



# Current Activities

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NREN Board

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# Nepal Research & Education Network

- Facilitator of advanced research and education
- Member of Asia-Pacific Advanced Network (APAN)
- Develop national computational grid for R&E
- Provide access to “have-not”s
- Sharing of knowledge and resource
- Establish Knowledge-Center to support ICT initiatives

# Current Activities

- Building Network
- Rural Networking
- Telemedicine
- Distance Education
- IPv6 Testbed
- Climate-change/Global-warming Monitoring

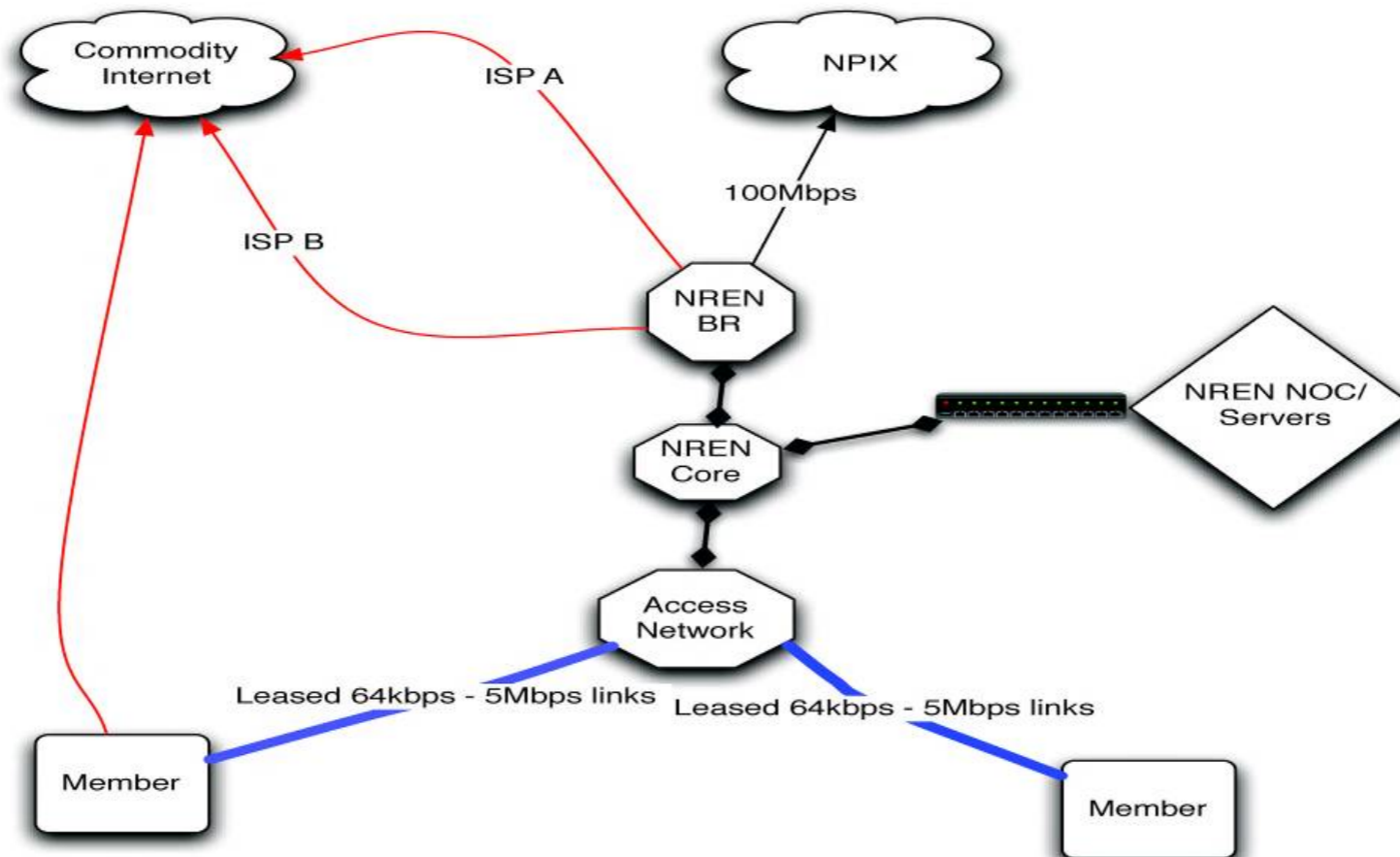
# NREN Network

- IP Resource
  - IPv4 Address Space - 202.52.0.0/23
  - AS45170
- Hardware (Mostly, donated by NSRC)
  - Routers - Cisco 7200 VXR NPE 400, 7200, 2600s
  - Switches - HP400X Series, Cisco 2960
  - Access Network - Cisco 1700s and Soekris routers
  - Wireless (2.4 and 5.8 GHz) Radios

# Connectivity

- Our network is concentrated in the Capital city mostly and 2 out of KTM
- Connected to the Global R&E networks (TEIN 3, APAN-JP)
- Local connectivity 10- 100 Mbps
- International Bandwidth 10 Mbps

# Current Logical Network



Nepal Research and Education Network (NREN)  
Logical Network Diagram  
v2008042101

# Partnership

- Health and Health Applications
  - HealthNet (Institute of Medicine, Tribhuvan University)
  - Model Hospital (PHECT)
- e-Learning
  - Nepal Wireless Networking Project
- Campus Network - 10 University Colleges (1st Phase)
- Industry
  - Service Providers, NPIX, Network Providers
- NGOs, INGOs

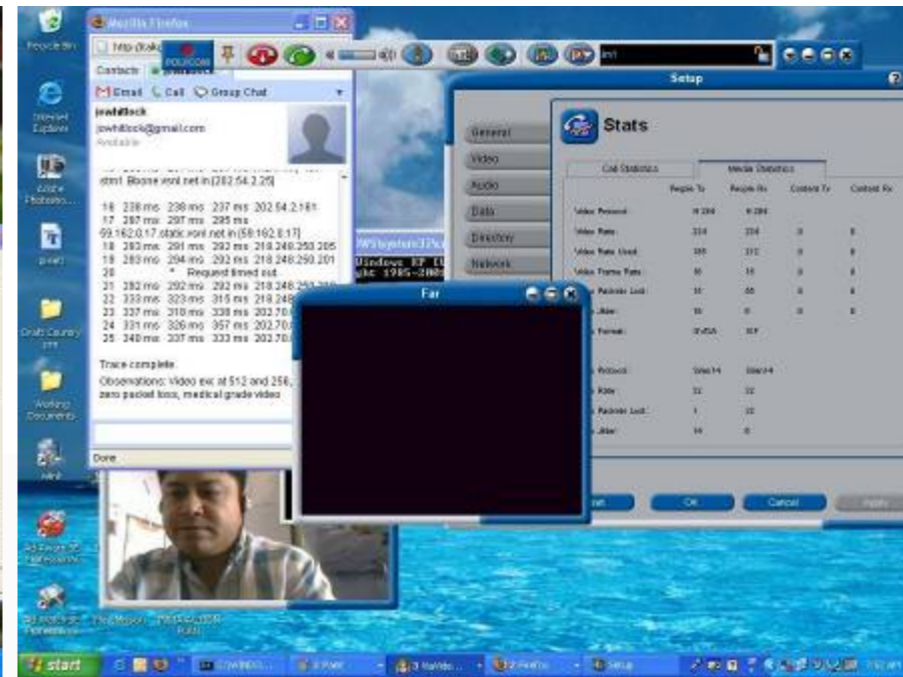
# Health Applications

- Video and Audio communications via Internet
- Narrow the gap between rural health-posts and well-equipped urban hospitals
- Diagnosis and consultation with specialists at urban hospitals staying in the rural area
- Possibility of distance-learning
- Using mix of wireless and other available medium to connect remote area with NREN partners

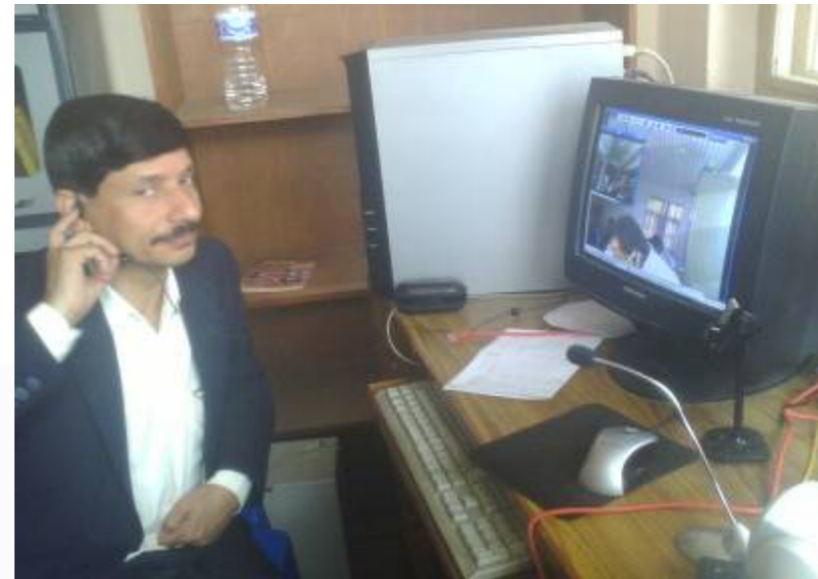


# Model Hospital

- General hospital in Kathmandu
- Run by non-profit PHECT
- Telemedicine Partner
- Hub for Wireless Networking
- Connected to NREN backbone through Fiber,  
Bandwidth of 10 ~ 20 mbps
- to Gaurishankar Community Hospital, Dolakha
  - Connected over Wireless
  - Consultation with Specialists



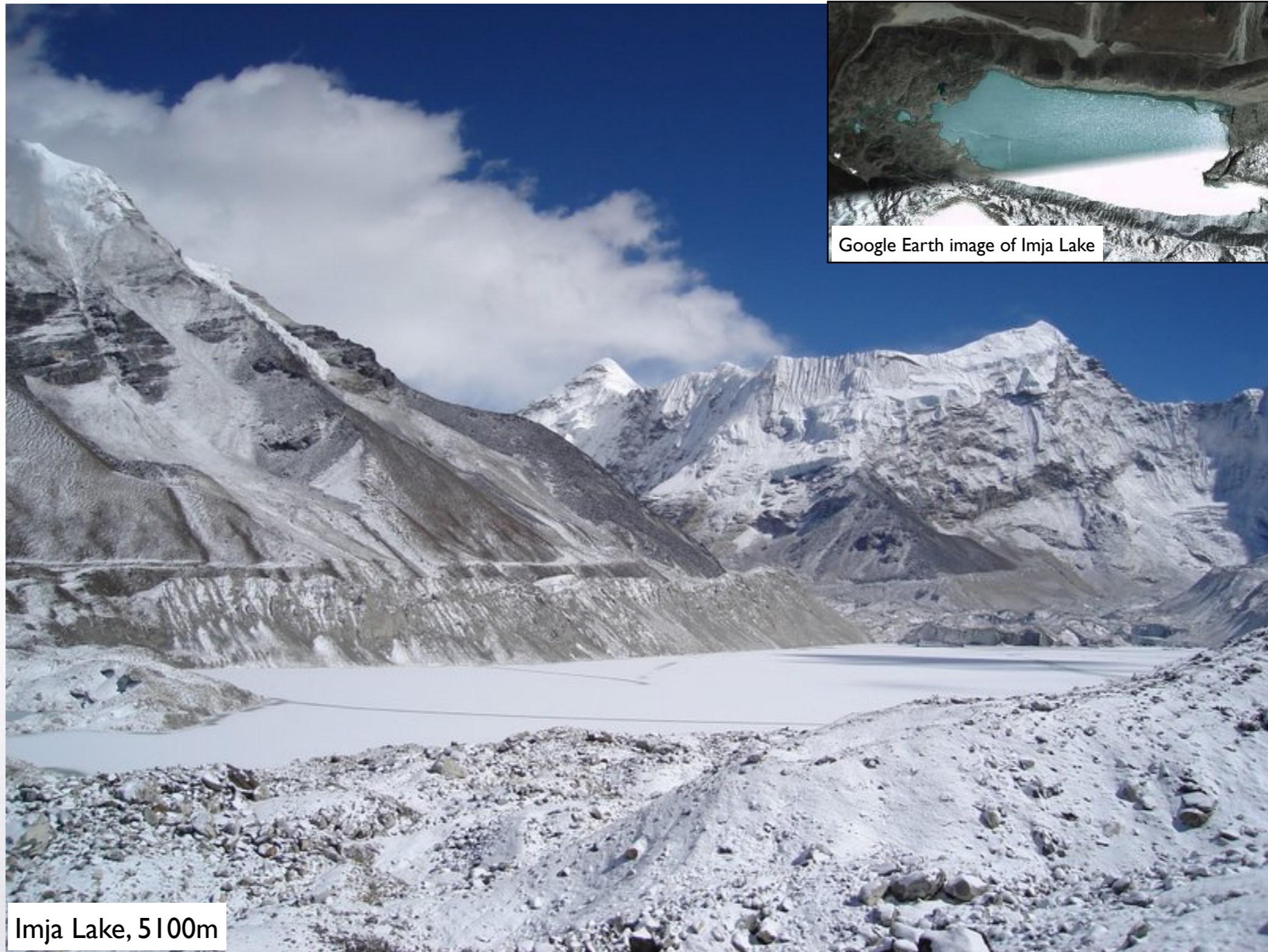
Telemedicine - From Model Hospital, Kathmandu to Dolakha Hospital



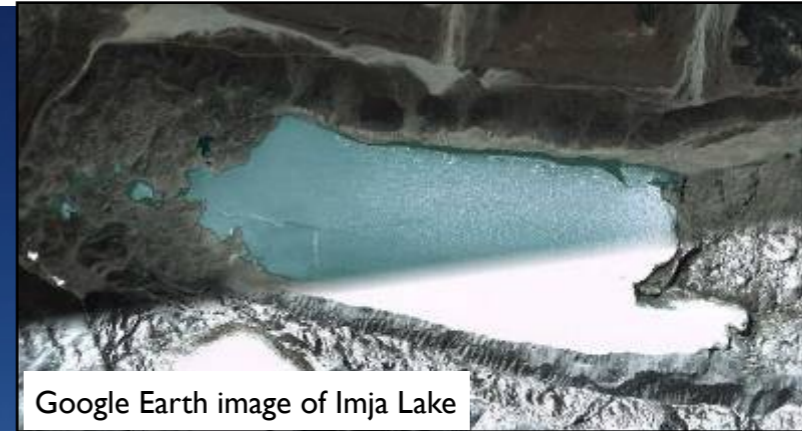
Telemedicine - From Model Hospital, Kathmandu to Dolakha Hospital

# Remote Monitoring Imja Lake

- Glacial lake in risk of out-burst flood
- 5100m
- 10km south of Mt. Everest
- Major tourist destinations on the danger zone downstream of the glacier
- Installed Field Servers
  - Gathers environmental data like temperature and water level
  - Relays data to Namche >> Tokyo >> Internet



Imja Lake, 5100m



Google Earth image of Imja Lake

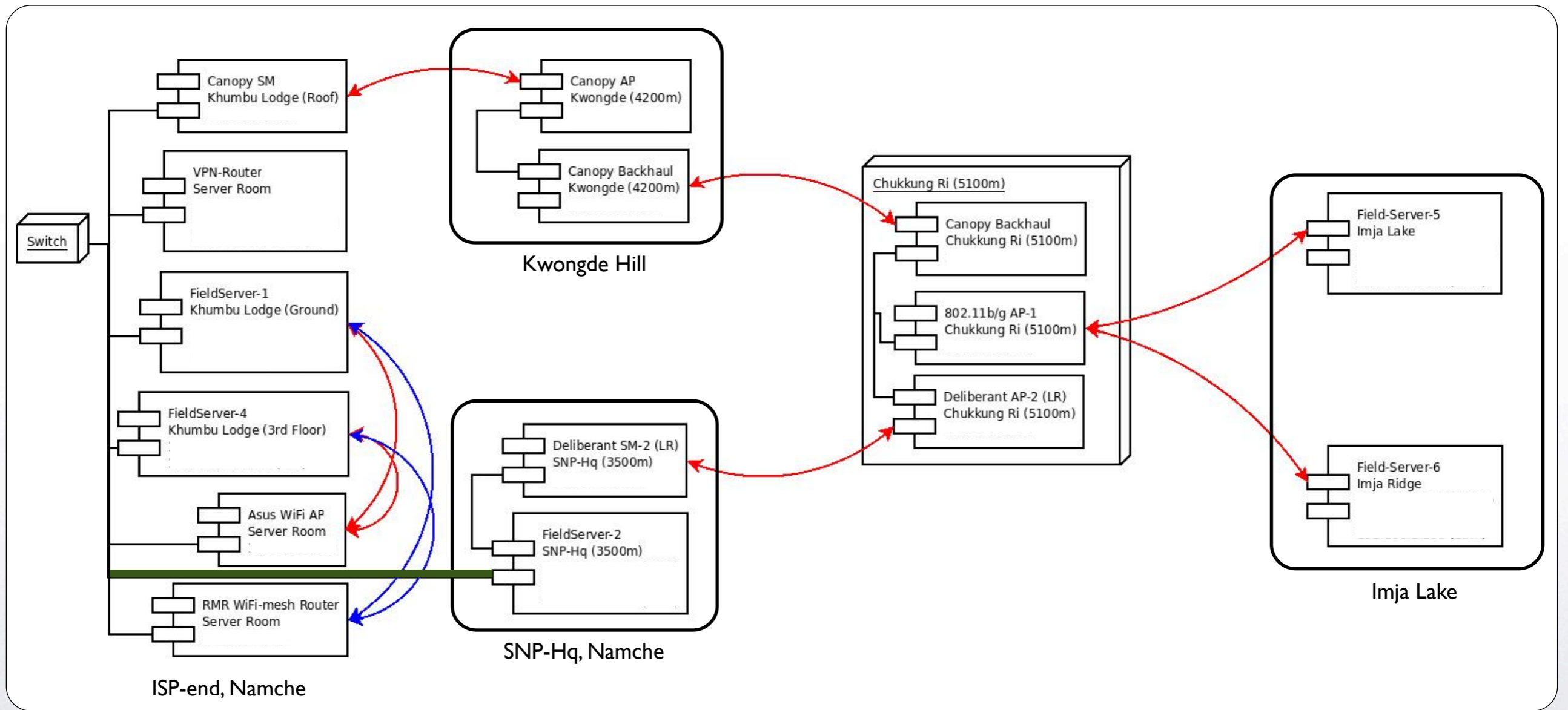
# Field Server

- Remote Sensor, equipped with environmental sensors, photographic camera and wireless radio
- 5 Field Servers deployed in Everest region
  - 2 near Imja lake (5400m & 5100m)
  - 2 in Namche Bazaar (3450m)
  - 1 in SNP Headquarters (3500m)
- Connected via wireless to ISP in Namche
- A Field Server is observing traffic condition in Kathmandu, equipped with High-resolution network camera





Pictures taken by Field Server's onboard camera stitched together. Taken 2007-11-13



Wireless Network in Everest Region





Relay station at Chukkung Ri (5100m)

## Field Server Monitoring Agent

### Field Servers Data Display

Format ver.2.2 [2008/05/15]  
T.FUKATSU (NARC,Japan)

select FieldServer  
[all data](#) / [round\\_cam](#)

fs  Cam

#### Field Server

[Himalayan06](#)  
(e-Lab FS4, Imja ridge)

[Himalayan05](#)  
(e-Lab FS4, Imja Lake)

[Himalayan04](#) (EOS version)

[Himalayan02](#) (2008 Standard version)

[Himalayan01](#) (demo version)

[Himalayan03](#) (Toshiba-cam version)

[Himalayan06\\_cam](#)



[Himalayan05\\_cam](#)



[Himalayan04\\_cam](#)



[Himalayan02\\_cam](#)



[Himalayan06\\_daily](#)

[Himalayan05\\_daily](#)

[Himalayan04\\_daily](#)

[Himalayan02\\_daily](#)

Field Server Real-time Data

#### Himalayan06

Interval	0 sec.
TimeZone	GMT+09:00
Date	2008/06/02
Time	14:01:07
Air-Temp.	9 C
Humid.	64 %RH

Field Server Real-time Data

#### Himalayan05

Interval	0 sec.
TimeZone	GMT+09:00
Date	2008/06/04
Time	12:01:57
Air-Temp.	10.5 C
Humid.	65 %RH

Field Server Real-time Data

#### Himalayan04

Interval	600 sec.
TimeZone	GMT+09:00
Date	2008/08/14
Time	15:21:57
Air-Temp.	20.2 C
Humid.	47 %RH

Field Server Real-time Data

#### Himalayan02

Interval	300 sec.
TimeZone	GMT+09:00
Date	2008/08/14
Time	15:29:07
Air-Temp.	13.6 C
Humid.	76 %RH

<http://fsds.dc.affrc.go.jp/data4/Himalayan/>

# Thank You

Nepal Research and Education Network

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<http://nren.net.np/>