The Bahamas Telecommunications Company Limited

Initial Response to:

Framework for Establishment of Internet Exchange Points ("IXPs") in The Bahamas

Public Consultation

ECS 07/2019

Issued 2 May 2019

Submitted to:

Utilities Regulation & Competition Authority ("URCA")

Legal, Regulatory and
Carrier Services Division
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1 Introduction

The Bahamas Telecommunications Company Limited ("BTC") is herein providing its Initial Response to the Utilities Regulation and Competition Authority's ("URCA") pursuant to the Public Consultation "Framework for Establishment of Internet Exchange Points ("IXPs") in The Bahamas" (ECS 07/2019) issued 2 May 2019 (the "Consultation Document").

BTC provides its general comments in Section 2 and provides specific responses to each of the Consultation Questions in Section 3. BTC notes that failure to address any specific statement, claim or conclusion in the Consultation Document does not imply BTC's agreement in any such case.

2 General Comments

The Consultation Document makes a case for establishment an IXP in The Bahamas on the basis of a number of claimed benefits – e.g., improved Internet service quality (reduced latency, improved access speeds and efficiency), cost savings on international transmission links, attraction of international content providers to The Bahamas, stimulated development of local content, increased demand for broadband services and the reduction of data protection/privacy risks, among others. As well, the Consultation Document also claims that the cost of establishing an IXP is minimal.

In BTC's view, however, the Consultation Document fails to provide any evidence to demonstrate that any of these claimed IXP-related benefits would in fact be likely to materialize to any significant degree in The Bahamas. As well, BTC considers that URCA significantly underestimated the cost of establishing a carrier-grade IXP in The Bahamas. In other words, the benefits outlined in the Consultation Document are largely "assumed" and overstated and the associated costs understated.

Before addressing the Consultation Questions set out in the Consultation Document, BTC first addresses some of URCA's more significant claimed benefits of establishing an IXP in The Bahamas – namely relating to (i) service quality (latency), (ii) international carriage cost savings, (iii) attracting international content providers to The Bahamas and the (iv) the promotion of local content providers – and (v) the cost of establishing an IXP in The Bahamas.

2.1 Service Quality (Latency)

The Consultation Document claims that the establishment of an IXP in The Bahamas will significantly improve network service quality and, in particular, reduce the latency associated with local traffic. BTC considers that URCA is overstating the potential latency gains, in large part because of its reliance on external reports dealing with foreign jurisdictions that are not representative of the local conditions in The Bahamas. It is important to understand that local traffic in The Bahamas typically transits through a Network Access Point ("NAP") in Miami. The distance from Nassau and Freeport to the Miami NAP is relatively short and, in terms of

traffic carriage, represents a minimal round-trip time ("RTT"). Therefore, the latency improvement benefit of localizing Bahamian traffic would be negligible.

These negligible latency gains from localizing traffic are in stark contrast to the findings included in many of the external reports cited by the Consultation Document, none of which analysed the Caribbean experience. Instead, the external reports focused on case studies outside of the Caribbean, mostly of countries in Africa. BTC has serious concerns with this type of analysis because BTC does not believe that the local conditions in such countries are representative of those that hold in The Bahamas. For example, based on a 2012 study sponsored by the Internet Society,[1] the Consultation Document highlights the reduced latency from the establishment of IXPs in Kenya and Nigeria. The latency estimates are included in Table 1, as well as the comparable data for The Bahamas. Clearly the latency gains from localizing traffic in such cases as Kenya and Nigeria that were very distant from the nearest NAP (likely London, UK) would be very significant, but such findings are simply not applicable to The Bahamas, which is very close to the Miami NAP. Table 1 shows that the minimal latency savings from localizing traffic in The Bahamas would be less than two percent of those reported for Kenya or Nigeria.

Table 1: Comparison of Actual or Potential Latency Gains from Localizing Traffic in Kenya and Nigeria vs The Bahamas

Latency	Kenya	Nigeria	The Bahamas
Before IXP	200-600ms	200-400ms	6-10ms[2]
After IXP	2-10ms	2-10ms	3ms
Reduction (mid-point of ranges)	394ms	294ms	4ms

2.2 International carriage cost savings

The Consultation Document claims that the establishment of an IXP in The Bahamas will result in significant international carriage cost savings. BTC considers that these claimed savings would be negligible at best. BTC and CBL have access to their own submarine cable systems which are essentially "sunk" at this time, so the only incremental cost of routing local traffic via Miami would be IP Transit.

In preparation of this Initial Response BTC carried out a traffic study covering a period of approximately four (4) years. This study confirmed that local IP traffic between BTC and CBL, as measured by BTC, is minimal, peaking at 200 Mbps/day for one (1) day only on November 6, 2018 and accounts for roughly 3% of total IP traffic. Given that IP Transit prices in Miami are generally below US$1/Mbps/month, the total IP Transit savings from localizing traffic would be in the range of US$2,500 per year. Those are minimal savings and are significantly less than IXP operational costs discussed below.

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[1] Referenced in footnote 13 of the Consultation Document.

[2] RTTs based on of "rule of thumb" of 100ms/10,000km, using approximate return distances to Miami of 300km from Freeport and 500km from Nassau.

2.3 International Content Delivery Networks

The Consultation Document claims that the establishment of IXPs will "attract international businesses to The Bahamas" and states that "major international content providers do not have a physical presence in The Bahamas". BTC is surprised by the latter statement since three major international content providers, Google, Facebook and Akamai already have nodes in The Bahamas. In any event, BTC considers that URCA failed to provide any evidence in support of its claim that the establishment of an IXP would in fact attract further major international content providers to locate in The Bahamas.

BTC has compiled publicly available data on major international Content Delivery Networks ("CDNs") in the region, focusing on Google,[3] Facebook[4] and Akamai.[5] The data collected covers all 20 CTU Members and a sample of 6 other non-CTU Member small countries/jurisdictions in the Caribbean, and Bermuda. The data are summarized in Table 2, which also includes country population, information on IXPs[6] and related traffic information (where available). As can be seen from the table, The Bahamas is one of only 7 CTU Members (35%) which hosts these three major international CDNs.

More generally, an analysis of the data in Table 2 suggests that the presence of an IXP does not determine where Google and Facebook establish their nodes. Rather, it is population (a proxy for total users and traffic) that appears to be a stronger driver of CDN presence, as well as the establishment of IXPs. It makes intuitive sense that CDNs would be drawn to larger markets, such as The Bahamas, independent of the presence of an IXP.

Further, BTC understands that many of the other major international CDNs have much more stringent node- or cache-establishment requirements than Google, Facebook and Akamai, requirements that would be difficult for CTU Member meets, whether or not they have an IXP.[7] More generally, BTC understands that from the perspective of these relatively more stringent CDNs, because of its proximity to Miami, The Bahamas is likely already considered to be within the typical catchment area (South Florida) for their existing caches. The Bahamas would account for 6% of South Florida's population of 6.2 million.[8] Bringing an additional cache to a location so close to an existing cache with a relatively very modest incremental population would not be a high priority and in BTC's view, establishing an IXP would not change these market dynamics.

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3 See: https://peering.google.com/#/infrastructure

4 See: https://anuragbhatia.com/2018/03/networking/isp-column/mapping-facebooks-fna-cdn-nodes-across-the-world/

5 See: https://www.akamai.com/uk/en/solutions/intelligent-platform/visualizing-akamai/media-delivery-map.jsp

6 The existence of IXPs in 11 CTU Members is based on Table 2 of the ConDoc.

7 For example, Netflix requires a minimum traffic level of 5 Gbps before considering establishing a local cache engine: https://openconnect.netflix.com/en/deployment-guide/requirements-for-deploying-embedded-appliances/

8 https://www.census.gov/quickfacts/fact/table/miamidadecountyflorida,browardcountyflorida,palmbeachcountyflorida/POP060210

Table 2: Summary of IXPs and CDNs in the Caribbean Region								
CTU Members		Pop (000)	IXPs			Content Delivery Networks		
			Y/N?	Members	Traffic	Google	Facebook	Akamai
1	Barbados[9]	287	Yes	3	N/R	Yes	Yes	Yes
2	Belize[10]	383	Yes	9	≈0.04	Yes	Yes	Yes
3	British Virgin Islands[11]	30	Yes	N/R	N/R	No	Yes	No
4	Cuba[12]	11,338	Yes	N/R	N/R	Yes	No	No
5	Dominica[13]	72	Yes	N/R	≈0.07	Yes	Yes	Yes
6	Grenada[14]	111	Yes	2	≈0.02	Yes	Yes	Yes
7	Jamaica[15]	2,935	Yes	4	N/R	Yes	Yes	Yes
8	St. Lucia[16]	182	Yes	5	N/R	Yes	No	Yes
9	Sint Maarten[17]	41	Yes	6	≈1.8	Yes	No	Yes
10	St. Vincent[18]	110	Yes	N/R	N/R	Yes	No	No
11	Trinidad & Tobago[19]	1,390	Yes	8	≈2.2	Yes	Yes	Yes
12	Antigua	96	No			No	Yes	No
13	Anguilla	17	No			Yes	No	No
14	**Bahamas**	**386**	No			**Yes**	**Yes**	**Yes**
15	Cayman Islands	64	No			Yes	Yes	No
16	Guyana	779	No			Yes	Yes	No
17	Montserrat	5	No			No	No	No
18	St. Kitts	52	No			Yes	No	No
19	Suriname	576	No			Yes	Yes	No
20	Turks and Caicos	38	No			Yes	Yes	No
All CTU Members (20)		**945**	**55%**			**85%**	**65%**	**45%**
CTU Members with IXP		1,534				91%	64%	73%
CTU Members without IXP		224				78%	67%	11%
Other Small Caribbean Countries/Jurisdictions								
21	Aruba	106	No			Yes	No	No
22	Bermuda	64	No			Yes	Yes	Yes
23	Bonaire	19	No			No	No	No
24	Curacao[20]	160	Yes	13	20	Yes	Yes	Yes
25	Saba	3	No			No	No	No
26	Sint Eustatius	4	No			No	No	No

Notes: 1) Country population (2018 or most recently available) generally World Bank, otherwise from CIA Factbook.
2) "N/R" means not reported or data not available.

9 BTC understands the Barbados IXP was established by 3 telecoms providers. No website or traffic statistics available.
10 See https://www.pch.net/ixp/details/1918. IXP does not appear to have its own web-site.
11 No data or web-site found.
12 No data or web-site found.
13 See https://www.pch.net/ixp/details/1364. IXP does not appear to have its own web-site.
14 See https://ixgd.wordpress.com/statistics and https://static1.squarespace.com/static/5138f2cae4b0f3422dd43abd/t/536065b7e4b0b40ffb1c7a83/1398826423928/CaribNOG7_Day_1_Caribbean_IXP_Update_Bevil_Wooding_PCH.pdf
15 See https://www.pch.net/ixp/details/1814. IXP does not appear to have its own web-site.
16 See https://www.pch.net/ixp/details/1782. IXP does not appear to have its own web-site.
17 See http://www.ocix.net/ocix/index.php?option=com_content&task=view&id=10&Itemid=14
18 No data or web-site found
19 See https://ix.tt/statistics/
20 See: https://www.ams-ix.net/car/documentation/total-stats

2.4 National Content Creation and Delivery

Separate from the claim related to attracting international CDNs, the Consultation Document also claims that the establishment of an IXP in The Bahamas will lead to an expansion of the national digital ecosystem. BTC considers that URCA is overstating the potential of such expansion and has not produced any relevant evidence to substantiate its claim.

As summarized in Table 2, BTC's analysis of the actual IXPs that have been established in CTU Members reveals that most have few members and manage relatively very little traffic. [21] Only a small minority appear to have facilitated an ecosystem of sorts and a critical mass of traffic. All this suggests that based on the actual experience of CTU Members, that there is no guarantee that the establishment of an IXP will lead to an expansion of the digital ecosystem.

In stark contrast to the experience of the CTU Members, there is one relatively small Caribbean jurisdiction, Curacao, that appears to have established a broader digital ecosystem around its IXP (i.e., it has 13 IXP members and generates 20 Gbps of traffic). This case appears to be largely driven by particular local conditions and other circumstances. First, Curacao is a "constituent country of the Kingdom of the Netherlands" and has strong ties to continental Netherlands and other former Dutch colonies in the Caribbean. Specifically, the Amsterdam IXP (AMS-IX, one of the largest in the world), help in the set-up of the Curacao IXP and provided all support systems, including 24/7 NOC services provided from Amsterdam by AMS-IX. Basically, the operation of the Curacao IXP is outsourced to the AMS-IX. The AMS-IX leveraged its global standing to attract more content players to the Curacao IXP where an additional Tier IV certified data center was being established with potential to serve a much larger regional population catchment area[22] in addition to already also serving other former Dutch islands (Aruba, Bonaire, Saba, Sint Eustatius and Sint Maarten). Currently the Curacao IXP is fully part of the global AMS-IX family of IXPs. The relative success of the Curacao IXP was only possible due to very specific conditions locally, an initial critical mass of 6 telecommunications operators,[23] presence of a major regional data center, presence of many submarine cable systems[24], and the continuing commitment of one of the largest IXPs in the world. This combination of geography, critical mass of founding telecommunications operators and historical ties is not available to The Bahamas.

2.5 IXP Set-up and Ongoing Costs

The Consultation Document suggests that cost of establishing an IXP in The Bahamas will be relatively modest. The Consultation Document cites as series of external reports that offer estimates in the range of US$4,000 to US$40,000. BTC considers that URCA is significantly under-estimating the cost of setting up a carrier-grade IXP that would have the features and reliability that would be necessary to attract serious IXP participants. Indeed, BTC considers that there are significant costs associated with the set-up of a carrier-grade IXP. Based on BTC's

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[21] Using the number of IXP members as a proxy for a digital ecosystem, Table 2 indicates that only three IXPs have 6 or more members and of these only two (Trinidad and Tobago and Sint Maarten) have peak traffic of 1Gbps or above.

[22] Including an area which could not be served well from the Miami IXP ecosystem due to too high latency.

[23] These include 3 incumbent operators in their respective island, 2 alternative operators and 1 regional mobile operator.

[24] ARCOS, PAN-AM, Americas-2, Alonso de Ojeda, Amerigo Vespucci, Jerry Newton, EC Link and later also PCCS

research, an initial investment in the range of US$100,000 to $150,000 would be necessary for just the IXP equipment.[25]

BTC notes that the Consultation Document does not mention IXP operational costs, which further under-estimates the overall IXPs costs. For example, the hosting of the IXP in a suitable high-end neutral datacenter could be in the range of perhaps US$30,000 to $50,000 per year. Other operational costs would include administration, technical and promotion services that would include perhaps 2 to 6 Full Time Equivalent ("FTE") staff to provide ongoing support, including 24/7 technical support, depending on the size of the IXP, the number of members and other considerations. This component could cost perhaps US$120,000 to $300,000 per year.

2.6 Alternative to IXP

The Consultation Document did not consider alternatives to the establishment of an IXP for The Bahamas. For example, as noted above, one of the indicators of a successful IXP is the number of members, including "new" members beyond the "founding" members, which can be expected to be the existing service providers. Because of the relatively modest size of Caribbean markets, many CTU members have at most 2 or 3 potential "founding" members, which is often below a critical mass necessary to build a successful IXP.[26] This is the case for The Bahamas, where there would be only two potential founding members BTC and Cable Bahamas Limited ("CBL") who have active Autonomous System Numbers ("ASN"s)[27].

Consequently, BTC considers that a bilateral peering arrangement between BTC and CBL could provide a more effective and cost-efficient means achieve many of the benefits URCA had hoped could be generated by establishing an IXP in The Bahamas, all at the much lower set-up and operational costs, while also addressing the data protection/privacy risks noted in the Consultation Document.

3 BTC Responses to Consultation Questions

3.1 Consultation Question 1

Context for Consultation - Do you agree with URCA's justification for publishing this consultation on the establishment of local IXPs in The Bahamas? Please detail your response in full.

BTC Response

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[25] For example, the set-up costs of the St. Vincent and the Grenadines IXP were $104,349 (http://carcip.gov.vc/carcip/index.php/documents/211-internet-exchange-point-ixp-launched-in-st-vincent-and-the-grenadines)

[26] For example, this is in stark contrast to the critical mass of 6 founding members for the Curacao IXP.

[27] See https://bgp.he.net. The third ASN in The Bahamas, "Bahamas WiMAX" seems to be inactive (no IP addresses announced).

BTC appreciates URCA's general motivation for publishing the Consultation Document. However, as explained in Section 2, the Consultation Document fails to provide any evidence to demonstrate that any of URCA's claimed IXP-related benefits would in fact be likely to materialize to any significant degree in The Bahamas. As well, BTC considers that URCA significantly underestimated the cost of establishing a carrier-grade IXP in The Bahamas. In other words, the benefits outlined in the Consultation Document are largely "assumed" and overstated and the associated costs understated.

On a technical point, BTC would like to point out an apparent anomaly in Figure 1 of the Consultation Document. It shows International IP Transit connected to the IXP. BTC understands that this would not be best practice for IXPs. Each ISP is using IP Transit where needed and local traffic between ISP and between ISPs and CDN's would be routed via an IXP when applicable.

3.2 Consultation Question 2

Demand for Broadband Connectivity in The Bahamas. Do you agree with URCA that there is high penetration of broadband access in The Bahamas? Please detail your response in full.

BTC Response

Table 3 shows that The Bahamas' fixed and mobile broadband access penetration rates are above the CTU country averages. For fixed broadband, The Bahamas's 23% penetration rate is above the 19% CTU average for 2018 and The Bahamas ranked 5th out of the 17 reporting CTU countries. For mobile broadband, the Bahamas' 51% penetration rate is above the 47% CTU average and The Bahamas ranked 3rd out of the 15 reporting CTU countries.

BTC notes however, that high broadband penetration does not lead to the conclusion that it is appropriate or cost-beneficial to establish an IXP in The Bahamas or, for that matter, any specific the Caribbean country. The two CTU countries with the highest fixed broadband access, Cayman Islands and St. Kitts and Nevis, do not have IXPs, and the two CTU countries with the lowest fixed broadband access rates, Cuba and Jamaica, do have IXPs. In other words, there appears to be no correlation between broadband penetration and IXPs, as seemingly implied in the Consultation Document.

Table 3: Fixed and Mobile Broadband Penetration Rates in CTU Countries			
	CTU Countries	**Fixed Broadband (%)**	**Mobile Broadband (%)**
1	Barbados	24%	45%
2	Belize	5%	13%
3	British Virgin Islands	19%	116%
4	Cuba	0.3%	0.0%
5	Dominica	22%	41%
6	Grenada	20%	33%
7	Jamaica	8.1%	55%
8	St. Lucia	17%	39%
9	Sint Maarten	N/R	
10	St. Vincent	22%	49%
11	Trinidad & Tobago	24%	47%
12	Antigua	9%	41%
13	Anguilla		
14	**Bahamas**	**23%**	**51%**
15	Cayman Islands	49%	
16	Guyana	8.3%	0.2%
17	Montserrat		
18	St. Kitts	31%	79%
19	Suriname	12%	47%
20	Turks and Caicos	27%	49%
	All Countries	**19%**	**44%**
***Notes**: Data for Fixed Broadband is for 2018 and sourced from the World Bank; data for Mobile Broadband is for 2016 and sourced from the ITU. "N/R" means not reported or data not available.*			

3.3 Consultation Question 3

Consumer preferences for online content & services.

Do you agree [with] URCA that there is increasing local preferences for web content that have high demand for bandwidth and high sensitivity to latency? Please detail your response in full. In support of your position, respondents are invited to provide relevant survey results and industry or specific company reports on the use of online content and services in The Bahamas.

BTC Response

BTC agrees with the statement that Bahamians have a preference for web content that has high demand for bandwidth and high sensitivity to latency. BTC notes however, that such a preference does not lead to the conclusion that it is appropriate or cost-beneficial, given local conditions, to establish an IXP in The Bahamas.

3.4 Consultation Question 4

Bandwidth Costs and Internet Traffic

Do you agree that the practice of routing local Internet traffic outside The Bahamas adds costs to the operations of local ISPs? Please detail your response in full.

BTC Response

Please refer to Section 2.2 above.

3.5 Consultation Question 5

IXP Enabling Measures

Do you agree with the supporting measures URCA proposes to adopt to stimulate entry of IXPs in The Bahamas? Please detail your response in full.

BTC Response

Licenses and Fees (Sections 5.1 and 5.2 of the Consultation Document): BTC is opposed to URCA's proposal that IXPs be licensed. BTC considers this to be an unnecessary measure that is not "light touch". BTC notes that an IXP is a wholesale-only facility that provides no services to end-users. The process to gain and maintain a licence would increase the set-up and ongoing costs for the IXP, which would further make the establishment of an IXP relatively less cost-beneficial. The same applies to licence-related fees and contributions – BTC is opposed to this proposal.

Localizing Traffic (Section 5.3 of the Consultation Document): BTC is opposed to the URCA's proposed "enabling measure" that would require companies, including BTC, to keep local Internet traffic in the Bahamas. BTC does not consider this to be an "enabling" measure, but rather a restrictive technical measure that is disproportionate to the matter at hand and unnecessarily prescriptive of network traffic management and routing decisions best left to operators to decide on the basis of commercial and other considerations. BTC reminds URCA that such a measure would have to be consistent section 5 of the Comms Act which states, inter alia, that "regulatory and other measures shall be efficient and proportionate to their purpose". In Section 2, BTC demonstrated that given local conditions, it may not be cost-beneficial to establish an IXP in The Bahamas at this time. Therefore, any restrictive technical measures aimed at implementing such a result would be disproportionate.

Access to Infrastructure (Section 5.4 of the Consultation Document): BTC notes that URCA appears to suggest in the Consultation Document that it may be contemplating implementation of sweeping measures aimed at regulating and mandating access to wholesale domestic and international transport facilities seemingly in support of its proposed establishment of an IXP in The Bahamas. No basis or rationale is provided however for this proposal. In any event, as BTC demonstrated in Section 2, given local conditions, it may not be cost-beneficial to establish an IXP in The Bahamas at this time. Therefore, regulating and mandating access to wholesale domestic and international transport facilities introduction in support of such an objective would be inappropriate, disproportionate and inconsistent with section 5 of the Comms Act.

3.6 Consultation Question 6

Principles for Regulation and Other Measures

Do you agree with URCA's assessment of the enabling measures discussed? Please detail your response in full.

BTC Response

BTC agrees with the general principles included in Section 5.5 of the Consultation Document. However, BTC disagrees that with URCA's assessment that the enabling measures included in Sections 5.1 to 5.4 meet these general principles for the reasons set out BTC's response to Consultation Question 5. BTC considers that the proposed enabling regulatory measures included in Section 5.3 and 5.4 are inappropriate, disproportionate and inconsistent with section 5 of the Comms Act.

In the former case, BTC notes that the Consultation Document refers to the Internet Society's ("ISOC") "A Policy Framework for enabling Internet" document to promote local content and traffic exchange rather than ISOC's more specific "Internet exchange points: An Internet Society Public Policy Briefing"[28] document. In any event, in neither of these documents, or as far BTC is aware, in any other document does ISOC advocate or recommend the type of restrictive traffic management measures that URCA is proposing in Section 5.3. Indeed, ISOC calls for a "flexible" approach including, as set out in Figure 6 of the Consultation Document, that policy-makers "Avoid mandating a requirement for local hosting of content or data. Instead, promote an environment that makes local hosting a viable option for content producers and distributor".

3.7 Consultation Question 7

Objectives for Establishing IXPs in The Bahamas

Do you agree with URCA's objectives for the entry of IXPs in The Bahamas? Please detail your response in full.

BTC Response

BTC notes that there appears to be considerable overlap between the "specific objectives" included in Section 6.1 and the "expected benefits" included in Section 6.2.

BTC's comments on the specific objectives in Section 6.1 are as follows:

- Facilitate efficient and more productive routing of Internet traffic. BTC does not agree that the establishment of an IXP in The Bahamas would help achieve this objective. Please see Sections 2.1 and 2.2 above.

[28] See: https://www.internetsociety.org/policybriefs/ixps/

- Facilitate market expansion by existing ISPs and further market entry by new players. BTC does not agree that the establishment of an IXP in The Bahamas would help achieve this claimed benefit to any meaningful degree. The Consultation Document did not provide any evidence demonstrating that the establishment of an IXP would promote or lead to new entry of ISPs.

- Attract international businesses to The Bahamas. BTC does not agree that the establishment of an IXP in The Bahamas would help achieve this objective. Please see Section 2.3 above.

- Contribute to the protection of personal privacy. BTC does not consider that it necessary to establish an IXP in The Bahamas to address either personal privacy or data protection concerns. The establishment of a direct bilateral peering arrangement between BTC and CBL would effectively and more efficiently address such concerns. See also Section 2.6 above.

- Promote affordable access to a wide range of carriage and content services which are of a high quality. BTC believes that existing and prospective competition in The Bahamas can achieve this objective without the establishment of an IXP. More importantly, the Consultation Document has not provided any evidence that demonstrates that the establishment of an IXP would help achieve this objective.

3.8 Consultation Question 8

Expected Benefits for IXPs in The Bahamas

Do you agree with the benefits URCA has identified for IXPs in The Bahamas? Please detail your response in full.

BTC Response

BTC notes that there appears to be considerable overlap between the "specific objectives" included in Section 6.1 and the "expected benefits" included in Section 6.2.

BTC's comments on the expected benefits in Section 6.2 are as follows:

- Reduction of network operational costs. BTC does not agree that the establishment of an IXP in The Bahamas would help achieve this claimed benefit to any meaningful degree. Please see Section 2.2 above.

- Enhanced Internet Reliability and Robustness. BTC does not agree that the establishment of an IXP in The Bahamas would help achieve this claimed benefit to any meaningful degree. Please see Sections 2.1 and 2.2 above.

- Data protection/privacy. As noted above, BTC does not consider that it necessary to establish an IXP in The Bahamas to address either personal privacy or data protection concerns. The establishment of a direct bilateral peering arrangement between BTC and CBL would effectively and more efficiently address such concerns. See also Section 2.6.

- Promote more affordable retail pricing for broadband access and usage. BTC does not agree that the establishment of an IXP in The Bahamas would help achieve this claimed benefit. The purported cost savings and efficiency gains attributed to an IXP included in the Consultation Document are at best negligible in magnitude (see Sections 2.1 and 2.2). Moreover, BTC considers that the costs are significantly understated. Therefore, if the costs of the IXP were to be passed on to broadband customers, the prices of broadband access and usage could increase, not decrease as incorrectly claimed in the Consultation Document.

- Enhanced end-user experience owing to the technical improvements and the advent of a wider range of online context that is relevant and comprehensible to local users. BTC does not agree that the establishment of an IXP in The Bahamas would help achieve this claimed benefit to any meaningful degree. Please see Sections 2.1 to 2.4 above.

- Stimulate development of local context sector in The Bahamas. BTC does not agree that the establishment of an IXP in The Bahamas would help achieve this claimed benefit to any meaningful degree. Please see Section 2.4 above.

3.9 Consultation Question 9

IXP Policy Document

What is URCA's role, if any, in the formation and/or approval of an IXP Policy document? Please detail your response in full.

BTC Response

BTC agrees that, if an IXP were to be established in The Bahamas, it may be appropriate for URCA to prepare a draft IXP Policy Document for public consultation purposes and, based on the feedback received, finalize and approve any such document.

3.10 Consultation Question 10

IXP Location, Decision-making, Business Model and Funding

Do you agree with URCA's recommendations regarding IXP location, governance and decision-making, participation, business model and funding? Please detail your response in full.

BTC Response

BTC's comments on Sections 7.1, 7.3, 7.4 and 7.5 are below (Section 7.2 is dealt with above).

- Location Neutrality. BTC agrees that the location of the IXP should be in a neutral site.

- Open Membership and Participation BTC agrees with URCA that the IXP should be open to all interested parties. The Consultation Document refers to "universal membership", which is an unclear term. BTC is concerned that perhaps the Consultation Document is advocating mandatory membership, to which BTC would be opposed because it would constitute a restrictive measure that is unnecessary and disproportionate.

- IXP Business Model. Because BTC is of the view that, given local conditions, the Consultation Document has not demonstrated that an IXP would be cost-beneficial in The Bahamas at this time, it is strongly opposed to having to devote financial and other resources to the establishment and/or operation of an IXP. Otherwise, if an IXP is established, BTC considers it should be based on a not-for-profit model.

- IXP Funding Model. See above regarding IXP Business Model. Because BTC is not convinced of the appropriateness of establishing an IXP, it would be strongly opposed to having to devote financial and other resources to the establishment and/or operation of an IXP. BTC strongly prefers a "free" not-for-profit model, rather than the fee-based model to any IXP that may be established. Further, BTC considers that the initial set-up costs of the IXP should be paid for by the Regulator and/or Government.

3.11 Consultation Question 11

Assessment of Implementation Options for Local IXPs

Do you agree with URCA's preferred IXP model for The Bahamas? Please detail your response in full.

BTC Response

BTC agrees that, if an IXP were to be established in The Bahamas, Option 2 "Multi-stakeholder owned IXP" would be appropriate. To be clear, because BTC is not persuaded that an IXP would be cost-beneficial in The Bahamas in the short or medium-term, it is strongly opposed to having to devote financial and other resources to an IXP, which is why it recommend that the Regulator and/or Government finance the IXP set-up and operational costs.

Further, BTC considers that the "multi-stakeholder owned IXP" could be combined with Option 5 "Outsourcing Model" – i.e., the IXP would be operated by a third-party selected by and subject to the majority approval of the multi-stakeholder owners.