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SCHOOL CONNECTIVITY OPTIONS MATRIX

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Authors: Alex Twinomugisha Alex.Twinomugisha@gesci.org and Roxana Bassi
Roxana.Bassi@gesci.org

Objective

This document and annexed country examples are intended to serve as a guide when advising Ministries of Education (MoE) on the connectivity options available for schools.

The first section compares several variables of four simplified models: e-rates, purchasing consortia, educational ISP and market deregulation.

The Annex provides some examples of countries that have applied these models.

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Introduction

As more MoEs around the world deploy computers in schools, it has become obvious that the students and teachers perform better, making better use of ICTs when they have access to the Internet and can network amongst themselves. Over the years the demand for connectivity has increased, and those schools already connected, now need access to broadband (faster online access).

In many cases schools can not afford such access, and all too often, cannot even afford the cheapest dial-up options, and so government, namely Ministries of Education assume the responsibility of providing solutions that reduce these costs or subsidise the existing cost.

The situation that they face is usually characterized by the following factors:

- A limited number of Internet Service Providers in a given area, and in many cases just one, coupled with poor local connectivity infrastructure.
- Expensive high speed bandwidth for schools that requires planned funding to be sustainable.
- Cost of installing a high speed line beyond city perimeters, in rural areas and in small communities is far more expensive than in cities due to a lack of any nearby ISPs or enabling infrastructure.
- Lack of available resources at government level for improving and sustaining infrastructure and connectivity.

Several countries have examined different models to be used alone or in combination to meet the communication requirements of schools. We have identified four models which are compared in tables in the following pages.

The Appendix contains a brief description of country cases where these models have been applied. It is important when going through the models to bare in mind that there is no universal solution, one or a combination of more than one of the options has been applied according to the needs and the specific circumstances of the country situation.

SCHOOL CONNECTIVITY OPTIONS MATRIX: Model Comparison and Pros & Cons

This table compares four connectivity alternatives that might be also applied “in parallel” as the market evolves.

Notes: N/A means “Not applicable”, which means that the variable is either not measurable or does not relate to the model.

Model	Brief Description
<p>E-Rates (Education Rates, also called preferential rates)</p>	<p>Consists of obtaining specially discounted rates for Internet Access for educational institutions.</p> <p>The government implements a way for schools to obtain a discount from commercial ISPs (generally 50%) off the standard market rates. There are several options to fund the discount.</p> <p>Schools typically still have to pay for the remaining part of the fee.</p>
<p>Creation of purchasing consortium (aggregation of bandwidth purchases or collective purchasing)</p>	<p>Groups of schools, usually aggregated by region, district, province or other geographical administrative units form a consortium to collectively buy bandwidth from commercial providers, obtaining some collective discount.</p> <p>The consortium can be created by schools themselves, local governments, NGOs or the central government. The consortium creator usually helps by providing guidance and technical assistance, leading negotiations with ISPs, providing initial administrative and financial support.</p>
<p>Creation of educational ISP (Internet Service Provider)</p>	<p>The government decides to set up a specific organisation (called an ISP) to provide discounted and/or free access for schools. This organization is either a government body or a separate organization, even a commercial one, partially funded by the state.</p>
<p>Market liberalization (or deregulation)</p>	<p>The process of lessening or removing government telecommunications regulations, leaving prices to be determined by market forces. A much more complex solution, it allows for free market competition which indirectly benefits new players, and results in new areas being covered and cheaper rates.</p>

SCHOOL CONNECTIVITY OPTIONS MATRIX

Model	Complexity of the model How difficult it is to implement	Potential Impact	Scope
E-Rates	<p><i>Medium- High</i></p> <p>Must involve other stakeholders like Ministry of Telecommunications and the Telecoms regulator. The ISPs can voluntarily agree to grant e-rates or be compelled by legislation to provide e-rates.</p> <p>E-rates work best where they are tied into a Universal Access Fund (UAF) or scheme as this ensures that there are funds available to fund the discount (and even pay for the schools portion for poor schools) and also extend coverage of infrastructure to benefit rural schools.</p> <p>Also e-rates programmes usually require applying a different discount rate to different regions e.g. rural vs. urban which can make this model quite complicated.</p>	<p><i>Medium</i></p> <p>Schools usually still have to pay for the remaining cost after application of the discount.</p> <p>May still be unaffordable for poor schools.</p> <p>Impact can be limited by geographical coverage of providers' services if not tied to UA obligations.</p>	<p>All educational institutions but usually applied to primary and secondary schools.</p> <p>Note: Different rates might apply to different economic areas e.g. rural vs. urban</p>
Creation of purchasing consortia	<p><i>Lowest</i></p> <p>The hardest part is coordinating the schools to make coordinated purchases through a single</p>	<p><i>Medium</i></p> <p>Impact limited by geographical coverage of providers' services</p>	<p>All educational institutions.</p> <p>Can be one national</p>

SCHOOL CONNECTIVITY OPTIONS MATRIX

Model	Complexity of the model	Potential Impact	Scope
	How difficult it is to implement		
<p>Creation of educational ISP</p>	<p>channel as this means they have to give up some level of control.</p> <p>It is also difficult to assure availability of required funds for the schools to make payments for services.</p> <p>Consortium needs to appoint an “agent” to act on behalf of all schools. The agent can be a new organisation or an existing local government or national government department. A new organisation can increase the complexity and cost of establishing a consortium model.</p>	<p>Schools must be willing to join consortium.</p> <p>Schools must still have funds to pay for services.</p>	<p>consortium or several consortia comprising of groups of schools, normally in the same geographical area e.g. same province, region or district.</p> <p>Mostly urban schools tend to benefit.</p>
	<p><i>High</i></p> <p>Requires availability of technical skills, setting up an organisational structure, purchasing equipment and systems and managing and operating the ISPs.</p> <p>Requires high initial investment.</p> <p>Might also require an ISP license.</p> <p>Note: Universities in many countries have formed National Research and Education Networks</p>	<p><i>Highest</i></p> <p>Long term solution with maximum control.</p> <p>ISP can command low prices because of volume purchases, and can subsidize poor schools.</p> <p>Also ISP can build its own infrastructure to cover schools in areas with no commercial</p>	<p>All educational institutions.</p>

SCHOOL CONNECTIVITY OPTIONS MATRIX

Model	Complexity of the model How difficult it is to implement	Potential Impact	Scope
Market liberalization	<p>(NRENs) which are dedicated ISPs for the higher education and research sector. These can be extended to cover schools and other educational institutions.</p> <p><i>High - Very high</i></p> <p>Depends on current legislation/ state of affairs. Requires strong government will and to overcome commercial interests.</p>	<p>providers.</p> <p><i>High</i></p> <p>Impact in telecom market as a whole</p>	<p>All educational institutions</p> <p>(beneficial effect on the whole society)</p>

SCHOOL CONNECTIVITY OPTIONS MATRIX

Model	Connectivity alternatives	Control Level (at MoE level)
E-Rates	Limited options (i.e. flat rate or hourly rate) Only available where commercial ISPs that adhere to the initiative operate.	<i>Medium.</i> Requires creation of a control/support organisation or administrative structure, either an existing department or unit of the MoE or a new organisation (recommended).
Creation of purchasing consortia	<i>Very flexible</i> according to needs and geographical availability.	No control necessary. Some support desirable, so that schools can obtain better rates/services. Also usually requires a single entity to act as an “agent” on behalf of all the schools in a particular consortia region. Many providers will prefer to deal with one entity only rather than all the schools. This agent could be the regional MoE office or even a new entity created for this purpose and owned by the schools in the region.
Creation of educational ISP	<i>Very flexible.</i> Type of services provided highly adaptable to needs.	<i>Highest.</i> Full control of services provided, of quality, of who receives them and of usage.
Market liberalization	n/a	n/a

SCHOOL CONNECTIVITY OPTIONS MATRIX

Model	Set up and operating (recurring) cost considerations	Deployment time
E-Rates	<p><i>Setup costs: Low-medium</i> cost range to support control/support structure. Costs can be relatively high if a new organisation is set up.</p> <p><i>Operating costs: medium to high</i></p> <p>Requires funds to pay for staff of the control/support structure or can be administered by existing government department.</p> <p>Requires sources of funds to pay for the discount to commercial vendors.</p> <p>Requires sources of funds for schools to pay for their part.</p>	<p>Can take a long time</p> <p>Legislation: unknown but can be very lengthy</p> <p>Organisational setup: short, if legislation passed. Can simply be administered by an existing government department.</p> <p>Procurement: competitive procurement/RFP can last from 6-10 months for schools connectivity.</p>
Creation of purchasing consortia	<p><i>Setup costs: Almost none - low.</i> Some to develop guidelines and provide support to schools.</p> <p>Where the agent is a new body, start-up costs can be high. If the regional MoE office is appointed as agent to act and negotiate on behalf of all schools, then costs are very low.</p> <p>Operating costs: very low – low</p> <p>Cost mainly related to agent’s administrative costs.</p>	<p>Fast</p> <p>Legislation: No legislative changes or new legislation required.</p> <p>Organisational setup: easy and little time needed to set up by appointing an existing body as agent for the consortium.</p> <p>Procurement: RFPs might be required to select service provider(s) for each region. Competitive RFPs can take 6-</p>

SCHOOL CONNECTIVITY OPTIONS MATRIX

Model	Set up and operating (recurring) cost considerations	Deployment time
<p>Creation of educational ISP</p>	<p><i>Setup costs: High</i></p> <p>Costs to setup ISP structures and support purchase of equipment. Will also depend on the ISP approach used and specifically whether WAN/national infrastructure is leased from existing providers or the ISP builds its own national/WAN network.</p> <p><i>Operating costs: high</i></p> <p>ISP staff costs, maintenance costs for equipment and network</p>	<p>10 months.</p> <p>.</p> <p>Legislation: unknown but can be very lengthy</p> <p>Organisational setup: ISP installation can take 6-12 months. Also depends on whether ISP builds its own infrastructure or leases WAN/National infrastructure from existing providers.</p> <p>Procurement: RFP might be needed to select lease infrastructure provider and also provider of upstream/ international bandwidth. Competitive RFP can take 6-10 months.</p>
<p>Market liberalization</p>	<p>n/a</p>	<p>Long/ Very Slow</p> <p>Depends on current state of affairs and is very complex since it involves many players with different interests.</p>

SCHOOL CONNECTIVITY OPTIONS MATRIX

	Minimum Lifetime of the model How long it might be applied	Origin of funds
E-Rates	Depends on availability of financing funds. Ideally with no end-date. Less than 3-4 years is not advisable because of the initial effort required.	Discount compensated through: <ul style="list-style-type: none"> - UAF (requires agreement with Ministry of Telecommunications and probably decree or other legislation). - Write off income taxes or other taxes (requires agreement with Ministry of Finance and probably decree or other legislation)
Creation of purchasing consortia	Flexible, renewable. Depends on each particular agreement (can be short periods, i.e. one school year) ISPs can compete for the renewal. Motivating market competition and lowering rates.	<ul style="list-style-type: none"> - Government grants (regional and/or national) or subsidies - Students/parents - ONG/international support - Community support programmes
Creation of educational ISP	Depends on the cost of creation/maintenance of the ISP vs. other available connectivity alternatives. Less than 3-4 years is not advisable because of initial investment costs.	<ul style="list-style-type: none"> - Very complex as it requires a large initial investment and high ongoing costs (connectivity, personnel, equipment) - Origin of funds can be same as e-rates or from government grants. - Note: Organisation can generate income to support own costs.
Market liberalization	<i>Longest</i> (forever? Difficult for situation to revert back to monopoly)	n/a

SCHOOL CONNECTIVITY OPTIONS MATRIX

	Legal and regulatory Requirements	Other players involved
E-Rates	<ul style="list-style-type: none"> - Regulatory policy and/or legislation or through a voluntary partnership with service providers. - Legislation to ensure origin of funds for the discount (i.e. Universal access funds). 	<ul style="list-style-type: none"> Ministry of Telecommunications Telecommunications Regulator ISPs
Creation of purchasing consortia	<ul style="list-style-type: none"> - None, or that of the creation of a separate organisation to act as agent. 	<ul style="list-style-type: none"> ISPs
Creation of educational ISP	<ul style="list-style-type: none"> - That of the creation of a separate organisation - Might require an ISP license -Legislation to ensure origin of funds for the operation 	<ul style="list-style-type: none"> Ministry of Telecommunications Telecommunications Regulator ISPs Legislators
Market liberalization	<ul style="list-style-type: none"> - Complex regulatory policy and legislation required 	<ul style="list-style-type: none"> Highest government officials Legislators Ministry of Telecommunications Telecommunications Regulator Industry

SUMMARY OF PROS AND CONS OF THE VARIOUS MODELS

	Pros	Cons
E-Rates	<ul style="list-style-type: none"> • Easier to set-up • Benefits all schools where there is coverage available 	<ul style="list-style-type: none"> • Origin of funds is a big issue, since schools still have to be able to partially pay for their access. • Does not solve the issue of areas (schools) without connectivity alternatives nor of high market rates.
Creation of purchasing consortia	<ul style="list-style-type: none"> • Easiest to set up, can last for a short period of time • Simpler model, does not require many political changes. • If there are several ISPs available, helps in developing competition and lowering costs. 	<ul style="list-style-type: none"> • Origin of funds always an issue • Does not solve the issue of areas without connectivity alternatives • Requires coordination among schools
Creation of educational ISP	<ul style="list-style-type: none"> • Full control of services provided, quality and usage. Coordination with specific content generation. • Can offer connectivity in regions where no alternatives exist by building own infrastructure • Can support free/low cost service to schools through commercial service provision, solve problems of poor/rural schools • Can even generate own income to support costs 	<ul style="list-style-type: none"> • High initial investment and ongoing costs. Must have sources guaranteed of funding for high initial investment and operations. • Affected by political pressure
Market liberalization	<ul style="list-style-type: none"> • Beneficial influence in the whole market. • Helps solve connectivity problem for all society. • Helps in creating UAF 	<ul style="list-style-type: none"> • Success depends on many external factors and requires a mature government

Feasibility and Suitability	
Local conditions required for each model to work	
E-Rates	<ul style="list-style-type: none"> - Requires financing method to pay for discounts - Requires funds to be collected per school - Two issues are probably vital for implementing an e-rate scheme: providing quality bandwidth and a fixed and predictable monthly cost for schools' users. - MoE must exert more control over the use of the connectivity - Requires the existence of one or several ISPs in the desired geographical areas. - A criteria must be defined to assign discounts to schools based on location, income or students
Creation of purchasing consortia	<ul style="list-style-type: none"> - Schools must have sufficient funds available - There must exist one or several ISPs in the required geographical areas
Creation of educational ISP	<ul style="list-style-type: none"> - There must be some existing national communications infrastructure, or the funds and political will to create it. - Requires the political will to create and fund a separate organisation to maintain the ISP
Market liberalization	<p>A series of variables must be in place for liberalization:</p> <ul style="list-style-type: none"> - Strong institutional settings. Capacity for government regulatory control. Political conditions for a reform. Groups that block reform lose influence. - Popular pressure for open competition (due to lack of service), unprofitable regions and services and higher demands - Investment opportunities, opportunity to cut spending. Credibility.

SCHOOL CONNECTIVITY OPTIONS MATRIX

	Notes	Country examples
E-Rates	<p>Requires a flexible RFP for connectivity. Probable complexity of ISPs contracting options.</p> <p>Also requires that different rates be applied to different regions e.g. poorer schools obtain a larger discount than urban schools</p>	Senegal, Argentina, Chile, USA, South Africa
Creation of purchasing consortia	<p>This model works well when there is a single agent representing each of the regional consortia. It seems to work in countries where there is an established system of independent or semi-independent “local education authorities” i.e. in countries where education has been “decentralized” down to the local level. These local education authorities act as the agents on behalf of the schools and sign the agreements with the service providers and generally interface between the schools and service providers.</p> <p>Model options: can be simply aggregators or also run their own educational ISPs</p>	United Kingdom, South Africa
Creation of educational ISP	<p>A detailed preliminary study is required in order to determine the costs associated with installing and operating an ISP (3 year period) compared with the number of schools served.</p> <p>Model options: educational ISP can lease network or build its own network.</p>	Pakistan, Namibia, Romania
Market liberalization	<p>Please refer to an interesting report by InfoDev – “Broadband for Africa Policy for Promoting the Development of Backbone Networks” (June 2008) http://www.infodev.org/en/Publication.526.html</p>	Chile, Brazil, Nigeria, Guatemala, Uganda

Appendix - International practices and solutions for educational institutions' access to the Internet

Country: Chile

Main site: http://www.subtel.cl/servlet/page?_pageid=58&_dad=portal30&_schema=PORTAL30

Model: school connectivity subsidized through UAF (Fondo de Desarrollo de Telecomunicaciones) since 1994. Funds used to provide access to rural schools and ADSL access to urban schools.

Country: Colombia

Main site: <http://www.compartel.gov.co/> (in Spanish)

Model: school connectivity subsidized through UAF (programa Compartel). The fund perceives 5% of the national and long distance operator revenues plus funds from license fees. It subsidized the school connectivity for a certain number of hours a day, which are reduced over time.

Country: Pakistan

Main link: <http://www.hamdard.net.pk/>

Model: Education ISP supported through universities

Country: Romania

Main site: <http://www.roedu.net/default.php?t=site&lang=EN>

Model: Educational ISP as a separate organization

Country: South Africa

Site: <http://www.doc.gov.za/> <http://www.usa.org.za>

Model: e-rates (since 2001) Similar to US model, the implementation of the e-rate has not been fully implemented due to various interpretations of the Act

Model: purchasing consortia - <http://www.wcsn.org.za/>

Country: United States

Main Link: <http://www.universalservice.org/sl/>

Model: e-rates supports 20-90% of connectivity costs of schools, funds come from Universal Service. The scheme is administered by a not-for-profit organization. The scheme has six different levels of discount in order to focus the maximum subsidy in poor and rural areas.