

**Questionnaire
on
Establishment of a Myanmar IX**

DATED AS OF: November 2018

PREPARED BY



Posts and Telecommunications Department
Ministry of Transport and Communications
The Republic of the Union of Myanmar

Preface

- A. The Internet is an essential tool for communication, commerce, and development of a “knowledge-based” society in today’s globalized world. A strong ICT sector is particularly important to Myanmar’s future growth and development. Development of Myanmar’s ICT sector depends on the ability of the national Internet infrastructure to provide reliable and affordable access to high quality broadband capacity. An IX is a key component of a country’s Internet infrastructure that can help to increase the affordability and quality of Internet services.
- B. At present the majority or even all Internet traffic transmitted between Myanmar ISPs is conducted via international transit links via IP-transit from operators from other countries. These include links to Thailand, Singapore, China and others. An IX is a simple, resource-efficient means of achieving data interconnection among ISPs. It keeps local Internet traffic “local,” by enabling ISPs to exchange local Internet traffic directly instead of using international links.
- C. Internationally, IXs have shown a number of benefits:
- i. **Cost** – Direct traffic exchange lowers an ISP's average per-bit delivery cost of service;
 - ii. **Technical Quality** – Direct traffic exchange improves speed and number of hops by more direct routing of local Internet traffic from one national location to another, reducing latency and other technical quality degrading parameter;
 - iii. **Security and Privacy** – Keeping local traffic “local” within national boundaries reduces privacy and security risks inherent in sending sensitive data across national borders over multiple hops;
 - iv. **Resiliency** – An IX facilitates establishment of routing arrangements amongst ISPs to reduce congestion and to provide redundant back-up paths in the event of upstream network outages;
 - v. **Response and Restoration** – An IX also supports coordinating local security (e.g., intrusion detection), infrastructure protection, and emergency response activities;
 - vi. **Market Development** – An IX can promote local ICT service market development for co-location services (e.g., hosting, cached services, etc.) and services that require high bandwidth and low latency (e.g., real-time and multimedia services) and is with this prerequisite for the evolution of the next generation mobile technology (5G) in Myanmar;

- vii. **Services** to ISPs – An IX can provide services to its members (e.g., traffic reporting); and
 - viii. **Community** – An IX can provide a nexus for education and research projects that help develop the local Internet community and advance the ICT market.
- D. Accordingly, the Department is interested in the industry view on establishing an IX in Myanmar. For this, the Department developed a catalogue of questions to address the setup and operations of an IX in Myanmar to fully reflect the needs of the industry. All submissions should be substantiated with reasons and, where appropriate, evidence or source references. Stakeholder should provide written submissions as soft copy in English language to the Department in full by 28.12.2018. A Myanmar language submission shall only be considered if also a full English translation of the Myanmar version is provided. The Department developed a MS Excel tool “Myanmar IX Questionnaire.xlsx” for the industry feedback which is enclosed to this document to simplify and structure the feedback. The Department would be grateful if feedback would be provided in this MS Excel tool. Soft copies shall be provided either via email or via USB stick. Industry stakeholders shall hereby provide their feedback in the enclosed excel file in the sheet “Myanmar IX Questionnaire.xlsx”
- E. Submissions should be addressed to:
- Director General
The Republic of the Union of Myanmar
Ministry of Transport and Communication
Posts and Telecommunication Department
Building No. 2
Nay Pyi Taw, Myanmar
Attention: Daw Seint Seint Aye
Email: resource@ptd.gov.mm
- F. The Department intends to make submissions received available to the public. Any confidential information shall be provided under a separate cover clearly marked “CONFIDENTIAL”. For any party who wishes to make a confidential submission, a “public” version of the submission shall also be provided where confidential information is redacted.
- G. The Department thanks interested parties upfront for their participation in this consultative process and looks forward to receiving submissions with the industry feedback.

Request for Industry Feedback

General Aspects

The Department is not publishing answers from industry stakeholders on Question 1 & 2:

1. Please estimate in TB (Terabyte) the total Internet traffic that your company carried in calendar year H1/2018 and what portion (reported in TB or as a percentage) of that traffic was intra-Myanmar traffic (i.e., where the originator and recipient of the request were located at Internet locations within Myanmar).
 2. With respect to the international links maintained by your company, please identify the:
 - 2.1. Destination countries,
 - 2.2. Technology employed,
 - 2.3. Redundancy catered for,
 - 2.4. Installed capacity, and
 - 2.5. Capacity utilized.
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3. Describe any potential economic, technical, security or other benefits to your company that you foresee will happen when you connect to an IX?
 4. Describe any potential economic, technical, security or other benefits or costs that you foresee that an IX could bring for the Internet market and broader ICT sector in Myanmar.
 5. What potential risks are inherent with setting-up an IX?
 6. Describe the preferred circumstances and conditions under which your company would participate in an IX.
 7. Should the Department mandate that ISPs be required to participate in the IX? If not, why?
 8. If so, should the mandate apply to:
 - 8.1. All ISPs;
 - 8.2. All ISPs licensed to establish international links or to purchase IP-transit;
 - 8.3. All ISPs that have established international links or purchase IP-transit?

Organizational Model of the IX

9. There are a variety of institutional models internationally that have been adopted to setup and operate IXs including:

- 9.1. Nonprofit industry associations of ISPs
- 9.2. Government bodies (e.g., regulator)
- 9.3. Operator-neutral commercial profit companies

In your view, what is the optimal organizational model to setup an IX in Myanmar? Please provide reasoning.

10. With respect to the entity that manages and operates an IX in Myanmar:

- 10.1. What type of entity is most appropriate to manage and operate an IX in Myanmar; (such may be governmental bodies, associations, or private companies)
- 10.2. Do you have a recommendation for an appropriate candidate entity?
- 10.3. If so, please explain the basis for this recommendation.

11. Do you believe that the Department by rule or regulation should set the basic principles and minimum requirements for the structure and operation of an IX?

12. Do you agree that an IX in Myanmar should function based upon the following principles?

- 12.1. Inclusive (open to all qualifying ISPs)?
- 12.2. High technical reliability?
- 12.3. Operator neutral (not a competitor in the market for retail Internet services)?
- 12.4. Based on agreed-upon, open standards?
- 12.5. ISP users participate in governance?

If your answer to any of the above question is “no”, why? Do you think there are additional principles additionally to the above mentioned that should be reflected? If so, what and why?

13. What eligibility criteria should be established for ISP participation in an IX, and why?

14. Should the IX web site be public or for ISP members-only?

15. With respect to the operating policies of an IX:

- 15.1. Should interconnection rules defining the terms and conditions under which an ISP is permitted to route their Internet traffic to another ISP's network via the IX be set:
 - 15.1.1. by the IX?
 - 15.1.2. by the ISPs per bilateral agreements?

- 15.1.3. by the Department?
- 15.2. Should routing control over the traffic to the IX be performed by IX or by ISPs (or both)?
- 15.3. Should transit traffic be permitted through the IX and, if so, under what terms and conditions?
- 15.4. Should an IX be limited in capturing the content of a member's data traffic that is required for the conduct of traffic analysis and control?
- 15.5. What additional confidentiality rules should apply to the IX?
- 15.6. Should the IX collect and report technical information to members? If so, what type?
- 15.7. What types of technical information collected by the IX should be reported to the Department?
- 15.8. Should any, and if so what types, of technical information collected by the IX be made publicly available?
- 15.9. Shall the IX be entitled to filter traffic? If so, what policies shall be applied?
- 15.10. Who should set those policies? (e.g. Department, IX, ISPs, other?)
- 15.11. What should the IX role be in the event of security issues, infrastructure failures, routing equipment failures, or software configuration issues?
- 15.12. What additional security response services should the IX provide to the ISP participants?
- 15.13. What limitations of liability should be established for the IX operations?
- 15.14. What are appropriate access rules for ISP member's staff to access the IX premises, if any?
- 15.15. What additional technical support services should the IX provide to the ISP participants?
- 15.16. Shall the IX be permitted to offer other services (example collocation, hosting, ..) then pure data interconnection services between ISPs?

Technical Aspects

16. What technical model should be used –

- 16.1. Layer 3, in which ISP members exchange traffic inside the router located in the IX,
or

- 16.2. Layer 2, in which IX provides switching connectivity and ISP members retain full control over routing policy?

Please state the reasons for your answer.

17. What protocols should be used (e.g., BGP, other)?
18. Should the IX be connected to the Internet other than through its ISP members?
19. What should be the content of the Internet Routing Registry (IRR) set up at the IX?
20. What is the optimal means of establishing physical connectivity between IX and each ISP?
 - 20.1. Fiber, wireless, etc.
 - 20.2. Existing ISP platforms or new facilities
21. Are there any circumstances where bandwidth and/or download restrictions should be imposed on ISP participation in an IX?
22. Should a minimum bandwidth be required for ISP links to the IX?
23. Should the IX be required to provide redundancy and increased fault tolerance (e.g., each ISP connects to a single switch/router or, to provide fault tolerance, to multiple switches/routers located at the IX)?
24. Should the IX be required to implement a denial of service (DOS) attack detection system at the IX switches/routers?
25. For IX address space, should the IX obtain separate address space or use address space of existing ISPs?
26. 26 What are key requirements and specifications for physical security of the IX space?
 - 26.1. 24h CCTV?
 - 26.2. Locks?
 - 26.3. Controlled access for IX members?
 - 26.4. Space requirements for cabling, racks and equipment?
 - 26.5. Fire control?
 - 26.6. Air-conditioning?
 - 26.7. Power supply/backup?
 - 26.8. Data center tiers?
 - 26.9. Other (please specify)?

27. Should a time server or other services for ISPs be provided by the IX (please specify)?
28. Should technical and operational readiness for lawful interception be prerequisite for the operation of an IX.
29. What is the suitable internet protocol the IX shall support? IPv4, IPv6? Shall there be any policy in relation to IPv6 migration be in place? What party shall establish such policy? The Department, the IX or ISPs?
30. Shall the IX only deal with best effort internet traffic or shall the IX establish facilities and contractual agreements to also support end to end QoS traffic? If your answer is yes, please elaborate technical backgrounds how end to end QoS traffic transport could be established and please provide backgrounds how this could be reflected in agreements with the IX or between ISPs.
31. Shall IP-Voice interconnection be in focus of the IX? If yes, what kind of IP Voice services shall be supported? What would be suitable QoS parameter and measures the IX should support or establish? Should the IX be reimbursed for transport of IP-Voice in a different way, as for example via voice transit charges? How can end to end QoS be ensured?

Monetary Aspects

32. Based on your understanding of the intra-Myanmar traffic volumes generated by Myanmar ISPs, do you believe an IX would lead to a cost savings, increased cost, or be cost neutral for your company? (Please specify the basis for your answer in financial figures.)
33. Do you believe that at present there is a market in Myanmar for more than one IX?
34. Please estimate the capital costs required to establish an IX?
 - 34.1. Cost of equipment for the core of the IX;
 - 34.2. Preparing the space;
 - 34.3. Furnishing the space:
 - 34.3.1. Backup power,
 - 34.3.2. Air-conditioning,
 - 34.3.3. Equipment cabinets, and
 - 34.3.4. Relevant security fixtures.
 - 34.4. Link provision from ISP to IX:
 - 34.4.1. Router,

- 34.4.2. Fiber or other links.
- 34.5. Others (please specify)
- 35. How many staff do you estimate the IX will require?
- 36. Would your company consider providing technical advice and assistance to the IX at no cost?
- 37. Based on your previous answers and your understanding of your own operations, please estimate the costs for annual IX operations:
 - 37.1. rent of space,
 - 37.2. electricity,
 - 37.3. staff salaries (how many?)
 - 37.4. security, and
 - 37.5. insurance costs
- 38. How should the financing of IX CAPEX requirements be arranged?
 - 38.1. In the case of a governmental body:
 - 38.1.1. A PPP option using a mix of grant and Government funds?
 - 38.1.2. A PPP option using a mix of grant and Government funds, plus ISP contributions?
 - 38.1.3. Wholly subsidized by Government?
 - 38.2. In the case of a private sector association, private capital plus a partial subsidy?
 - 38.3. A private, profit company using its own capital?
- 39. Under what circumstances would your company contribute to funding the capital costs of establishing an IX under the options described above?
- 40. How should the financing of the IX OPEX requirements be arranged? Please specify
 - 40.1. OPEX recovered based on a monthly, cost-based, per capita subscription fee for all ISPs connecting to IX?
 - 40.2. OPEX recovered based on a monthly, cost-based, subscription fee apportioned among ISP members based on relative traffic volumes of each ISP connecting to IX?
 - 40.3. OPEX recovered based on a combination of a monthly flat, cost-based, per capita subscription fee for all ISPs connecting to IXP, plus an additional fee to be based on relative traffic volumes of each ISP?
 - 40.4. OPEX costs for a maximum initial period of two years from start-up to be publicly

subsidized, and then reverting to one of the options described above?

40.5. Other?

41. Should “in-kind” contributions by ISPs be permitted as a substitute for fees and, if so, under what circumstances?
42. While payment for the cost and maintenance of the link between the ISP network and the IX (including a redundant link if required) is usually the responsibility of each ISP member, some IXPs have adopted policies to smooth these costs so that each member pays the same amount to access the IX.
43. Should Department consider requiring this approach for the Myanmar IX?
44. Does the future potential exist for the IX to serve as a sales point for the provision by Tier 1 ISPs of connectivity to smaller ISPs? If not, why not?
45. Should such activity be prohibited or restricted?

Location & Licensing

46. What is a suitable location from your perspective for the IX including existing / new data center. Shall for redundancy reasons two locations be targeted? Shall these locations be in one city or in different cities?
47. Shall the IX be licensed? If so, what license do you see suitable? Shall the hosting data center be licensed?

Peering Aspects

48. Should all ISPs that connect to the IX be required to peer with every other connected ISP?
49. What are appropriate peering rules for the IX? Should all ISPs connected to the IX be required to peer with every other connected ISP:
 - 49.1. Under a Mandatory Multilateral Peering Agreement (MMLPA) to be established by the IX with Department approval?
 - 49.2. Under Bilateral Peering (BLP) arrangements, the commercial terms of which the ISPs would be free to negotiate, provided they are completed within a set time period?
 - 49.3. Under Bilateral Peering (BLP) arrangements, where the minimum basic commercial parameters required for peering arrangements are set by the Department by rule or regulation and the actual negotiation is lefty to negotiations between ISPs? Please explain the reasons for your answer.

50. Where there are significant asymmetries (please specify a qualifying asymmetry in terms of traffic ratio or other measure) between potential peering partners should “paid peering” arrangements be an option?

51. If so, under what conditions would paid peering be an appropriate approach?