among these. Protégé also provides ezOWL as a plug-in that provides a graphical editor besides the basic OWL plug-in. The capabilities of Protégé OWL are supplemented (whenever necessary) by Jena to build the required OWL ontologies. Jena is an open source Java-based framework for building Semantic Web applications. It provides a programming environment for SPARQL Protocol and RDF Query Language (SPARQL), OWL, RDF, and RDFS. It also includes a rule-based inference engine.

FIGURE 5: VOIP CONGESTION CONTROL SERVICE OWL ONTOLOGY REALISATION ON PROTÉGÉ

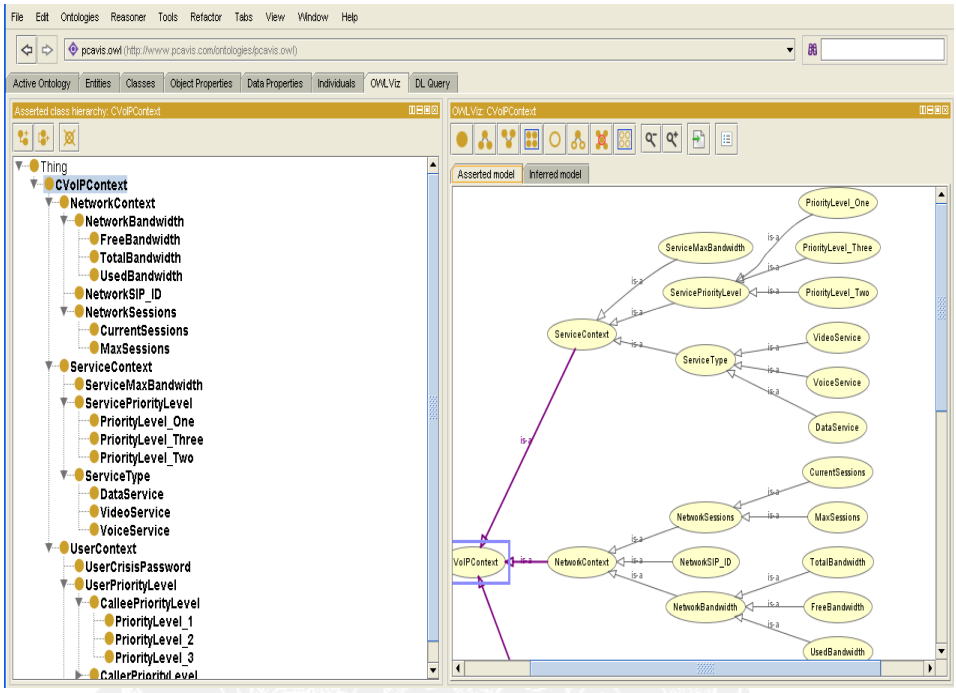


Figure 5 highlights the classes, subclasses, and the hierarchical graphical structure of the VCS ontology developed using the OWL plug-in in Protégé. OWL classes are sets that contain individuals. Individuals in this context represent objects in the domain of VCS. The binary relations between individuals are specified using properties. OWL classes are described using formal descriptions that clearly specify the requirements for membership of the class. VCS ontology hierarchy consists of super-classes and sub-classes. For example, the class ServiceContext consists of sub-classes such as ServiceType, ServicePriorityLevel, and ServiceMaxBandwidth. The hierarchy of super-class and sub-class is relative based on the hierarchy level. This implies that a sub-class of some given super-class might be a super-class to classes that appear below it in the hierarchy.

CONSISTENCY CHECKER

Ontology is said to be inconsistent if any one of its parts does not agree with another. Reasoning with an inconsistent ontology may lead to wrong conclusions, actions and reactions. OWL consistency checkers perform the task of automatically validating the constructed ontology for logical consistency. This ensures accuracy and consistency in the development of complex ontologies. We use ConsVisor, a Versatile Information Systems Inc standalone open Java application as the VCS OWL/RDF consistency checker. The tool analyses OWL and RDF documents by looking for any signs of semantic inconsistencies and also identifies incomplete specification of logical implications in a document. ConsVisor handles formal ontologies

including recent ontology languages (such as OWL Full, OWL Description Logic (DL) and OWL Lite) and traditional data modelling languages.

RULE EDITOR

Rule editors assist with the construction and maintenance of Semantic Web Rule Language (SWRL) rules. SWRL combines OWL and Rule Markup Language (RML) sublanguages. Protégé-OWL provides the SWRLTab as the development environment for editing and executing SWRL rules. The SWRL editor component of SWRLTab supports manipulations and saving of SWRL rules in OWL ontology.

POLICY-BASED SERVICE MANAGEMENT

Policy-Based Service Management (PBSM) consists of the necessary policies, rules, procedures, guidelines, practices and standards that are used to support the business, business processes and their interrelationship. PBSM enables the service providers to know their customers, services and applications to which the customers have subscribed, when to give users access to the network, and how to offer the subscribed services to the users. In crisis situations, the PBSM gives guidelines on how to handle and manage the crisis. Different policies are applied depending on the type of crisis detected. The input to this system is the crisis information passed over by SApp. The output is a set of rules based on the business policies and guidelines to execute or ignore the request.

F. WEB SERVICE DEVELOPMENT LANGUAGE INTEGRATION

The technology in web services allows applications to communicate with each other independent of the platform on which they run and the programming language used. This technology is supported by the standardised architecture of web applications and various enabling technologies such as Web Services Development Language (WSDL), Simple Object Architecture Protocol (SOAP) and Universal Description, Discovery, and Integration (UDDI). Figure 6 highlights the relationship between these enabling technologies.

An industry standard web service employs enabling technologies for web services to provide a service description consisting of WSDL documents. The web service is also capable of transporting XML documents using SOAP over HTTP while at the same time providing service discovery through UDDI.

For Web services to be interfaced with and discovered by other services and applications, they need to be defined in a consistent manner. Web Services Definition Language (WSDL) is a W3c specification which provides the language for description of web service definitions. The integration layer introduced by the web services framework establishes a standard, universally recognised and supported programmatic interface. For VCS to interact with and take over call admission control from the SIP server, a WSDL interface is required.

FIGURE 6: RELATIONSHIP BETWEEN WEB SERVICES ENABLING TECHNOLOGIES

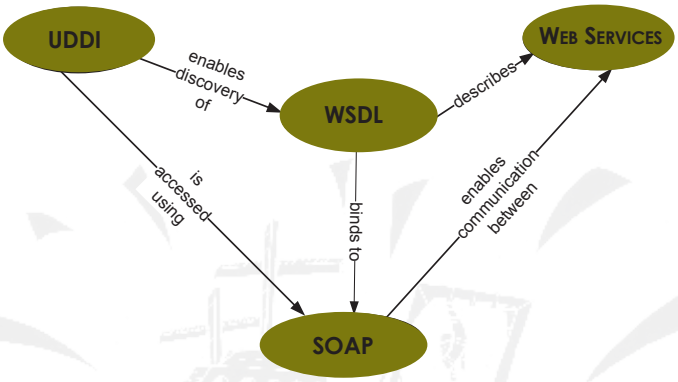
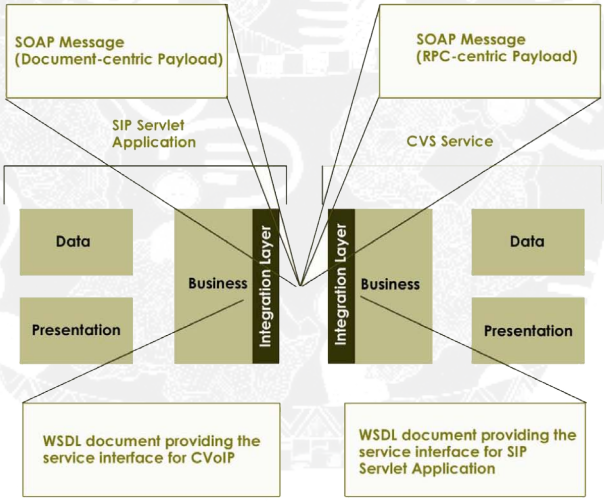


Figure 7 highlights how WSDL interfaces VCS and the SIP server. The presentation, business, and data layers shown in Figure 7 are the core layers of an enterprise web application. The presentation layer generates web pages and decodes web pages coming back from the client, thereby finding the user entered data and passing the contained information to the business logic layers. The layer also includes dynamic content, which originates from a database, in the web page. The role of the business layer includes performing all required calculations and validations, managing workflow, and managing all data access for the presentation layer. The data layer plays the role of managing data. It stores data whenever requested and provides the business layer with required data whenever needed. The data layer is available in the form of a relational database. It may also provide data access procedures to other data sources.

FIGURE 7: VOIP CONGESTION CONTROL SERVICE INTERACTIONS WITH SIP SERVER THROUGH WEB SERVICES DEVELOPMENT LANGUAGE INTERFACE

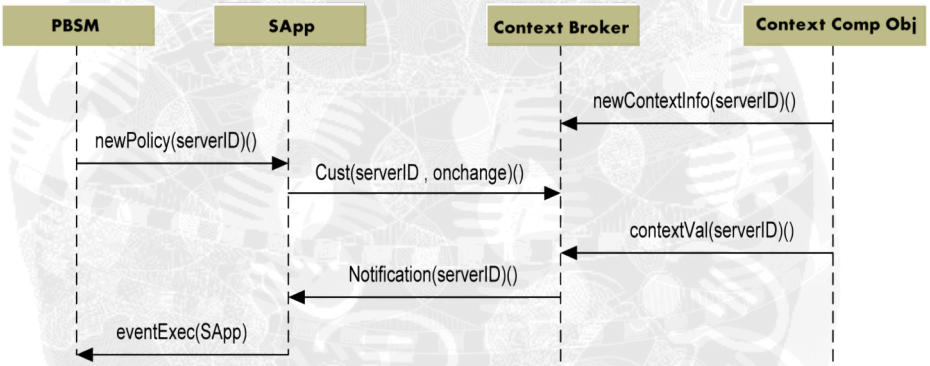


Also highlighted in Figure 7 is the transportation of XML documents using SOAP over HTTP. SOAP was originally designed as a bridge between Remote Procedure Call (RPC)-based communication platforms. It has evolved with time into a protocol for use with XML Web services and a widely supported messaging format. The messaging format consists of an XML document which hosts both document and RPC-centric data, hence supporting both synchronous and asynchronous data exchange models. UDDI provides the mechanism through which web services are discovered. It provides a central directory that hosts service descriptions.

G. VCS CRISIS DETECTION AND EXECUTION

Figure 8 illustrates the crisis detection interactions among some of the service components. The Context Computational Object continuously provides the Context Broker with new context information by executing the newContextInfo(serverID) function. The provided context information contains network parameters which determine whether a crisis situation has occurred or not. For VCS, a crisis situation is detected whenever the set call threshold for the emergency number 112 is exceeded. The set threshold varies with the SIP server domain under consideration. The Semantic Web Application (SApp), by executing cust(serverID,onchange) function, retrieves the computed context information through the Context Broker and evaluates it for crisis situations. At the same time the Context Broker continuously updates SApp with context information by executing the notification(serverID) function. SApp informs the PBSM whenever a crisis occurs through the eventExec(SApp) function.

FIGURE 8: VOIP CONGESTION CONTROL SERVICE CRISIS DETECTION

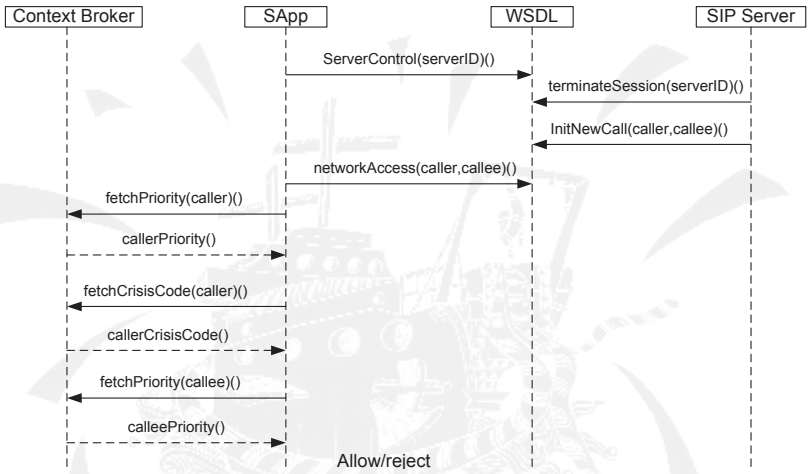


PBSM consists of policies which determine and authorise various actions and reactions of network applications under different circumstances. These policies are applied by executing the newPolicy(serverID) function.

Figure 9 highlights VCS execution during crisis situations. Whenever a crisis is detected SApp takes over admission control from the SIP Server by executing serverControl(serverID) function. SIP Server and SApp interact with each other through WSDL. The SIP server responds to the serverControl request by executing terminateSession(serverID) function and consults SApp on every new call initiation request that it receives. Caller and callee priority levels must

satisfy the set crisis priority levels for a call session to be established between them. Also, the caller crisis code must be authorised.

FIGURE 9: VOIP CONGESTION CONTROL SERVICE EXECUTION INTERACTIONS



The SIP server, WSDL, SApp, and Context Broker interact with each other by executing various functions. These functions take in caller, callee, or both as the input parameters. InitNewCall(caller,callee) function is executed by the SIP server whenever it is seeking network access authorisation for a new call. The interactions between SApp and the Context Broker through functions fetchPriority(caller), fetchCrisisCode(caller), and fetchPriority(callee) determine whether a call initiation request is accepted or rejected.

LABORATORY TEST BED IMPLEMENTATION AND SIMULATION RESULTS

In this section we demonstrate how the service functions through laboratory test scenarios and OPNet simulations. Our main focus is how the service takes over call admission control from the SIP Server, rejects non-privileged calls and drops non-privileged ongoing call sessions. The laboratory test bed consists of a SIP Server, two network switches, 10 client computers, a web server and application server. We installed and configured OpenSER on a Linux (Debian) platform. Our clients are notebook computers running X-Lite SIP client application. We further carried out simulations on OPNet for network performance analysis using parameters such as delay, throughput, connected calls, rejected calls and dropped calls. Some of these results are presented in the subsections that follow.

H. CALL MANAGEMENT DURING CRISIS SITUATIONS (LAB TEST)

During crisis situations the SIP Proxy server consults the Context-Aware System (Box) for every session request received from the clients. This is to ensure that only privileged users are authenticated by the Context-Aware Box to access the network. We present two scenarios where call initiation requests from eyewitnesses are either rejected or an ongoing session

terminated. The termination of an ongoing session results in dropped calls. The Context-Aware Box determines which calls to allow based on the ontology-based knowledge management system and updated captured context information. These systems consist of user priorities that are assigned based on the crisis situation. Whenever a call initiation request is received by the Context-Aware Box, it checks both the caller and callee priorities to determine if the session should be established by the SIP Proxy server or not. The session request is automatically rejected if either of the involved parties is a non-privileged user.

Figure 10 presents a scenario where an eyewitness tries to make a call to another eyewitness. Both parties in this case are non-privileged users. The presence of a crisis situation dictates that the call initiation request should be rejected. Eye_5 sends an INVITE request to Eye_6 through the SIP Proxy server. The SIP Proxy server sends back a 100 TRYING message back to Eye_5 indicating that the request is being processed. At the same time the SIP Proxy server sends the INVITE request to the Context-Aware Box for user priority confirmation and authentication.

FIGURE 10: SIP TRANSACTIONS (NETWORK ACCESS DENIED)

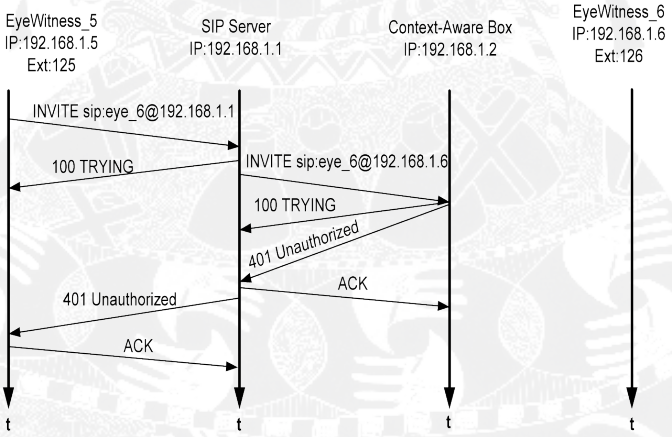


Figure 10: SIP Transactions (Network Access Denied)

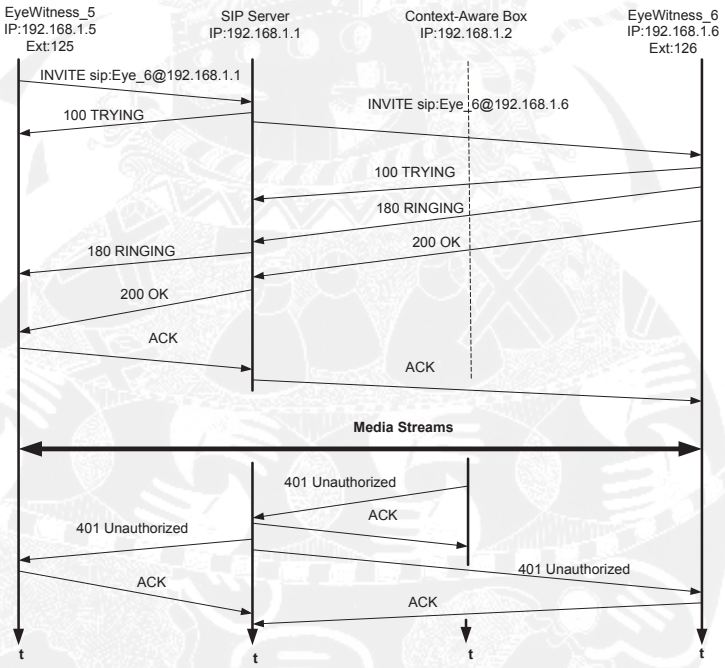
The Context-Aware Box sends back a 100 TRYING message back to the SIP Proxy server as it processes the INVITE request. The user is determined to be a non-privileged user and the Context-Aware Box sends a 401 UNAUTHORISED message to the SIP Proxy server. The SIP Proxy server acknowledges the UNAUTHORISED message by sending an ACK to the Context-Aware Box and at the same time sending the UNAUTHORISED message to Eye_5. Eye_5 sends an ACK to the SIP Proxy server hence marking the end of the call initiation request.

Eye_6 does not receive any information or communication about the aborted call initiation hence ensuring that bandwidth and other network resources are not consumed unnecessarily. Other scenarios related to this include a privileged user calling a non-privileged user such as a

doctor calling an eyewitness, a non-privileged user placing a call to a privileged user, such as an eyewitness calling a doctor. The same process, illustrated in Figure 10 takes place before any non-privileged call can be established.

The scenario highlighted in Figure 11 illustrates a premature termination of an ongoing media exchange session between two non-privileged users. The session started when the network was operating under normal conditions without involving the Context-Aware Box. Immediately a crisis situation is detected the Context-Aware Box comes into play and determines which sessions are to be terminated. The termination is dictated by network resource requirements during the crisis situation. The system continuously checks the ongoing sessions for privileges and priorities of the involved parties. This results in dropping of non-privileged users' calls.

FIGURE 11: SIP TRANSACTIONS (DROPPED CALL)



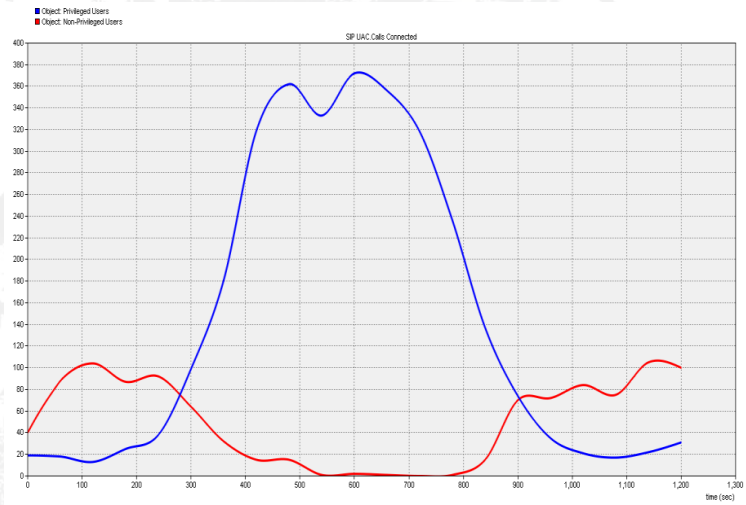
Before detection of the crisis situation, Eye_5 and Eye_6 were exchanging media information. Immediately the crisis situation is detected, the Context-Aware Box takes admission control from the SIP Proxy server and also checks the ongoing sessions to determine which calls should be dropped. In this scenario, the Context-Aware Box determined that the call session between Eye_5 and Eye_6 is non-privileged and should be terminated. It then sends a 401 UNAUTHORISED message to the SIP Proxy server, which acknowledges the message through an ACK. The Proxy server at the same time sends a 401 UNAUTHORISED message to Eye_5 and Eye_6. Both Eye_5 and Eye_6 acknowledge the 401 UNAUTHORISED message by sending an ACK to the SIP Proxy server, hence terminating the media exchange session between the two parties.

Another scenario related to the one illustrated in Figure 11 includes termination of non-privileged sessions initially authenticated by the Context-Aware Box during the crisis situation. For example, a media exchange session between a doctor and an eyewitness may be initially authenticated if network resources are available to sustain it. If the crisis situation worsens and more resources are required the session is automatically dropped in favor of a new session between two doctors.

I. CONNECTED AND REJECTED CALLS (OPNET SIMULATIONS)

Figure 12 shows the total number of calls connected for both the privileged users and non-privileged users. Connected privileged user calls comprise the total of connected calls originating from or destined to medical doctors, nurses, police officers, military personnel, rescue experts, and fire brigade personnel. Non-privileged user calls consist of connected calls originating from or destined to eyewitnesses and the general public. From the figure we can see that the network operates with normal traffic flow from 0 seconds to 250 seconds. The non-privileged user traffic during this period is higher than privileged user traffic. This is due to their heavy calling characteristic and general categorisation of some privileged users as non-privileged.

FIGURE 12: CALLS CONNECTED BY THE SIP SERVER



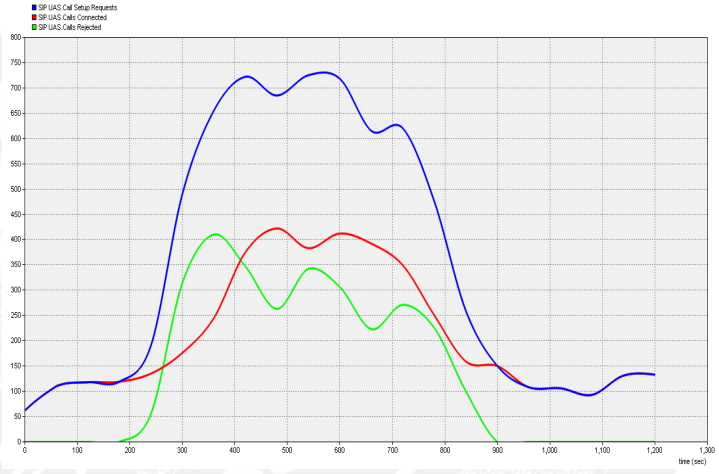
When a crisis is detected, the network through the SIP server slowly restricts network access to privileged users. This is observed between 250 seconds and 850 seconds. The peak of the crisis situation is observed around the 600th second where the total number of connected privileged user calls rises to 375 seconds, whereas the total number of connected non-privileged user calls reduces to zero. Zero connected calls for the non-privileged users implies that the ongoing sessions were dropped and any new call initiation attempts were blocked by the SIP server.

At the end of the crisis situation, the network reverts to its normal traffic loads where the connected non-privileged user calls are higher than the connected privileged user calls. This is observed around the 800th and 1 200th seconds, where the connected privileged user calls

slowly drops and later stabilises around the 1 000th second. The drop in connected privileged user calls is due to successfully terminated call sessions and a drop in new call initiation requests. The rise in connected non-privileged user calls is due to new successful call initiation requests and a reduction in the number of calls dropped.

The drop in connected non-privileged user calls and the rise in connected privileged user calls implies that some call requests were accepted and others denied. Figure 13 highlights the total number of call initiation requests, total connected calls and total rejected calls from both privileged and non-privileged users. This is an observation of activities at the SIP server. It is observed that all call connection requests are successful between 0 seconds and 200 seconds of the simulation period. During this period the total of connected calls is equal to the total number of call initiation requests and rejected calls are zero. This implies that the network was operating below its resource availability and SIP server maximum call connection constraints. The crisis situation dictates that some calls are connected while others are rejected. The connection or rejection is determined by the defined network policies and the captured network context information. A crisis is observed between the 250th second and the 850th second of the simulation period. During this time the total number of calls connected is lower compared to the total number of call requests, hence implying a rise in total number of rejected calls.

FIGURE 13: TOTAL CALLS CONNECTED, REJECTED, AND REQUESTED AS OBSERVED AT THE SIP SERVER



An observation of the configured client nodes indicates that none of the rejected calls originated from or was destined to the privileged users. All the observed call rejections were at the public and eyewitness client nodes. At the end of the crisis situation (800-1 200 seconds) the network reverts to its default state where no call rejections are observed and all call initiation requests are successful.

FIGURE 14: CONNECTED CALLS AS OBSERVED AT EACH SIP CLIENT NODE

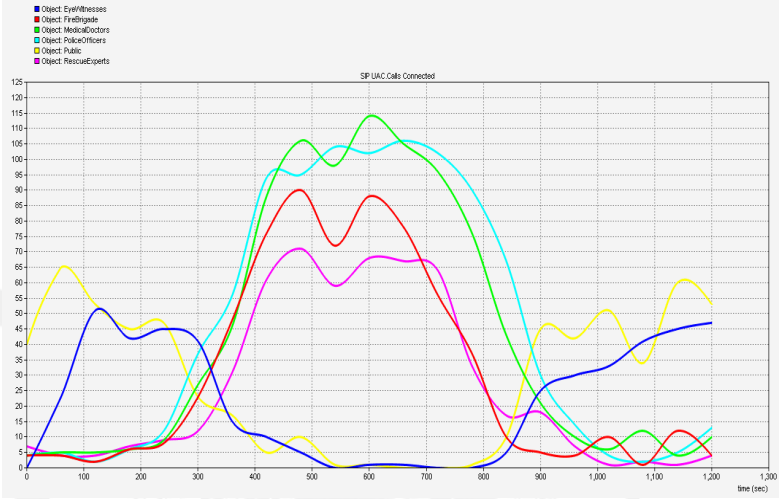


Figure 14 highlights a decomposed comparison of connected calls observed at each of the client nodes. The number of connected privileged user calls rapidly rises during the crisis situation and the number of connected non-privileged user calls rapidly reduces to zero or almost zero for the reasons stated above. Our interest here is the comparison of total connected calls among the privileged users. From the figure, the authors observe that doctors and police personnel were the most urgently required personnel during the crisis situation. The total number of military and rescue experts present was a little lower, compared to doctors and police.

CONCLUSION AND RECOMMENDATION FOR FUTURE WORK

J. CONCLUSION

This paper presented the design, implementation and simulation of a Context-Aware VoIP congestion control service. The paper presented detailed descriptions of the Context-Aware system and the knowledge management system that are core to VCS. In the design section, the authors highlighted the various function executions in monitoring, detecting, and taking over admission control from the SIP servers. The laboratory experiments concentrated on how the service responds to crisis situations by taking over call admission control. Simulation results have shown that privileged calls are given more priority compared with non-privileged calls. Other results, which are not presented in this paper, show that network performance requirements are met during crisis situations if VCS is deployed, but suffers severe quality of service degradation without VCS. This observation is based on the end-to-end delay time and throughput performance achieved with and without VCS. The high level of performance is achieved by dropping and rejecting non-privileged calls and at the same time ensuring that all privileged calls are connected.

With the realised improvement in the environment for networked readiness in Africa, the innovative service developed and reported in this paper, if implemented, could relatively improve

the quality of VoIP in a manner that matches the qualities experienced in other networks, such as the Public Switched Telephone Network (PSTN). Also, the dynamic technology of VoIP as evidenced in this paper should be considered as part of many other approaches to addressing telecommunications problems in Africa and other parts of the world.

K. FUTURE WORK

This work opens up several interesting research issues for future work. Firstly, in this paper the authors addressed congestion control in VoIP networks only. It would be very interesting to make adjustments to VCS to manage congestion and call admission control challenges in other networks, such as the everyday evolving GSM-based networks. Secondly, this paper considered only voice and video traffic. It would be interesting to incorporate other services such as Instant Messaging. Lastly, network convergence is the way forward. Further research work should exploit the evolving technologies in Semantic Web and Context-Awareness to address admission control issues which come with network convergence.

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FRANSMAN, M. (2010). THE NEW ICT ECOSYSTEM: IMPLICATIONS FOR POLICY AND REGULATION, CAMBRIDGE UNIVERSITY PRESS: CAMBRIDGE.

Reviewed by Lucky Madikiza,
Development Bank of Southern Africa (DBSA)

This new book by Martin Fransman, Professor of Economics at the University of Edinburgh, invokes the biological concept of an "ecosystem" as a metaphor for understanding and interpreting the development of the ICT sector. Fransman suggests that we should consider ICT as a living, breeding and evolving environment, much like the complex dynamics and interplay of biological organisms. But exactly what prompts him to adopt the idea of the ICT sector as an evolving ecosystem?

This approach is justified in an assertion in the preface of the book that "the idea of interacting organisms in a constant process of change is more appealing than that of a mechanical system settling into equilibrium, if the aim is to understand living force and movement" (Fransman, 2010: xiv). The "interacting organisms" in the ICT socio-economy are firms and consumer users of technology products and services. The nature of the interactions in these so-called organisms continually changes as learning and adapting takes place through a range of "symbiotic interactions". These symbiotic interactions should in turn be seen as embedded in another, broader bio-network – one which consists of institutions and other non-firm entities, such as universities and government research and policy-making institutions that also play a role in the ICT ecosystem. Then there are the technical aspects of this ecosystem, such as platforms, architectures and networks.

Though he utilises a biological concept of "ecosystem", the thrust of Fransman's focus is economic. The essence of his approach is that the ICT sector is vital as a driver of socio-economic growth, providing the enabling communication infrastructure upon which contemporary economies function. Fransman goes further to address questions such as: why does the ICT sector perform better in some countries than in others; and what should governments, regulators and firms be doing to enhance its contribution to development? These two questions are perhaps more pertinent to policymakers and regulators.

On the second question, Fransman observes how some countries fare better than others in ICT competitiveness. He documents how East Asian firms have enjoyed a globally dominant position in the "networked elements" layer of ICT (telecoms equipment, computers and consumer electronics). These companies come mainly from four countries (Japan, Korea, Taiwan and China), and have achieved global competitiveness in areas previously dominated by firms from the USA and Europe.

Fransman suggests that, in these four countries, the necessary conditions to stimulate a "sustainable learning-based growth trajectory" (Fransman, 2010: 217) were put in place very early. For instance, Korea started assembling consumer products such as black and white TVs in the 1950s, while Taiwanese firms began low-cost assembly for US firms around the same period. Chinese companies in computers and telecoms equipment emerged from government research institutes. It was the learning-based trajectory that ultimately led to these countries becoming major global players. More precisely, he observes, it is particularly when innovation is fervently propagated within the ICT ecosystem that some countries succeed better than others.

The fact that Europe has been beaten in the global competiveness stakes can be discerned from the regulatory framework adopted there. Europe's New Regulatory Framework places emphasis on a single market; establishment of competitive conditions in the EU market; and the need for remedial intervention should there be an operator with significant market power (SMP). However, for Fransman, these conditions, though necessary, are insufficient to drive Europe to be globally competitive. Rather, "it is the intensity of competition that is crucial – where firms fight and cooperate in order to improve their positions, often using innovation as their key weapon – rather than 'market power' as defined in the Framework" (Fransman, 2010: 157). He blames what he calls the "Dominant Regulatory Paradigm in Telecommunications (DPRT)" (Fransman, 2010: 74) in policy and regulation. This paradigm is concerned with dealing with a dominant incumbent that holds SMP until there is sufficient competition in the market. However, this DPRT stifles innovation and does not provide incentives to investment by an incumbent.

It is therefore important that regulators and policymakers begin to consider the ICT sector in terms of an ecosystem paradigm, so that a response to its strengths and weaknesses can be a much more coordinated one. The problem in many contemporary policy and regulatory environments is that ICT governance institutions are fragmented; these include regulatory authorities, competition authorities and standardisation bodies. This raises questions around coherence in policymaking for the ICT ecosystem. Further, regulatory and policy frameworks must factor in or enable the crucial process of innovation to drive ICT growth.

It is therefore a critical assertion that policymakers and regulators must be conscious of ICT as an evolving ecosystem. Fransman's work is ground-breakingly original in this regard. The fact that he won the 2008 – 2010 Joseph Schumpeter Prize for this work attests to the high regard in which his analysis is held.

This book is a refreshing work from an economist who has moved away from the mould of mathematical models often seen in economic-oriented ICT analysis. At times, such models come with simplistic assumptions on how markets or competition work. If we adopt, instead, the natural science assumption of an evolving ecosystem, the ICT environment must evolve in its entirety, including its firms, consumers, governing institutions and markets.

Fransman's insights have important implications at the level of ICT regulation and policymaking. How should ICT regulation and policymaking institutions be configured to respond to a highly

innovative, changing sector? How do we alleviate the problem of regulatory or policy lag, which tends to chase after the moving target of a rapidly evolving ICT sector, despite the limitations of institutions? A suggestion is that these macro spheres in the ICT ecosystem must themselves have competencies to be futuristic. They must contemplate and experiment with foresight methodologies on regulatory and ICT policy issues. One has noted some interesting work on foresight ICT policy analysis by Leo van Audenhove. In similar vein, futuristic research orientations must come to the fore and regulators should become more aware of ICT "regulatory futures" research efforts. In the same way that innovators are always contemplating ICT technology trends such as Web/Internet 3.0, fourth generation networks, Telecoms 3.0, decision-makers should be putting a comparable effort into thinking about next generation regulatory and policy frameworks. This means that regulatory and policymaking institutions must have vigorous innovation and future studies research functions in their own internal R&D structures. These next generation steps are also imperative if the institutional frameworks of ICT governance are to keep pace with an evolving ICT ecosystem.

Fransman's work is invaluable reading for policymakers and regulators, as well as ICT companies and organised consumer groups. It represents new thinking, a new paradigm of considering ICT as an ecosystem, which should hopefully gain some mindshare among various role players in the ICT sector.

SIX

HANNA, N. (2010). E-TRANSFORMATION: ENABLING NEW DEVELOPMENT STRATEGIES – INNOVATION, TECHNOLOGY AND KNOWLEDGE MANAGEMENT, SPRINGER SCIENCE AND BUSINESS MEDIA, NEW YORK

Reviewed by Last Moyo,
Senior Lecturer, Media Studies, Faculty of Humanities, University of the Witwatersrand, Johannesburg

Information about the book is available at http://www.springer.com/economics/public+finance/book/

Reading a book on media technologies and development is always accompanied by some anxiety. Much has been written by scholars of different persuasions in this broad and interesting subject area, though sometimes without much intellectual rigour and philosophical depth. Much as this topic has been of intellectual curiosity and debate across the world, scholarship has often been characterised by a poverty of theory and simplistic interpretations of the relationship between society and technology. Social development has often naïvely been perceived as technologically driven, despite the equal or greater importance of factors related to human agency and social context. From the steam engine to electricity, the printing press to radio, technology has often erroneously been understood as the sole driving force for development and human progress.

The advent in the 1990s of new ICTs, such as the Internet and mobile phones, has re-ignited the optimism wherein the Information Society and its concomitant innovations in communications are sometimes blindly celebrated as the panacea for all human development challenges. At the one end of the spectrum is the utopian and deterministic view of new ICTs as neutral tools that will always lead to universal progress at once autonomous, unidirectional, and predictable. At the other end is the view that new ICTs are far from being neutral or value free, since they represent materialised ideology, based on the overarching interests of the producing cultures and elite classes. As products of a capitalist system, new ICTs are believed to first and foremost serve the interests of power. In the continuum of philosophy surrounding the questions of technology and development, many other epistemes exist that critically engage with the subject. Given this context, Nagy Hanna's contribution represents a milestone in fostering a critical engagement with the subject matter. In e-Transformation, Hanna explores the question of new ICTs and development in a probing and intellectually invigorating way, underpinned by a sound theoretical grasp of problems in the key approaches in the society-technology matrix. He confronts the practical and institutional bottlenecks impeding the effective use of ICTs in participatory development and unravels the greater philosophical questions relating to the dialectical relationship between ICT and development.

The author's 35 years of experience in international development, working mostly for the World Bank, strongly influence how he explores the question of ICTs and development, based on knowledge gathered from cases around the world. The main themes that run through the book are the strategic integration of ICTs into national development processes, and how public and

private enterprises and communities can appropriate ICTs to enhance their productive capacity, empower themselves and unleash their development potential. Hanna notes that the ICT revolution is replete with promises to institutions, local communities and the global community about the opportunities embedded in a networked economy, but warns that without a sound, comprehensive and holistic e-transformation strategy that weaves and mainstreams ICTs into national development, such promises will remain a dream. The digital revolution, he argues, necessitates a fresh concept of development as a techno-economic paradigm, recognising that new ICTs as communication and information resource tools are indispensable. He also acknowledges, though, that ICTs are not a magic bullet for development challenges. Their success depends on many other factors.

His experiences at the World Bank have clearly been instructive in facilitating an understanding of the range of cognitive, institutional and social factors that can undermine the effective use of ICTs in development. He argues that e-transformation must be a responsibility not only of ICT specialists, but also of development workers who provide development thinking, models and practice. At the World Bank, Hanna observed how the power of ICTs as an enabler of development can be compromised by the communication and philosophical gaps that exist between ICT specialists and development practitioners. Hanna's voice is not only that of an insider and a technocrat, reflecting on his experience at the Word Bank to explore and unravel some of the deep-seated institutional dilemmas of the development world, but also that of a scholar who is advancing an intellectually compelling argument regarding the potential that new ICTs carry for development. However, he is equally aware of the limitations that abound; in his words, the ICT revolution offers "many promises and opportunities, even while posing serious risks and uncertainties" (Hanna, 2010: 29). Ultimately, he contends, countries must fashion responses that address their specific social, political and economic experiences and conditions.

This acknowledgement of geographic and cultural relativism locates Hanna's work within a critical and scholarly vein that perceives ICTs as socially shaped. New ICTs as General Purpose Technologies (GPTs) might affect how we work, learn, play, produce, or even date, but questions of agency and social context must never be ignored. He emphasises the social character of new ICTs, which he perceives as socially embedded rather than as an autonomous force outside society and human agency. The social context underpins how technologies are appropriated and deployed to achieve what people perceive as pressing developmental goals in a given social and historical setting. The author notes that new ICTs are ambivalent as they are at once a resource and a constraint. They are without a singular essence and can play different roles in different social systems. Hanna confronts the downside risks, such as the exacerbation of inequalities and reinforcement of power relations, and observes how new ICTs may control rather than empower the individual in the development process. While, for example, mobile phones and the Internet have compressed space and time in many sectors such as e-transactions, e-learning, e-networking, and e-politics, digital opportunities are concentrated in the affluent and elite classes, while poor communities remain trapped in abject poverty.

More often than not, ICTs are quickly appropriated by the powerful political and economic elite to advance their interests. Yet Hanna sees this domination as not necessarily embedded in technologies, but as socially and historically contingent, based on the economic models, policies, and political choices that the elite make in their struggle to inscribe their meanings to the process of development. Thus, while he sees new ICTs as far from being a panacea for social, political and economic ills, he simultaneously rejects the essentialist view that their sole purpose is for political and economic domination. In my view, it is this middle ground constructivist and critical position of Hanna's conceptualisation that makes his work interesting and relevant to every reader.

But Hanna's treatment of the concept of the digital divide appears to emphasise the physical access to new ICTs, hence his perception that telecentres may provide the answers to those without access. In the process, the author forgets that the divide, which stands as a stumbling block to popular participation in e-development, is in reality more complex and multi-dimensional. National ICT infrastructure cannot unleash the e-transformation of institutions or national development potential as long as the content and language of ICTs remains irrelevant and alienating to many, especially in the developing world. These questions are not exhaustively dealt with and the complex questions of balancing universal access to ICTs and corporate profit maximisation by networks are not convincingly answered through a comprehensive political economy analytical perspective. This may be partly because Hanna, while addressing many other important issues, has institutional analysis as the flagship of his contribution. For example, he argues that the ICT revolution has brought about network-centric enterprises whose business ecosystems are dependent on what other network players do. However, in emphasising his normative theme of how networks contribute to e-transformation and e-agility, Hanna overlooks the fundamental questions of power and agenda-setting, which Manuel Castells has seen as co-existing with networks.

So what knowledge gaps in terms of theoretical and policy interventions does the book fill? Hanna's input is rich, complex and multidimensional, because of its interdisciplinary approach. The author makes a persuasive argument for e-transformation for development by integrating insights from political economy, development studies, management studies and technology studies. His work is versatile in many respects, but institutional analysis in the uptake of ICTs for development stands out as the major strength of the book. Through interesting case studies, Hanna amply demonstrates how ICTs, if appropriately utilised, can revitalise and re-kindle organisations as sites of production, not only through interactive communication but also through the creation of participative spaces for workers and managers.

TAPSCOTT, DON AND WILLIAMS, ANTHONY D. (2010). MACRO WIKINOMICS: REBOOTING BUSINESS AND THE WORLD. PORTFOLIO/PENGUIN, NEW YORK, NY.

Reviewed by Nagy K. Hanna

In this new book Tapscott and Williams argue that a powerful new model of innovation, involving open source and mass collaboration, is sweeping across all sectors, where people with drive and expertise take advantage of new web-based tools to reshape established institutions and the world. The argument builds on their earlier book Wikinomics: How mass collaboration changes everything (Tapscott & Williams, 2006), which focused on a new era of collaboration in business, and extends their analysis and examples to show how business, government, civil society and individuals can leverage collaborative technologies to work in new ways to solve the greatest problems of our time. They argue that collaborative innovation can revolutionise work, as well as how we live, learn, create, and govern. With many vivid examples from more than a dozen fields, the book makes for inspiring reading.

The authors describe a new environment fostered by the Internet, the rise of networked intelligence, and suggest that organisations can succeed in this environment by embracing the five principles of Wikinomics: collaboration, openness, sharing, integrity and interdependence. The common thread is the growing realisation that the collective knowledge, capability, and resources, embodied within broad horizontal networks of participants, can accomplish more than one organisation or individual can acting alone.

Twitter, Facebook and Wikipedia have captured the popular imagination about collaborative innovation and content creation, but the authors share many other examples of companies and communities that apply these principles, with great impact. Examples of platforms that radically drop collaboration costs and enable access to the global marketplace for ideas, innovations and talent, include Linux, InnoCentive, NineSigma, iPhone, Open Source, P&G's open innovation called "Connect and Develop", and GE's "virtual collaboratory" – all developing Internet-based global platforms for collaboration and innovation.

The book covers the use of Wikinomics for re-industrialising, building green energy and intelligent transportation, promoting collaborative learning, collaborative science, and collaborative heath care. It shows how consumers are turning into prosumers and content creators, and how Wikinomics is turning the media inside out. The book also shows how governments are becoming platforms for creating public value, and how citizens are using Wikinomics to monitor and enforce regulation, fight for justice and address global problems.

Again, the book is rich with examples from each of these fields. In transportation, for example, some applications could facilitate carpooling and ridesharing, ease congestion and select optimal routes. Foundations are organising large-scale innovation contests as a way to generate

ideas and turn them into radical breakthroughs that will benefit humanity, in areas like fighting climate change and creating a green energy economy. In the realm of education, Wikinomics can transform pedagogy through collaborative learning, interactive computer-based courseware, just-in-time teaching, course content exchange (OpenCourseWare), course content co-innovation, and even customised student-centered collective syllabi of the world. Emerging applications in the public sector are no less inspiring: Apps for Democracy, open sourcing government (web-enabled collaboration with citizens, civil society, and the private sector for public services), participatory budgeting, Data.gov (an open hub for federal data) to help co-create information-based services, and the use of social networks to reinvent government from the bottom up.

The authors celebrate the power of collaborative technologies, drawing primarily on practices and applications from advanced countries. They acknowledge the vested interests involved in maintaining closed systems, as in health systems and authoritarian governments, and the dangers of killing privacy and empowering dictators. They suggest ways to overcoming such barriers and managing the dark side.

The authors do, however, tend to underestimate the barriers of adopting, spreading and scaling up Wikinomics in the context of the digital divide and institutional rigidities that prevail in developing countries. It would have been useful to have extended their analysis to address these barriers and the role of new leaders, public policies and national strategies in making Wikinomics a mass movement in developing countries and in addressing the challenge of global poverty. But that may be the challenge for a follow-up book.

The book provides a comprehensive overview of the promise of Web 2.0 in all kinds of economic activities, a useful overview for policy-makers, information technology specialists and development professionals. For academics, it should stimulate much needed research and evaluation to assess the actual impact of promising pilots and emerging practices using collaborative technologies, and define the framework conditions necessary to spread these practices to developing countries where they are most needed.

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NOTE TO AUTHORS

The academic journal is published by the University of the Witwatersrand LINK Centre. It is a journal, accredited by the South African Department of Higher Education and Training, which has been published for ten successive years. The following guidelines for the submission of articles apply:

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Articles for forthcoming issues of The African Journal of Information and Communication (AJIC) should be submitted to the co-editor, Lucinne Abrahams, at the LINK Centre, Faculty of Humanities, University of the Witwatersrand, Johannesburg via the following email address: luciennesa@gmail.com

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Articles should not exceed 8 000 words in length, including the Abstract and References. Book reviews, comments, reports or rejoinders to articles should be much shorter, usually 1 000 – 3 000 words. Contributions are received with the understanding that their contents are original, unpublished material and are not being submitted for publication elsewhere. Translated material that has not been published in English will also be considered. The Editors reserve the right to edit or otherwise alter contributions.

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All submissions should be in 11-point Arial font, single-space, left-aligned Microsoft Word format (or compatible open source format) with minimal formatting / layout. Where necessary, footnotes rather than end notes should be used.

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The bibliography should contain only those references cited in the text, arranged in alphabetical order according to the surname of the author using standard APA format.

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These should be numbered consecutively in Arabic numerals followed by a caption. All graphs, diagrams and other drawing should be referred to as figures, which should also be numbered consecutively in Arabic numerals. These should be in a format that can be easily manipulated for editing and printing purposes. Where possible all figures should be submitted either as a JPEG, with a resolution of 300 DPI or higher, or as a vector file (Adobe Illustrator, Freehand, CorelDRAW or EPS). Screen captures or images taken from the Internet usually have a resolution of 72 DPI, which is sufficient for the web, but inadequate for printing purposes.


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