International Journal of Engineering Research & Technology (IJERT)
ISSN: 2278-0181
Vol. 4 Issue 01,January-2015

# Engineering the Future E- Governance Architecture: Cloud Computing & Telcos as essential ICT Resources

## (A Case Study of Engineering and Developing Sustaining Electronic Government System in Third World and Developing Countries)

Ekendra Lamsal
Information & Communications Technologies
Asian Institute of Technology
Bangkok, Thailand

***Abstract* - Emerging nations worldwide face many challenges on their way of development. The technology of good Governance comes with reliable, transparent and speedy electronic Government system which can foster the growth of such developing economies.**

**Cloud computing is the future generation of computing characterized with optimal computing entities while gaining the maximum benefit of scalability over desired software, hardware and network characteristics. Almost all countries are, at least, developing or researching their own e-Government strategies. But only few have been able to maximize the benefits from e-Governance while many others have failed the challenge of proper e-Government system.**

**In this paper, we analyze the availability of existing telco architecture and cloud computing resources as essential Information and Communications Technologies (ICT) resources for engineering the future of e-Governance system for the third world and emerging economies. We propose a cloud-computing system from development to the implementation of e-Government architecture with respect to economy and know-how of such countries.**

***Keywords: Cloud, e-Government, Architecture, Telco, System, e-Governance, Service***

## I. INTRODUCTION

E-Government refers to the use by government agencies of ICT that have the ability to transform relations with citizens, business, and other arms of government [1]. Hence, providing facilities and services to the citizens and the stakeholders of the state in digital or electronic delivery that stakeholders are better delivered with improved interactions with the stakeholders resulting in totality of e-Governance. Many have put in place e-Government initiatives and ICT applications for the people to further enhance public sector efficiencies and streamline governance systems to support sustainable development [2].

Cloud is basically visualized as the cluster of computing resources that form a distributed system to provide electronic information services over a network in real-time [3]. The integration of such government clouds and prevailing telco architecture with a decent software application can help us realize an ecosystem of the e-Government system. This system can help governments provide necessary services to the citizens with least effort on front end which are otherwise way much manual and need lot of human resource. The system can be customized according to the need of government offices, departments and ministries from the national to the local level of governance organization.

With the aim of e-Governance, citizens (the users and the stakeholders) should be able to get all if not most of the government services in a much faster, flexible, and efficient approach. This purposes to ameliorate the services provided by the third world and emerging economies to its citizens where the users feel that they are benefitted in many aspects like duration of work, cost involved and remoteness of the service provider.

Both efficiency and effectiveness can be achieved when e-government system itself is sustained by pre-built telco architecture as a strong backbone, and backed by reliable software system satisfying organization's both functional and non-functional parameters. It is not that governments have not tried their best to go digital offices even in the remotest part of the country, but too often the challenge fails sooner or later because of improper networks, unlinked computing resources and stand-alone or local model of information system [4]. With the use of emerging cloud computing and existing telecom infrastructure, the traditional challenges can be addressed by a low cost and reliable e-Governance system.

## II. METHODS

The technical build-up of our desired e-Government system comprehend the potential of setting up cloud computing resources, utilizing existing telecommunication infrastructures, and employing software application to deliver government services. The ICT components and resources available at local to national level government organizations are used whenever possible for speedy architecture development.

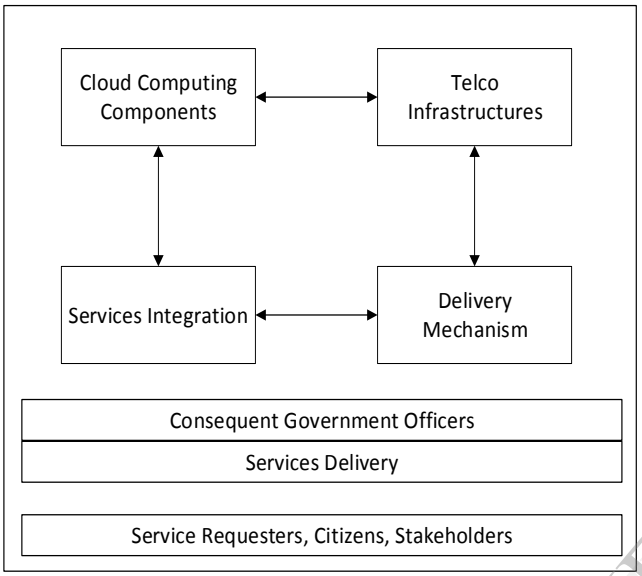


Fig. 1. Components of e-Government Architecture Model

### A. *Cloud Computing Resources*

Cloud computing accommodates highly scalable and virtualized IT resources that can host an ocean of applications to provide services to users in a utility model. We can avail Cloud Computing features in all of its aspects for realizing a reliable and strong e-Government system with facilities in terms of services, namely

1) Infrastructure as a Service (Iaas)

Sharing of Infrastructure from upper tier to the lower tier hierarchy of government offices for distributed infrastructure components.

2) Software as a Service (Saas)

Select offices or departments with select features of the application being used in their category resulting in a low cost single cloud hosted application.

3) Platform as a Service (PaaS)

This can be used as a reserved service for providing shared platform for offices with specific need at no extra hassle of deployment and cost factor.

4) Network as a Service (NaaS)

Network can be used either directly from the cloud computing resource or linked via local telecom infrastructure directly or in a combination for worriless bandwidth and network management issues.

5) Data Storage as a Service (DaaS)

Both data and content delivery network can be used according to storage necessity of the service providing office.

### B. *Cloud Computing for e-Governance*

The above five different technical possibilities of cloud computing implies the philosophy of getting required things, here service to citizens and stakeholders, as service on demand. Facilities, thus provided in terms of service, help to determine government offices and organizations to allocate only the necessary service levels and support. This provides ease of maintenance and lower the ICT components office wide.

Cloud computing utilities varied technologies for proper realization of sustainable e-Government system. The proper ICT technology of grid computing, virtualization, content management system, distributed system, dedicated web host, service oriented architecture (SOA), system engineering, system accessibilities come into action for strongly built system.

Cloud computing for e-Government system should be hierarchized into major centralized and minor partially centralized service stations. This two-tier of shared resources can accommodate data center images and shared application infrastructure independent of upper-tier of ICT resources. The complaint with data security, back up, access levels and deployment strategy can be secured in this way.

### C. *Telco Infrastructures as Resources*

Like developed nations, most of the third world and emerging economies have properly functioning government telecommunication infrastructures set up and running. Many telco operators provide diversified network services of all kinds – communications and internet access.

These existing telco infrastructures are good resources for setting up and running e-Government system providing maximum flexibility on the deployment part [5]. Users have been using various telco services on the front end proving that they have the access of a kind of network. On the back end, the

telco service providers have a strong local, national and international network for uninterrupted and consistent connection.

*D. Telco Infrastructures for e-Governance*

Preferably government (owned) telecommunication infrastructures are the best available ICT resources for realizing e-Governance. Such infrastructures provide hassle –free environment as a pipeline for accessing and distributing electronic Government system on multi-tier government organizations and offices.

With existing telco infrastructures, the e-Government system gets advantaged over availability of always existing network, bandwidth, local and national linkage. This is irrespective of the entire world of Internet where users assume that they are using Internet to access Government's services electronically but in reality it is the intranet capability. However, the reach or accessibility can be extended based on tier of services and organizations for sensitivity and need of services.

*E. Engineering the e-Governance*

One of the most common approaches of e-Governance is digitizing government services. Converting every government activities in digital form and delivery these activities in terms of services to the citizen or stakeholders with the proper use of ICT is e-Governance best engineered [3].

Today, e-Governance has become most-talked technology among governments but it is equally challenging in unifying the services and system as a complete e-Government system [6]. From initiation to the deployment and to the sustainability of the e-Government system requires multi-disciplinary engineering. It is not only about using technologies but also about various aspects of citizen's service domains like social art and science, management, policy and economy to deliver services in the best practice unlike traditional approach.

Engineering a proper e-Governance architecture for third world countries and emerging economies utilizing cloud computing and existing telco infrastructure build up a suitable and sustaining system. Such system, thus, achieved is favorable for developing countries in many aspects:

1) Cost

For developing countries, cost is a key factor even when they wish to implement e-Government system. However, the e-Governance model proposed here can help lower the cost of developing and implementing a complete e-Government system. Employing cloud computing, existing telco infrastructures, and available ICT resources can benefit governments decide on this.

2) Scalability

There is no need for governments to spend all of their budgets just for procuring ICT resources in name of transiting to e-Governance. The proposed model here utilized the scalability both in the deployment and realization of the complete e-Government system. Should government have additional budgets, they can scale the architecture of the system.

3) Resources

Availability of ICT resources from all local, to national level government organizations assist in designing, deploying, scaling and post-deployment assessment of the e-Government system in this model.

4) Integration

The cloud computing feature of this e-Government model allow pre-existing government application software, databases and ICT tools alike to be integrated into a unified system. The integral role of available telco network thus help provide unbreakable service to the pre-existing and digitizing newer government services.

5) Expertise

This is a hidden part in realizing most of the e-Government system. Expertise of all domains associated with the e-Governance model are critical thru out the life cycle of the e-Government system. Generally, not all always available experts are found in developing countries. Many organizations like UN help governments realize governance at some or the other aspects for electronic and democratic governance [2].

6) Maintenance

Deployment, post-deployment and maintenance of the proposed e-Government system is very friendly in aspect that it is realized utilizing locally available ICT resources and infrastructure.

7) Sustainability

To realize sustainability of the proposed architecture, it can be scaled during deployment for better understanding of how the government is going to function electronically. Governments can serve even higher number of citizens in less time with more

flexibility, reliability and availability when going digital. Thus, strong economy is generated when more citizens are served via e-Government system.

## III. DISCUSSIONS

All third world and developing economies can utilize the emerging technology with existing ICT resources in their vicinity to realize a sustaining e-Government system without extra financial burden. The scalability, low risk, reliability, availability, low cost, ease of deployment, system integrable features of cloud computing confirms or defines its significant role in sustaining and engineering e-Government system in third world economies.

On the other hand, existing telecommunication infrastructure provide a proper back bone for smooth functioning of the e-Government system without the need of investing huge in alternative options. The ICT Components in thus deployed e-Governance model are lesser than in traditional approach. Thanks to scalability & less IT resource requirement of cloud computing aspect, which also support e-Government systems for green ICT.

## REFERENCES

[1] The World Bank, Definition of E-Government, Retrieved from http://go.worldbank.org/M1JHE0Z280, 2013.

[2] UNPAN, United Nations E-Government Survey 2012: E-Government for the People, Retrieved from UN Public Administration Programme: http://unpan1.un.org/intradoc/groups/public/documents/un/unpan048065.pdf, 2012.

[3] Manish Pokharel, J. S., Cloud Computing: Future solution for e-Governance, ICEGOV, 409-410, 2009.

[4] Heeks, R., Implementing and Managing E-Government, SAGE Publications Ltd, 2012.

[5] Krishnan, S., Telecommunication Infrastructure, Governance, and E-Government Development: A Global Perspective. Pacific Telecommunications Council, Honolulu, Hawaii, 2013.

[6] Charalabidis, Y. a., ICT for Governance and Policy Modelling: Research Challenges and Future Prospects in Europe, 45th Hawaii International Conference on System Science (HICSS), (pp. 2472-2481). Maui, HI, 2012.

[7] Vijayakumar, N., Role of ICT in e-Governance: Impact of Cloud Computing in Driving New Initiative, SETLabs Briefings, 43-52, 2012.