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Executive Manager,
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Re : **Comments on the Strategy for Internet Bandwidth Management in Trinidad and Tobago.**

For the attention of the Executive Manager, ICT Policy and Stakeholder Engagement

The Trinidad and Tobago Computer Society (TTCS) is writing to express our concerns on the proposed strategy for Internet Bandwidth Management in Trinidad and Tobago available on Fastforward's website at http://www.fastforward.tt/media/release_detail.asp?id=4642

We solicited comments from our mailing list (http://groups.yahoo.com/group/ttcs_announce/message/509), and received comments via email and instant messaging. We held two public meetings (http://groups.yahoo.com/group/ttcs_announce/message/510 and http://groups.yahoo.com/group/ttcs_announce/message/513) where members met to discuss the document and to compose this response.

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Title of Consultative Document	Internet Bandwidth Management in Trinidad and Tobago

Section 8 – Discussion

Though the timely and accurate dissemination of information is a prized asset of any organization it is often quite difficult to assess the real advantage and cost benefit of such. Therefore the extent to which information plays in organizations and the cost benefit to be garnered may be exaggerated and may not be easy for local business to quantify, in terms of the initial investment required by such a proposal.

The document speaks of developing a particular internet based culture but there is nothing within this proposal which indicates exactly how this will be achieved. The entire proposal hinges on this premise and the goals appear unrealistic,especially in light of: local limitations of E-commerce, bandwidth restrictions, computer and Internet penetration levels, etc. End users will most likely expect additional opportunities for entertainment and communication (Email, Instant messaging, Podcasts, Blogs, videos, etc.) rather than for the dissemination of information as envisioned by the proposal.

Section 8 suggests that web hosting in the US is utilised simply because it is the most affordable. However, we believe that the US is a popular choice for hosting because it

is the nearest and cheapest hub for english speaking websites in relation to Trinidad and Tobago. The fact is Trinidad and Tobago does not have the economies of scale to create an affordable and reliable local web hosting environment.

The "implicit tax" argument is frivolous because even if local web hosting was available, there will still be a need for local users to access international websites in greater quantities than local websites. The document infers that consumers will end up paying an "implicit tax", however such a tax is already subsumed within the Internet subscription fees in the form of 15% Value Added Tax (VAT).

Section 8.1 Traditional model of Internet backhaul access

Domestic electronic commerce is being constrained by factors such as lack of ability of local consumers to pay online. From the business point of view, hosting is affordable and therefore electronic commerce is **not** being hindered by the Internet bandwidth situation in Trinidad and Tobago.

The document cites a gaining worldwide acceptance of Internet usage, however this may not be an accurate reflection of the local environment. Proof is found within the document in Section 8.4.2 where Internet penetration rate is set at 17%. Internet usage/penetration relies upon Government initiatives taken to stimulate such activity.

Section 8.2 The economics of the internet

Whilst it is true that the Internet access routes follow lines of colonial control we suggest that this is due to the fact that a significant amount of commerce (in relation to Trinidad and Tobago) is located in the US. Telecommunication patterns follow the traditional lines of domestic imports and exports. These jurisdictions are far more established in their protocols and legislation with e-commerce issues so it is natural that the US and UK will appear to have more control.

The document infers that Trinidad and Tobago is "losing" money due to international web traffic yet offers no evidence to support this suggestion. If Trinidad and Tobago **is** "losing money" the document does not provide the details necessary for the reader to understand to what extent it is occurring. Such information is critical to understanding both the reasoning and feasibility of this proposal.

While the document describes the international situation with the US and smaller countries, it is important that we investigate the domestic situation. The local status quo is not stated so the precise nature of what is required for implementation is still unclear from this proposed policy.

> *"This will effectively result in a unilateral revenue flow for international telecommunications: out of the developing or 'remote' economy, into that of the Northern states where the backhaul resides (and is incorporated). Merely liberalising the domestic telecommunications environment is not sufficient as a strategy in stemming, or reversing this tide."*

If this argument is to be effectively made should we not look at the current domestic situation first? The incumbent TSTT and smaller ISPs are in a similar situation whereby the larger carrier owns/has influence over the Internet backbones into Trinidad and Tobago and the smaller carriers must pay exorbitant rates to connect to such backbones. Therefore instead of reviewing the situation with regards to the US and smaller commonwealth countries, we should investigate the local situation with regards to this discrepancy and both understand and remove our local limitations before undertaking such an advanced task.

This section though part reality, actually distracts the reader with emotional terminology and encourages the belief that the nation is under economic attack due to internet usage. Policy makers must realise that if the background or guiding information is inaccurate, misleading or biased in any way, the policies derived from it

will be flawed and have negative consequences on the nation.

It is possible that in the future, peering arrangements may be negotiated with the US and it is highly unlikely, based upon our culture that bandwidth to the US will be reduced significantly by local hosting. As previously mentioned, the tax (15% VAT) paid by consumers is an indirect subsidy for the bandwidth costs.

8.2.4 - Reviewing interaction with the internet

In this section, there is no description of how the regional cooperation for the creation of central regional hubs will be implemented or even if any such discussions have taken place with any CARICOM leaders. What will be their interests or support in this project? We do not know the situation in these countries, their technological levels, the telecommunication situation, their local level of legislation in this area and whether they share similar concerns with regards to bandwidth management. It appears that Trinidad and Tobago will bear the brunt of the financial and technological burdens of an elaborate project that may or may not be needed by the rest of CARICOM.

In the foreseeable future regional hubs as envisioned in this section will still rely on foreign links and expertise since locals are only now moving into these areas.

While the quote with regards to Africa in 2000 may represent our situation this goes back to the point of developing, investigating and regulating our domestic situation with regards to TSTT.

8.2.4.1 - Increase Computer and Internet Penetration Rates

This section describes a low Internet penetration rate reflective of a situation whereby the local web hosting may not really be necessary in the immediate future. Once again, it is highly reliant upon Government initiatives and their success. Do these initiatives necessarily increase the amount of local content? The attraction is generally for accessing the global Internet with foreign content.

There is no information of such initiatives taking place in the rest of CARICOM. So it seems that the mentioning of a possible CARICOM policy and our local Fast forward initiative underscores the need for a proper analysis of the Telecommunication situation and the internet penetration levels in CARICOM member countries.

8.2.4.2 - Increase Local Loop Internet Capacity

Even though increasing the local loop capacity is **sorely** needed, again end user interests will always require a faster Internet access to foreign content.

8.2.4.3 - Limiting dependence on the central US backbone through alternative routing strategies.

It is difficult to envision where local content providers can match the services (e.g. "Web 2.0" capabilities) of larger, more established foreign websites e.g. Google, Yahoo!, Microsoft. To take advantage of this we must improve not only our local loop capacity but our "people" capacity to develop and maintain such web services. Developing the talent ultimately requires students to access content overseas to download the software (tools, server software) for them to understand experiment with and create localised solutions.

Also, local content is often desirable to persons outside of Trinidad. If local hosting is to be encouraged, the overseas infrastructure links must be reliable and fast enough to allow them to connect to the local servers.

Ultimately, the way forward **MUST** include strengthening the overseas infrastructure links to ensure reliable i**ncoming** bandwidth.

8.2.4.4 - Utilising the regulatory framework

While Section 29 (3) of the Telecom Act does appear to give the telecom authority regulatory oversight, it has yet to use such oversight, for example: to intervene in the disputes between TSTT and the independent ISPs regarding pricing of bandwidth and it still faces difficulty in the mobile telephone sector to set prices.

The Telecom Authority does not have the power to dictate settlement rates for external bandwidth controlled by foreign carriers or migitate against cartelisation especially with regards to oligopilies.

8.3 - Further review of the digitial gap in ICT

The seven measures referred to do not consider the population size of the country, the ability to record and capture data for posting and the maturity level of the population. Further it is a false argument to say that lack of local content and services is due to the lack of local web hosting facilities. From the end user's perspective it is easy to upload content via blogs, wikis and other content management systems available online, sometimes even at no cost. How can we compete with this?

Again the saving of lucrative foreign revenues is an empty argument due to the lack of information on existing web content hosted overseas and potential cost-savings.

8.4 - The effects of hosting content via the United States rather than hosting locally

The description is confusing as it initially refers to the direct path but later refers to the most efficient path.

The preponderance of bandwidth on certain routes suggested in the document, i.e. by historical and economic causes, implies that there is nothing that could have been done to prevent the current telecommunication shortfall. Citizens were made to believe that the Cable & Wireless deal in the late eighies would have addressed or solved this problem, but due to its failure of providing reliable incoming bandwidth in the early 1990's content had to be hosted abroad. Therefore lack of foresight by the then Government and the monopolistic provider mentioned exacerbated the current situation.

The reason suggested for hosting sites in the US is that it improves performance but the more realistic reason is rather that it is more cost effective, more reliable and it works!

Although the fast forward agenda encourages the Internet driven e-commerce among local and regional partners there is still no significant advantage for domestic hosting industry unless :

i. It is price competitive

ii. the local hosting affords a simple viable ecommerce mechanism for allowing companies to sell to consumers. This would require addressing other ecommerce issues eg the problems of receiving payment online, delivery of products, the banking sector's current practices in accepting popular payment systems such as Paypal, etc)

8.4.1 - The effect on Internet download and response times

Again, regardless of whether domestic hosting can improve the response times of receiving local content, it is still important to invest in the international gateway to garner the benefits of local hosting eg. As an outsourcing destination etc.

8.4.2 The effect on the national macro economic positition

Table 1 states that the average monthly cost of bandwidth of 1.544 Mbps to the consumer is $12,000.00 USD for both TSTT and ISPs. However, is this a fair market value based on the actual cost? What is the actual cost that TSTT pays for external bandwidth? Could this be an area of monopoly abuse?

Also the document states that only way to limit the "hidden cost" of the utilisation of the international carriage is to review how the internet access is managed locally. An alternative would be the liberalisation of the international telecommunication market, such that other companies may run fibre optic lines to Trinidad and Tobago.

Again, the “one stop point of interconnection” of the ISPs infers that the demand for external web content is not as great as internal local web content, which is simply not the case.

The report does not take the cost of local hosting into consideration. For instance a typical web hosting facility (http://www.interconnection.org/services/hosting.php) requires :

- Environment - Precision-controlled air conditioning systems, a virtually dust-free and particle-free computing environment, with temperature, humidity and air-quality regulation.
- Security - Restricted access to the Network Operations Center is monitored by

qualified personnel 24 hours, ensuring prompt response and thorough coverage to fire or security alarms.

- Failsafe Power Supply - UPS power as well as backup generators
- Monitoring - Providing round-the-clock (24x7x365) monitoring of all hardware including routers, switches, UPS systems, and servers, as well as power, environmental factors (such as temperature and humidity), generator status and network connectivity. All critical services/ports are monitored.
- Network - Redundant network connections utilising multiple upstream providers and several peering partners to ensure continuous Internet connectivity, greater route diversity and ultimately enhanced Internet performance. This strategic combination allows customer traffic to be routed over the best available connections.

There is also the ongoing maintenence and personnel needed to maintain the building and the computer infrastructure, both hardware and software (e.g patching servers to prevent security flaws). In light of these costs, especially with regards to the foreign exchange spent, how much would actually be saved to maintain this facility and who will end up bearing the burden of these costs?

8.4.2.1 - The volume based savings mis-conception

Regarding the Figure 3 graph, since there has been only one company (TSTT in partnership with Cable and Wireless) allowed access to any fiber optic cables landing in Trinidad and Tobago for the past two decades, it is likely that because TSTT is the monopoly supplier, it could charge any amount for bandwidth because there was no alternative. Many independent ISPs had no choice but to resort to satellite providers for bandwidth to overcome this. Referring to Table 1, there is a need to know the true cost that TSTT pays for bandwidth from the international fiber optic cable, not the cost that TSTT charges third parties (including the government) for bandwidth.

Such information is necessary in order to determine the validity of the arguement put forward in this document.

8.4.3 - The security concern

The Trinidad and Tobago Government may well implement similar legislation or policies as the U.S Patriot Act. Indeed, the Draft Broadcast Code may be used to censor content hosted locally. Although, local hosting of content will ensure that such data will fall under the Computer Misuse Act and the (future) Data Protection Act.

8.5 - Hosting content locally ; essential for the Internet economy

As mentioned before, knowledge sharing and sharing of local "relevant" content can take place today since overseas hosting is quite competitive. Also any of Trinidad and Tobago's petro-carbon, manufacturing and tourism industries that could potentially use domestic hosting will still require robust external bandwidth to ensure that anyone on the Internet can access the site. It will be of no use if after the costs of developing a website that the site is not reachable from overseas and that it cannot be indexed by search engines such as Google or Yahoo!.

Re: possible entrepreneurs creating ventures that domestic hosting will "somehow" make happen

see "The Cost of Bootstrapping Your App: The Figures Behind DropSend" at

http://www.37signals.com/svn/archives2/the_cost_of_bootstrapping_your_app_the_figures_behind_dropsend_part_one_.php (here is a shorter URL : http://tinyurl.com/n25q6) which describes how a web application (www.dropsend.com) was created. Could a entrepreneur in Trinidad and Tobago get financial backing and the technical/creative persons needed to launch a web application?

8.5.1.1 – Open Content

While the idea of persons creating content licensed under a "Creative Commons" license (http://creativecommons.org/) sounds wonderful, consider that :

- such content (music and creative arts, literature) can be easily hosted abroad with services such as/like Apple iTunes, Google Video, Lulu, ourmedia.org at little cost.
- The cost of audio/visual equipment (cameras, microphones, etc), bandwidth and computers is probably a bigger obstacle for persons wanting to create and show such content.
- Local persons who don't have broadband will not want to take the time to download the content.
- Persons creating content to put on the Internet will want anyone, anywhere on the Internet to discover it, not just for locals. Currently, more persons on the Internet outside of Trinidad and Tobago are interested in local content than locals with Internet access here in Trindad and Tobago. Hence, if domestic hosting was used, there needs to be sufficient incoming bandwidth to allow anyone on the Internet to access such content.
- there is widespread apathy towards understanding copyright (consider the popularity of street cart vendors selling copies of music CDs). Persons may create works which may infringe on existing copyright.

8.5.1.2 – Proprietary Content, Intellectual property

Comments similar to 8.5.1.1. Actually, because of contracts signed to record labels, artists are not free to simply offer a new channel (such as the Internet) on their own. The record labels will have to do that for them.

8.5.1.3 – Data-warehousing and Tele-services

Such services would require a level of infrastructure present throughout Trinidad and Tobago and not in one or two areas. There is no details to suggest how this could be done affordably.

8.6.1 – 8.6.5 – Techniques for Improving Efficient Utilization of Bandwidth

While the techniques are useful and some already implemented by many local ISPs already, one method for improving efficient utilisation of bandwidth is for local and government websites (be it hosted locally or overseas) to be designed with web standards. Web standards are technologies, established by the W3C and other standards bodies, that are used to create and interpret web-based content. These technologies are designed to future-proof documents published on the Web and to make those documents accessible to as many as possible. A key part of web standards is the separation of content from its presentation (colours, fonts, layout, positioning) using Cascading Style Sheets.

A site that has been built to web standards generally will be:

- Less bandwidth intense
- Future-proof
- Extensibility
- Easier to maintain
- Compatible with newer browsers
- Accessible

For a useful overview of web standards, see

http://www.456bereastreet.com/lab/developing_with_web_standards/

As examples of how designing sites with web standards saves bandwidth :

- http://www.stopdesign.com/articles/throwing_tables/ - a redesign of Microsoft's 2004 main page using web standards reduced the size by **62%** or 25kbytes.
- http://www.clagnut.com/blog/366/ - The redesign of http://multimap.com/ to web standards : "As for bandwidth, roughly speaking Multimap.com serves 4 million pages a day. On average, the HTML of the old site weighed in at 65kb per page. The new site pages are half that at 35Kb". What's more, the redesign actually resulted in more revenue, because "Bandwidth consumption has certainly decreased with the declining page weight but not by the proportion we were expecting. What actually happened was that people starting using the site more. It seems the faster pages (both in terms of bandwidth and rendering) resulted in more page views as people panned, zoomed and searched significantly more than they did before. So not only did the switch to CSS layout save Multimap money, it made Multimap money (page views = banner ad impressions) and quantitatively improved people's experience (more page views per visit)."

So, local websites (especially government websites) should be redesigned to accommodate web standards which can save time and money for website creators, and provide a better experience to the website's visitors.

8.6.6 – Domestic ISP Peering though a national IXP

While the benefits of an IXP seems clear, it is interesting to note that local peering between local ISPs is not being done for email. Each ISP has its own email server in

Trinidad and Tobago, but due to the various ISP internet connections, email from one local ISP to another ISP is usually routed overseas (the email from the sender's ISP is sent outside T&T (to typically the US), and then from the US back to T&T to the receiver's ISP mail server), even though physically the ISPs server are right next door to each other.

Yet while local peering would allow email to be routed directly to local ISP's servers and there isn't the issue of setting up domestic web hosting, this is not being done in T&T. Why?

Currently there are unresolved issues regarding pricing of bandwidth from TSTT to independent ISPs and complaints by the independent ISPs of predatory pricing by TSTT (http://www.aiisp.org/Documents/AIISP-letter-05-05-05.doc) re: TSTT's smartchoice. Given these unresolved disputes, it is unlikely that a multiple bi-lateral IXP model could work and would likely be more expensive and less straightforward. What may work is the single multi-lateral model where a neutral party is responsible for such an exchange.

There needs to be an analysis of how much bandwidth could be saved if peering could be done. It may be too small to be worth the costs and the hassle of creating a IXP.

The examples of Kenya and Mongolia IXPs may not be comparable to Trinidad and Tobago. English is not the primary language of these territories and there is a dominance/abundance of Internet content in the English language which Trinidad and Tobago wants to access and/or contribute to.

Conclusion

The Internet Bandwidth Management Document makes these points :

- that the cost of external Internet bandwidth and the hosting of content outside of TnT is detrimental to the local economy and is a hurdle to e-commerce and content development and to the success of Government's Fastforward initiative.
- that methods should be taken to reduce the usage of external Internet bandwidth. These include
  - the hosting of content locally in Trinidad and Tobago which would
    - act as a catalyst for local content being released under Creative Commons and for the marketing of proprietary content.
    - create a robust foundation for e-Business/e-Commerce.
    - act as a catalyst for use of local content based services such as data warehousing and tele-medicine.
  - employ techniques for efficient utilisation of bandwidth such as compression of content/data and caching servers.
  - local ISPs peering through a national IXP to facilitate local hosting.

The main premise that the cost of external Internet bandwidth is detrimental to Trinidad and Tobago is not correct. This is because :

- the low cost of web hosting (with content management systems such as blogs and wikis which makes it easier than ever to put content online) allows individuals and businesses in Trinidad and Tobago to create content which can be read by anyone anywhere on the Internet. For businesses, this results in increased revenue when potential customers are searching on the Internet for solutions. If there was easier methods to accept payments from credit cards and from payments systems like Paypal, e-commerce would improve and there would be more businesses looking to the Internet to improve sales.

- Government already gets taxes on bandwidth from VAT and from businesses who have used the internet to increase their sales (coporate tax).
- The document does not provide evidence required to support this claim. There is a need to know the true cost local ISPs are paying for external bandwidth, not the cost it is being resold at.

Regarding the local hosting of content :

- Persons creating content to put on the Internet will want anyone, anywhere on the Internet to discover it, not just for locals. Currently, more persons on the Internet outside of Trinidad and Tobago are interested in local content than locals with Internet access here in Trindad and Tobago. Hence, if domestic hosting was used, there needs to be sufficient external bandwidth to allow anyone on the Internet to access such content. So having domestic hosting will not reduce the need for external bandwidth.
- Can the cost of local hosting be competitve with hosting overseas with regards to accessibility, reliability and security?

Regarding local peering :

- An analysis needs to be done to determine how much bandwidth (if any) would be saved with local peering.
- Given the unresolved disputes between TSTT and the independent ISPs, it is unlikely that an IXP would be implemented.

The document contains a confusing blend of three major issues: management of Internet bandwidth, increased local hosting and increased creation/provision of local content. These issues should be addressed independently of each other yet the impression conveyed is that all three must be in place and operational for them to work successfully. As such the blanket discussion gives an inaccurate view of the situation.

The proposals in this document suggests that the Government is implementing a portal similiar to America Online (AOL) in the early 1990's for the nation and/or the region. It will look like the real internet but it will confine citizens' access to "safe" content and actively discourage them from using the REAL Internet. This will fail. The Internet is not a local entity and whatever content we create on the Internet, we need to have it visible to the rest of the world.

Ultimately, the way forward **MUST** include :

- expanding our external bandwidth links and allowing local companies to land their own fiber optic cables and to get access to existing fiber optic cables already landed in Trinidad and Tobago.
- improve broadband internet penetration throughout Trinidad and Tobago. Without Internet access, there would be little incentive to create content and the existing content will not be accessible. The Government must consider treating ICT infrastructure as vital as roads, electricity and water. For example, a fiber optic network (see "Fiber to the People" by Lawrence Lessig at http://www.wired.com/wired/archive/11.12/view.html?pg=5