The Story of btIX - History & Experiences
While the facts are facts, the views and experiences shared in the following slides are my own. Nothing expressed herein should be construed as views or opinions of the btIX community or the organization I work for.
DrukNet (Dept of Telecom), First ISP in Bhutan, June 1999

A 256 Kbps Satellite Link to UK (BT)

v.33 and V.34 modem days - v.90 was a luxury

Photo Courtesy: PFS Archives
Internet in Bhutan: Timeline & Service Providers

First ISP Established by Dept of Telecom, RGOB
Nationwide Coverage

Another Private ISP
Limited Service Area
(No Longer in Business)

Latest Entrant
Expanding to provide Nationwide Coverage

1999
2004
2005
2008
2017

First Licensed Private ISP
Limited Coverage

Private Telecom Operator
Mobile and Internet Services
Nationwide Coverage

• Palbheu or Endless Knot (one of the eight lucky signs (Trashi Ta Gye))
• Nu.5000/- was the prize amount for the Logo
• New service under DoT and creating a brand of service under DoT (now BT)
Internet in Bhutan: Other Network Players

Resellers (Datanet, Supernet, Bitcom) - Limited Service Areas

Other Network Operators

DrukREN  Data Centre Services  GovNet
Internet in Bhutan: Current Market Profile

Population
735,553 (PHCB, 2017)
Bhutanese: 681,720

Telecom Operators
2 (Fixed - 1, MNO -2)

ISPs
8 (BICMA, Sept 2018)

International POIs
3 (Terrestrial)

Int'l IP Capacity
30 Gbps (As of Dec 2018)

International Providers
2 (TCL, Airtel)

Fixed Broadband
15,719 (BICMA, Sept 2018)

Leased Line Users
1,478 (BICMA, Sept 2018)
Internet in Bhutan: Current Market Profile

**Cellular Mobile**
- 705,677 (BICMA, Sept 2018)

**4G Connections**
- 162,558 (BICMA, Sept 2018)

**Smart Phones**
- 77% (TashiCell, Oct 2018)

**4G Capable Devices**
- 65% (TashiCell, Oct 2018)

**Mobile Broadband**
- 602,719 (BICMA, Sept 2018)

**MBB Data**
- 82% (TashiCell, Oct 2018)
btIX History: The Need of an IX

- Challenges with Local Peering
- Increasing Local Content (e-Services, Apps)
- New Entrants in the market (GovNet, DrukRen, Nano)
- Local CDNs Caching Solution Vs. Traffic volumes
btIX History: The Genesis of btIX

2009
SASEC Information Highway Project (DITT/MOIC)

2012
Fiber Infrastructure to Interconnect ISPs, Network Operators

2015
DrukRen Established & a Switch procured for IX by DITT. Two Servers for IX donated by APIA
ThimphuIX Established at BT Premises. Drukren, TashiCell & BT Connected

2015-2016
ThimphuIX - No further progress made. Servers used for training.

The first attempt to establish an IX in Bhutan failed despite good intentions and efforts by many.
Informal discussions helped in understanding individual ISPs views of an IX & also their hesitations, if any.

Involving neutral third parties as facilitators to sort out differences & reach a common goal.

Sometimes a frank discussion over momos & beers was the only way forward.
Meetings, Schedules, & Shifting Goals (Sept to Dec 2017)
All Stakeholders Meet, Agreement on IX, Location, Membership, Fees, Association, Board Representatives from Stakeholders. IX to be operational by 11 Nov 2017. Multiple Meetings thereafter, aggressive schedules but the various soft launch dates passed by without result.

Hurdles Along the Way
Inadequate Facilities for an IX at the “neutral” location - Power, Equipment Racks, Spare fiber pairs for connectivity, Access, IX Resources from APNIC and IX Legal Registration.

Identity Crisis (Jan to March 2018)
Search for having a legal identity for btIX - Required for everything from APNIC membership, TAX Payer Registration, Bank Account Opening, Equipment Import, etc. Evaluation of various Options. CSO, Trade Certificates, IX License and implications.

IXP Facility License (25 March 2018)
Proposal to BICMA, Briefing regulators / Policy Makers on IX benefits, grant of IX License.
btIX History: Second Attempt for an IX

Network Segregation (March - July 2018)
Need to segregate IX and Transit traffic. Evaluation of various options, Design Changes, & Additional Equipment, Implementation.

btIX Association & New Requirements (July 2018)
Fading Enthusiasm about the IX, Continuously Changing Requirements of some Association Members, Issues of fees & payments. Some Members already exchanging traffic while some association members were reluctant to be connected.

Formalizing the btIX Association (July - Sept 2018)
Drafting & Finalization of formal Association Documents - MoA & AoA but ratification delayed. Emergency Meeting and resolution to start btIX with or without some members.

1 Sept 2018 - btIX Operational
All founding members of btIX Association get connected to IX except DrukCom due to connectivity issues. Ratification of MoA/AoA by CEOs / Heads of all Association Members only in October 2018.
btIX Experience: Looking Back & Lessons Learned

Why Establishing an IX in Bhutan took 4+ Years?

1. Market Factors: Small customer base, few ISPs or players.
2. Vast differences in ISPs’ scale of operation, market share, & content
3. Market dominated by Telcos with PNI arrangements
4. Business Goals of prospective IX members vis-a-vis community spirit
5. Processes & Regulations
btIX Experience: Looking Back & Lessons Learned

The Mistakes Made: ThimphuIX

1. No Stakeholders Engagement - “If you build it, they will come”
2. No Ownership - DITT? BT?
3. Initiated by (DITT) as part of the SASEC Project - No Focus
4. Hosted & Operated by BT under compulsion?
5. Some say “Location” but I feel otherwise if there really was a “will"
btIX Experience: Looking Back & Lessons Learned

The Mistakes Made: btIX

1. Assuming establishing an IX would be only (or mostly) technical works
2. Not considering local context and ground realities when setting schedules
3. Thinking that all stakeholders have to IX members to start an IX
4. Not formalizing the IX Association in the beginning
5. Not factoring the differences of structure, hierarchies & processes of different members in the community
What has worked for btIX?

Many factors and right decisions, appropriate for local context, helped in making btIX possible in its second attempt.

Right Approach

- Association Formation
- Meetings, Momos, & Beers
- Neutral Third Parties
- Knowing when external support is needed
- Neutral IX Hosting Location
- Stakeholders Involvement
What has worked for btIX?

- Right Initiatives
- Project Ownership
- Active Participation of Community
- Initiatives by individual Members
- Simple Membership Policies
- Fees Affordable to All Member Types
- IX O&M by Members

Affordable to All Member Types
About btIX

1st IX in Bhutan
Licensed IXP.
L2 IX
First IX LAN at TTPL
Live from Sept 2018

Management
Managed by btIX Association
btIX Board for Major Decisions
Board elected from Members Reps
Elected Office Bearers

Policies
Neutral IX
Non-Profit based operations
Simple membership criteria

Finances
Expenses met from fees
Variable fees & decided at AGM based on planned activities

https://www.btix.bt for more info.
btIX: Some Technical Stuff

- Juniper EX4550 Switch (1G / 10G)
- Ganeti Cluster - 2 Nodes presently running 10 VMs for various applications
- Tools: IXP Manager, Librenms with various plugins, sflowtools
- Self hosting of applications (web, mail, dns, mailing lists, etc)
- Route Server for MLP, RC for LG on the cards
Members: 10 (7 Full, 3 Special)
BLP Peering Mode (RS not ready)
Mixture 1G & 10G Ports
CDNs Cache feed by Members
DNS Root Servers feed (K, & I)
That’s All. Thank you.

Questions Welcome