

DrukREN

UPDATE

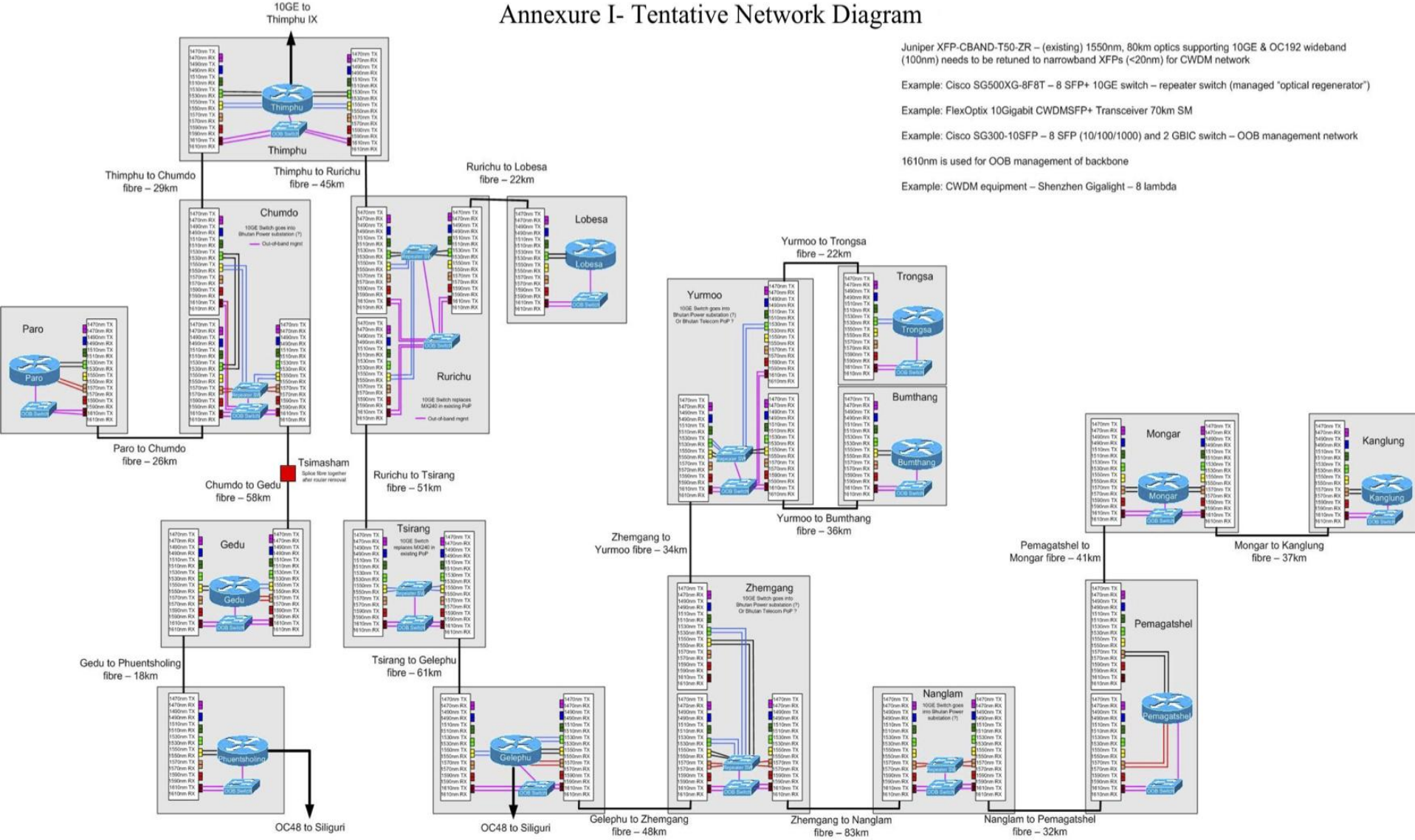
5 June 2017
BhutanNOG4



Status - where are we?

- Worked Closely with OVC, RUB
- TEIN Connectivity through NKN: 1gbps (still pending)
- Thimphu IXP Set up
- Campus Network and System Administration Workshop Organised - 2 *participants from each colleges*
- 10g DrukREN Backbone Established

Annexure I- Tentative Network Diagram



Juniper XFP-CBAND-T50-ZR – (existing) 1550nm, 80km optics supporting 10GE & OC192 wideband (100nm) needs to be returned to narrowband XFPs (<20nm) for CWDM network

Example: Cisco SG500XG-8F8T – 8 SFP+ 10GE switch – repeater switch (managed “optical regenerator”)

Example: FlexOptix 10Gigabit CWDMSPF+ Transceiver 70km SM

Example: Cisco SG300-10SFP – 8 SFP (10/100/1000) and 2 GBIC switch – OOB management network

1610nm is used for OOB management of backbone

Example: CWDM equipment – Shenzhen GigaLight – 8 lambda

10 gig Fiber Network

- Optical Power:
 - RX at Thimphu Core MX240:
 1. From Rurichu SG500 1530 44kms = -17.93dBm
 2. From Rurichu SG500 1550 = -18.63 dBm
 3. From Chumdo SG500 1530 30kms = -13.30dBm
 4. From Chumdo SG500 1550 = -13.25dBm
 - RX at Chumdo SG500
 1. From Paro Core 1530 27kms = -11.50 dBm*
 2. From Thimphu Core 1530 30kms = -20 dBm
 3. From Thimphu Core 1550 = (Less than 0.01mW)
 4. From Gedu Core 1550 60kms= - 13.01 dBm
 5. From Gedu Core 1570 nm= - 20 dBm

- Tingtibi to Nanglam 83kms+
- No Link between Tingtibi and Nanglam
- Drop at Pangbang
- RX at Panbang SG500:
 - From Tingtiibi SG500 1570 = -16.99 dBm
 - From Nanglam SG500 1570 = -13.98 dBm
- RX at Nanglam SG500:
 - From Pemagatshel Core 1570 32kms = -20dBm
 - From Panbang SG500 = -10dBm
- RX at Pemagatshel Core:
 - From Nanglam SG500 1570 = -18.66 dBm
 - From Mongar Core 1570 41kms = -17.90 dBm
 - From Hospital = -20.04 dBm
 - From JNE College = -14.63 dBm

<https://www.sunet.se/blogg/long-read-cleanline-ss-is-a-virtue/>

10G network Link Performance Test

- Links performances between router control planes using FTP
 1. Thimphu-Paro Link - 11.55 MB/s
 2. Thimphu-Gedu - 11.09 MB/s
 3. Thimphu-Gelephu - 10.59 MB/s (1.3 MB/s)
- Rest links close to 90 mbps

Last Mile Connectivity

🔍 Search downloads

Today



Office 2013 (5).zip

ftp://ftp.druknet.bt/Office/Office%202013.zip

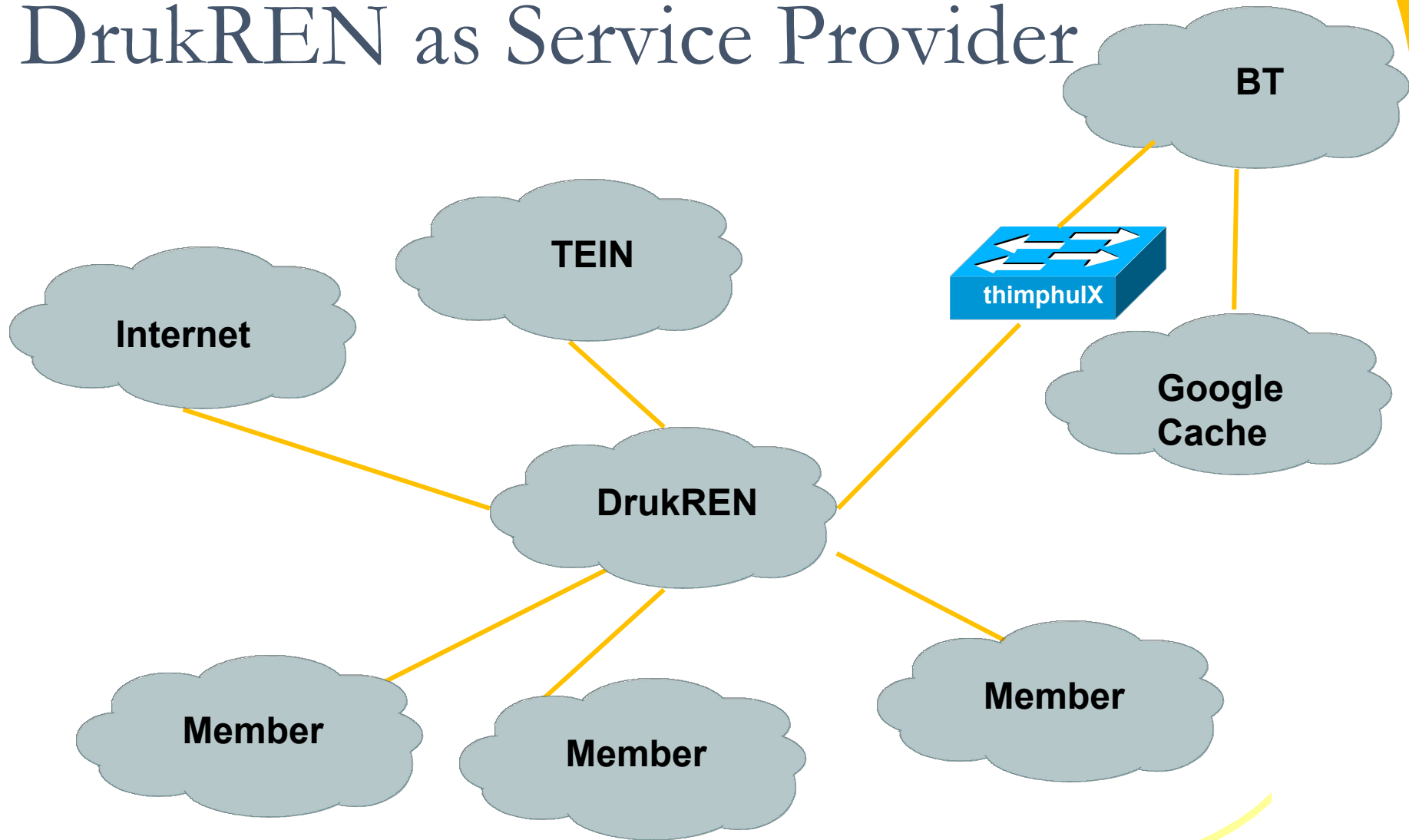
101 MB/s - 706 MB of 827 MB, 1 sec left



PAUSE CANCEL

- Built Last Mile Fiber Connectivity to 10 Hospitals (Paro, Gedu, Pling, Punakha, Trongsa, Bumthang, Pemagatshel, SJ, Mongar, Kanglung)
- Installed Cisco 4351 Router at the Hospitals
- 165 Mbps Download Speed

DrukREN as Service Provider



DrukREN Services

1. 100Mbps/1 Gbps Access to Domestic Contents for DrukREN Members
2. Research & Education Transit - 1 Gbps access to TEIN4 and global REN
3. International Commercial Transit: Bulk Purchase of the Internet Bandwidth

Cost Elements for Running DrukREN

1. Cost of bulk internet bandwidth purchase for its members
2. O&M Cost
3. APNIC Annual Membership Fee
4. Asi@Connect Annual Project Membership Fee
5. Thimphu IX Annual Membership Fee
6. Incountry Meetings & Celebration

Costing Model

- Tiered Bandwidth charge
 - Membership Charge
 - Commercial Transit Charge

DrukREN- Charging Model

1. **Membership Fee: 100mbps/1 Gbps Access to Domestic Contents, collaborate with institutes within and outside Bhutan**

SN	Bandwidth	Cost Per Month
1	100 mbps	Nu. 3,000
2	1 gbps	Nu. 5,000

2. **International Commercial Transit Charge:** DrukREN will charge based on the negotiation outcome with the ISP

SN	Internet Bandwidth (mbps)	Cost Per Month (Nu.)
1	1	
2	2	
3	3	
4	4	
5	5	
6	6	
7	7	
8	8	
9	9	
10	10	
11	11	
12	12	
13	13	
14	14	
15	15	
16	16	
17	17	
18	18	
19	19	
20	20	

Thank You

