Country IPv6 Deployment Plan
for NEPAL
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**Background**

Before entering into my migration plan, I want to briefly explain about the country’s current status about the migration. As a developing country, Nepal has very limited opportunities for its IT professional to work within its government agencies and private institutions. So that almost 70% students and professionals get migrated to abroad countries for work and study. There are very limited professionals who are aware about the technological changes in Nepal.

I have been involved in the IPv6 migration and deployment in university network since 2005 when I was joined as a system engineer at Tribhuvan University, Institute of Engineering (IOE). With the collaboration of Asian universities leading by Japan under Asian Internet Interconnection Initiative (AI3) project (www.ai3.net), our university network is fully operable with IPv6 for its network and internet services. However I am not satisfied with it. As I discussed with concerned authorities to develop plan to extend this current network to other universities of Nepal as well as its affiliated campuses so that migrating to IPv6 from university network would help ISPs and government agencies force towards the migration. But it is still in no progress condition. We are at the very beginning stage in the migration process.

**Current Country Activities in IPv6**

Towards concerning the technology migration, we have to find out the major stakeholders who are first responsible in this matter. The Major stakeholders in technology related especially in ICT sector are:

Ministry and Government Agencies

* Ministry of communication and Information technology (MoCIT)
* Nepal Telecommunications Authority (NTA)
* Department of Information Technology (DoIT)
* National Information Technology Center (NITC)
* Ministry of Education and Sports (MoES)
* Nepal Telecom (NT)

Non-Governmental Organizations

* Computer Association of Nepal (CAN)
* Information Technology Professionals Forum (ITPF)
* Nepal Engineers Association (NEA)
* Nepal Research and Education Network (NREN)

ISPs and Telcos

* Telecom Operators (NCell, Nepal Telecom, SMART Telecom, Nepal Satellite, STM, UTL)
* ISPs of Nepal (Worldlink, Mercantile, Subisu, Vianet….)

**Why Nepal is lacking behind the IPv6 migration?**

The major problem for Nepal is its political instability. The political Situation is the major backbone of every aspects of countries’ progress. Due to instability in politics, the leader of governing agencies is instable which leads to lack of coordination among the concerned authorities. We also do lack of seriousness and show more dependency with other countries due to very limited or no funding in education, research and Development/Implementation.

Lack of funding, lack of well aware human resources within the government agencies, lack of strong policies/framework and showing the dependency with other countries led Nepal lacking in technology migration.

**Migration Planning**

To complete the task in time, proper planning by corresponding stakeholders is necessary. We have to plan for following four major steps towards the migration.

1. Formation of task specific committee/council regarding the IPv6 Migration on behalf of its umbrella framework. Where Ministry of Information and Communication would be the umbrella body in Nepal.
2. Awareness and Training program by including as much stakeholders as possible with individual professionals within the country.
3. Policy and Strategy formulation for the migration.
4. Deployment plan (Time, Cost Estimation…)

We know that MoCIT, NTA, DoIT, and NITC are the major government bodies directly concerned with the technology and Research in Nepal. Among these Nepal Telecommunications Authority (NTA) is the telecommunications regulating body of Nepal. National Information Technology Center (NITC) is the executive body under science and technology to implement ICT projects in Nepal like e-Government, rural tele-centers etc.. DoIT is the policy making body with commissioning for IT policy Making in Nepal. It is necessary to create Country IPv6 task force under the initiation of MoIC incorporating the representatives from major stakeholders (NTA, DoIT, MoST, NITC and MoES). The task force with the creation of IPv6 forum which includes all stakeholders including private bodies should initiate the project by reviewing the country network landscape and creating successive awareness, training and workshop.

Brief setup and responsibilities of Government Agencies are:

***Ministry of Communication and Information Technology (MoCIT):***
Plays main role in the IPv6 deployment in coordination with NTA, HLCIT and other relevant stakeholders.

Initiates for IPv6 research and development with necessary testing in coordination with NITC and MoES where NITC may use the university network to have research environment.

***Ministry of Education and Sports (MoES):***
plays major role in University Network migration, research and development in IPv6 in coordination with MoST and Universities.

***Nepal Telecommunications Authority (NTA):***As being the regulatory body, NTA

* Formulates the policy and regulatory framework for IPv6 in coordination with HLCIT
* Coordinates with other ministries and execute the Taskforce activities
* Initiates for awareness/training and workshop program.
* Follow-up/facilitates Telcos and ISPs on behalf of policy framework for the migration.

***Tribhuvan University (TU):***
currently TU has IPv6 only research network. NITC via MoST/HLCIT in coordination with MoIC/NTA may collaborate with TU Research agencies to extend the IPv6 network, create necessary test environment and use network for training and workshop.

The major stakeholder with IPv6 Taskforce/Forum is depicted as below:

*Major Stakeholders of Nepal for IPv6 migration*

The TU network directly connected to Japan might be the best platform for Nepal to save investment cost for pilot project test, research and development. Institute of Engineering (IOE), Tribhuvan University is the member of AI3/SOI-ASIA ([www.soi.asia](http://www.soi.asia)) IPv6-Only Network since 2005. AI3 network has wide connection with European/American Network. We can extend this network to our country network for research and development by collaborating with Nepal government that helps us for necessary cost investment and technology required for the migration.

TU IPv6-Only Network
(*src: http://baburamdawadi.blogspot.com/2010/01/where-is-nepalese-ipv6-task-force.html*)

The existing TU infrastructure can be extended for IPv6 Auditing so that ISPs and telecom operators may increase the IPv6 services in phases.

The Basic Audit phases for Nepal might be:

**Phase one:**
1. Basic IPv6 setup
2. Check IPv6 applications functionality
3. Follow the transition

**Phase Two:**1. Interconnect with IPv6-only University network and other research network via Tunneling

*IPv6 Test Environment in collaboration with University Network*

**Phase Three:**1. Enable network into dual-stack
2. Increase the IPv6 network size
3. Commercialize the IPv6 network
4. Extend towards advanced services

The migration plan with phases for Nepal can be depicted as below:

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Phase 12015-2017 | Phase 22017-2020 | Phase 32020-2021 | Phase 42021-2022 | Phase 52022-2025 | Phase 62025-2030 |
| >>Initiation >>creation of IPv6 Task force and forum>> coordination | >>Formulation of policy and strategy for migration.>>Conduct Awareness and workshop  | >> Single and Isolated IPv6 network>> grow towards dual stack implementation | >> Interconnect with other network via tunneling>> extend dual-stack network size | >> process for IPv6 only network >> commercial IPv6 services>> grow IPv6 only network>> follow the world’s Scenario | >> enable IPv6 stack only>> remove the tunneling and tunnel broker>>move to IPv6 only network and services>> implement NAT-PT for rare IPv4 connection>> Post research and implementation after year 2035 |
|  |  | Make all ISPs IPv6 Ready |  |  |
|  | Awareness, workshop, training, research and development. Framework update |

**Budget Management for the Migration**

Nepal government has allocated very limited budget in the research and education as well as in ICT sector. However, it is necessary to convince to our government about the importance and network migration. In this regards, I would like to propose following cost investment policies by the government and concerned agencies/institutions for the migration.

From the migration plan listed above, it should be set as twenty years migration plan and government has to set into its government budget for this migration.

* Concerned government agencies, as per their responsibilities have to allocate yearly budget to fulfill the objectives.
* Government budget can only be set for awareness, training, workshop, research and development.
* Hardware and software deployment cost have to be set by the concerned institutions, in which government subsidy would be appreciable.
* It is necessary to find out the research funding partners like University Grant Commission (UGC), National Academy of Science and Technology (NAST), and international research agencies to invest budget for the research and deployment of IPv6 within the universities and the country.

**Conclusion**
it makes me clear about the migration issues as well as country roadmap with necessary stakeholders (entities) for the migration. Still we are in the initial phase for migration in Nepal. I have just highlighted with time frame for phase wise migration and necessary involvement of government agencies with proper coordination among the entities and international bodies for country IPv6 network migration.