HAWAII INTERNET EXCHANGE

Technical Specification, Version 3.6, April 21, 2009

(This specification may be superseded either in whole or in part, at a later time.)

ABSTRACT

The Hawaii Internet Exchange, or HIX, is a project operated and partially funded by the University of Hawaii’s Information Technology Services. The purpose of HIX is to allow IP networks which are physically located in Hawaii to inter-communicate with one another without sending traffic through the mainland. The HIX network will operate independently of all other networks, and will serve only as a means of connection among IP networks which are located in the State of Hawaii.

SCOPE

This document provides the technical specifications which define the means of access, routing, uses and restrictions that are necessary to fulfill the more general goals of HIX. The reader will need to have a clear understanding of IP routing among various, interconnected networks, as well as the consequences of incorrect routing. A firm grasp of router configuration will be necessary to implement the specifications described in this document.

CONVENTIONS

The following language conventions are used in the items of specification in this document:

Must, Shall or Mandatory

The item is an absolute requirement of the specifications.

Should or Recommend

The item should generally be followed for all but exceptional circumstances.

May or Optional

The item is truly optional and may be followed or ignored according to the needs of the implementer.

CHANGES FROM PREVIOUS SPECIFICATIONS

1. Additional clarifications on the rules governing the definition of IP Networks which are physically located in the State of Hawaii have been defined. Specifically HIX is now using the origin AS of the route announcement to determine if the announcement will be accepted.
2. Added Tier-1 ISP limitations.
3. Equinix has been renamed to DRFortess.
4. Updated DRFortess IX items.
5. Updated agreement to bind Provider and not signer to agreement.
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1.0 Means of Access

1.1 Access to the HIX shall be via University of Hawaii ITS sanctioned connectivity (i.e. Ethernet, etc) at either the Manoa peering point or DRFortress IX. Contact the University of Hawaii for details. HIX connections via Ethernet at DRFortress must be made through the DRFortess IX – no direct connection to the HIX router at DRFortress shall be permitted.

1.2 Encapsulation of network layer protocols, except IP itself, within IP datagrams is not allowed.

1.3 Peering may be established between the client router and one of the core HIX routers only. Peering between two clients directly through HIX is not allowed.

1.4 The HIX network shall be maintained on a best effort type of service. The University of Hawaii and its staff shall make every effort possible to maintain the HIX network and its equipment operational. The University of Hawaii shall have the ability to shutdown the HIX network at its discretion without prior notice.

2.0 Necessary Equipment and Protocols

2.1 Each network connecting to the HIX shall have an IPv4 router. HIX Members who wish to peer using IPv6 must be able to run IPv6 on their routers as well.

2.2 IP routers connecting to the HIX shall present one interface only to the HIX, and shall occupy one HIX IP address only.

2.3 IP routers connecting to the HIX must have the capacity to perform IP routing over BGP version 4 (and v6 if using IPv6)

2.4 IP routers connecting to the HIX must have the capacity to perform route filtering based on Autonomous System Numbers (ASNs) and/or network prefixes.
3.0 Routing Protocols, Rules and Configuration

3.1 In order that a simple, maintainable interface among HIX client networks can be arranged, HIX routing is based on BGP.

3.2 Client network routing must be configured to ensure that other HIX client addresses are not re-advertised to adjacent provider networks. (For example: Joe’s Internet Service is connected to the HIX. Joe’s Internet access to the mainland is via Fred’s Network Systems of America. Although Joe must keep a route in his table to reach the University of Hawaii, Joe must not advertise himself to Fred as a path to UH.)

3.3 It is recommended that as-path filtering into the HIX is performed so that client upstream AS paths are not injected into the HIX network by accident. Although the HIX performs inbound as-path filtering from a client into the HIX, it is good practice to perform filtering at both inbound and outbound points when peering.

3.4 UH Manoa HIX Peering point IP addresses for the HIX will be administered by UH Information Technology Services. Assignment of a HIX address will require a signed agreement between HIX member and UH ITS. DRFortess IX IP Addresses will be administered by DRFortess.

3.5 UH Manoa HIX peering point IP subnets use /30 prefix (subnet mask of 255.255.255.252), providing two valid host addresses per subnet.

3.6 HIX administration will monitor routing and traffic and reserves the right to isolate networks from the HIX that are the source of routing problems without prior notice. HIX administration will make every effort to contact the administrator of the network through contact information provided on the HIX agreement prior to the shutdown of the peer.

3.7 Contact information must be kept up to date with the University of Hawaii. This allows the University to notify and troubleshoot routing problems that may be affecting the client or other HIX member’s connectivity. Failure to maintain correct contact information may result in the disabling of peering until such contact information is corrected.

3.8 The HIX applies inbound and outbound AS-Path filters. The HIX does not filter on IP Prefixes. To perform adds or changes to AS-Path filters, please send email to networks@hawaii.edu, detailing the exact AS-Path that are being changed or added.

3.9 Once the AS-Path updates have been reviewed by UH, an email to hix-l@hawaii.edu will be sent informing all members to update their ACL’s accordingly.

3.10 IP networks located in the State of Hawaii shall be identified by their origin AS Number. The HIX will not allow any ASN in an AS-Path that is not physically located in the State of Hawaii.
For Example:

AS Path: 19035 100 200 300

19035 = HIX
100  = ISP A, located in Hawaii
200  = ISP B, located in Hawaii
300  = ISP C, located in California

ISP A, who provides access to ISP B, who then in turns provides access to ISP C.

In this case, the HIX’s AS-Path filter will only allow ^100_200$ and ^100$. Announcements of AS 300 will be filtered into the HIX.

If however ISP C has a router on AS 300 that is located in Hawaii, AS 300’s announcements will be accepted – but only announcements from AS 300. i.e. AS-Path of 100 200 300 400 will not be accepted.

3.11 The HIX will base its determination of the location of the ASN on the whois records of ARIN or similar routing registry. HIX members may submit additional documentation to demonstrate the location of a router in the event that the ASN is not based within the State of Hawaii.

3.12 Advertised prefixes shall originate from within the State of Hawaii.

3.13 HIX shall not allow Tier-1 ISPs to peer with the HIX in order to preserve symmetric routing. For the HIX definition, Tier-1 ISP’s are defined as ISP’s that have a nationwide backbone. Exemptions are available on a case by case basis. Contact networks@hawaii.edu to apply for an exemption.

4.0 Applications and Higher Level Protocols

4.1 There are currently no restrictions on the transport and application protocols on the HIX.

5.0 Capacity Issues

5.1 Currently, HIX is comprised of an established peering point located at the University of Hawaii at Manoa and a peering point located DRFortress. Both core routers have a complete view of HIX and are connected by Gigabit Ethernet.
6.0 Client Organization Acknowledgement of Specifications

Prior to connections of HIX service, the following statement shall be signed by a representative of the client organization and returned to:

Chris Zane, Manager, Network Engineering
University of Hawaii
Information Technology Services
2565 McCarthy Mall, Keller 204A
Honolulu, HI 96822

FAX: 808-956-2412 or email: networks@hawaii.edu

I ________________________________, being an authorized agent or representative of _______________________________ (Provider), acknowledge that I have read and understood the Hawaii Internet Exchange Technical Specifications, version 3.6, and that the Provider will guarantee compliance with the specifications herein. I understand that non-compliance, in the event that it affects the operation of the Hawaii Internet Exchange, may require HIX administration to interrupt my service in order to restore proper operation.

Signed: _______________________________________

Date: ___________________________

Title: __________________________

ISP Information

ISP Name: ___________________________

Address: ___________________________

NOC Contact: _______________________

NOC Phone: ________________________
NOC Email: __________________________________________

ASN: ______________________________________________

List Exact AS
Paths to be sent
to the HIX:
(attach another sheet if necessary)
____________________________________________________