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REVIEW ON UBIQUITOUS CLOUDS AND PERSONAL MOBILE NETWORKS

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Abstract: The cloud that frame the future of the computing has become more popular nowadays due to its numerous attractive benefits such as self-servicing, resource-pooling, elasticity, improved-scalability, resilience , and operational and migration flexibility. This server-client model with the pay per usage facility is described by the NIST as the enabling, on-demand, convenient-network access, with shared pool of computing resources that are provided swiftly with the minimal efforts of management and interactions. The paper gives a brief review on the continuous cloud computing services, explaining its ubiquity, and then proceeds with the usefulness of the cloud services in the personal mobile network, that could enable an enhancement in the performance of the personal mobile network in the future.

Keywords: Ubiquitous cloud, deploying models of cloud, services of cloud, cloud advantages, personal mobile networks

1. Introduction

The cloud computing that has become a promising paradigm for providing of service on pay-per-use, has gained an immense popularity due to its service provisioning that is efficient, flexible, elastic and the agile. The cloud computing by its service provisioning enables the user to work on a software without purchasing it, so the cloud enables the cost-cutting in terms of software purchase and maintenance by renewing, the cloud service even provides the users with the, infrastructure, platform, storage, security and the workflow as service, bringing down the investment cost and increasing the productivity, thus ensuring a strategic edge for the business. The seamless service provisioning of the cloud has made possible the completion of the work from anywhere, at any time, by any people. The concept of the cloud computing was developed to ensures the resource reuse in the IT, the development and hosting of applications that are complex, and the expansion of the computation power and more other services on pay-as -you -go. The characteristics of the cloud that is adopted from the different traditional computing

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technologies such as, cluster, grid, utility and distributed allows the user to enjoy the benefits of the technologies without having an expertise knowledge on the them. Based on the deployments of the cloud, the cloud be categorized as public, private, hybrid and community cloud. The public cloud, offering services with the shared resources has its entire service mounted on the cloud company, without any facility for the external control by the user. This ensures better performance for its clients. The private cloud are more preferred than the public, as they provide with remote or an onsite cloud infrastructure that exclusively belongs to a person or an organization. The private cloud includes the benefits of the public cloud and offers even better performance with the security enhancements. The hybrid cloud includes both the private and the public cloud services offering an expanded flexible operation with the greater options for the data deploying. The community cloud enables the cloud infrastructure to be shared within specific community such as group of individuals or organizations who are related with same concerns. The service provisioning of the cloud makes them potential suitable for the emerging applications and service that are related to a wide area. The service provisioning of the cloud is more opted for and yet to be opted by the concerns ranging from small to large scale as it provides with the pay as you use model with self-service without human intervention, but with cost-reduction, broader network access, scalability, reliability, maximum resource utilization, ability of re-configuring, resource-pooling and elasticity for a multiple number of users within the same span. From this client server model of cloud computing with the self-service and pay on use, the individual or the organizations is relaxed as the cloud is responsible for the complete maintenance that includes the updation of the applications, operating systems, networking, storage, physical-server and antivirus. So the cloud as mentioned above is more promising and beneficial for its clients with greater accessibility of network which makes the cloud ubiquitous. The table 1 gives the deploying models of the cloud that makes it ubiquitous.

So the paper is review the ubiquity cloud computing and it’s enabling characteristics and services that could be useful in enhancing the performance of the personal mobile network.

The paper is organized with the 2 explaining the ubiquity of the cloud services from the survey conducted, 3. The details carrying the information of the personal mobile network, 4 improvements that could be scoped in the personal mobile network by the ubiquitous cloud services and 5.conclusion.

2. Ubiquitous Cloud services

The enabling cloud computing with the key characteristics offering high reliableness, with improved level of the scalability and managing capability are categorized based on their service provisioning as software, platform, storage, recovery, security, and work flow. The table 2 presented below gives the detailed description of the services

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provided by the cloud that paves way for the agility, cost-reduction, maintenance, multi-tenancy with device and the location independence. This anywhere, anytime, anybody access of the cloud makes it ubiquitous and popular among enlarged and wide range of applications.

Deploying models	Governed By	Used by	Advantages
Public	Cloud service-provider	Common people, industrial applications, organizations etc.	Economical offering medium level of security.[12],[33],[35]
Private	Individual organization or Group of people	individual organizations, or industries	Economical , offers high level of security, [2],[35]
Hybrid	Common people and Organization	Common people and Organization	Enables aggregation, integration and customization with other cloud service, offers medium level of security, expands the capability of the cloud services,[35],[48]
Community	Multiple organizations or Cloud service-provider	Group of Organization and industries with same concern based on the policy and security.	Improvises the automation, productivity, functionality and offers enhancement in features.[35],[48]
Multiple	Multiple Cloud service-provider	Single organization or common people or multiple organizations and industries	Economical, offers reliableness, operational-flexibility, high performance and security against attacks. [28]
Distributed	Cloud service-provider	industrial applications, organizations etc.	High quality- real time cloud service, reduced network latency and Congestion [44]
Big-Data	Cloud service-provider	Large –scale industrial applications	Offers Better analysis, data acquisition, scalable environment.[42],[20],[10],[36]
HPC	Cloud service-provider	Applications requiring high performance like (seismic data processing)	Improved computing capabilities, offers parallel processing. [38]

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Table.1 Deploying Models of Cloud

The table 2 below explains the different service of the cloud that paves way for its ubiquity,

The key characteristics and the service provisioning of the cloud given above states the reason for the cloud popularity among various application making it ubiquitous in the accessing, storing, protecting and monitoring of the data without the need for the external, external storage, security, recovery mechanism, software, platform and maintenance.

3. Personal Mobile Network

The Personal mobile network, is decentralized network that is framed on the fly with the nearby available devices using the mobile network, for the personal use of the individual, or group of individuals. The device connected in the network might be homogenous or heterogeneous, for example the network could be framed either using the lap-top or the mobile phones that are nearby. The setting up of the personal mobile network, is easy as they are set up considering the mobile phones or the laptops as their nodes and share information's by tethering, here the nodes

Cloud Services	Uses	Applications	Advantages
Software as Service	Provides access to the client on the application software, operating system and other resources, and takes care of their maintenance.	Used in the wide range of areas that require the application software and operating system. (from home to industries)	Offers swift scalability, ubiquitous accessibility, and maintenance decreases the software privacy,
Platform as service	Enables the clients to build, manage, and execute the applications eluding the complexity and need for building and maintaining.	Used in a wide range of government, public and private enterprises, organization and industries	Reduced expenditure, lead times, and skill requirements, capable of adding new users at ease. Makes the maintenance and enhancements easier, higher level programming capability eluding complexity,
Storage as service	Conceals the data or the information in a hardware in a remote location that is accessible through any device.	Used mainly in medical industries and the organization that handle large data-flow and needs more hardware for storing of information's	Offers Easy access, storing, retrieving and sharing, offers scalable service, data backups and are very economical
Recovery as service	It provides the protection for the data or the information by back-up and restore from being destroyed during the	Used mainly in area or the industries or organizations liable to frequent, natural or human disasters.	Prevents permanent loss, cost-effective, flexible and allows faster recovery with accuracy maintenance

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	natural or the human disaster.		
Security as service	The different security provisioning are clubbed in the cloud and provided for each information stored in it, the application developed, the information stored and the process done are protected from mishandling with the security provisions of the cloud	Used by the government, industries, organizations, banks and the public who scope for the improved security service to protect the information from hacker.	Economical, consistent protection, greater security, faster service provisioning,
Work-Flow as service	The custom workflow are incorporated into the cloud computing to enhance its capabilities	Used in government and private industries and scientific applications,	Improves efficiency, saves production time and cost, enhances the quality, flexibility in resource allocation and scalability, Reduces the communication loss.
Network as service	This provides the network infrastructure as service such as, WAN and datacenter connectivity, the bandwidth on demand, and takes care of the traffic and the congestion status.	Used in the private network that utilizes the network infrastructure service provided by the cloud.	Reduced maintenance cost, guaranteed connectivity, easy setup, management and maintenance.

Table 2. Service Provisioning's of Cloud

acting as modem makes the transmission possible through internet sharing. The personal mobile network more or less resemble the heterogeneous adhoc network[41] that frames its own network using the available nearby devices usually termed as nodes in the adhoc network. The personal mobile network though facilitated with the advantages of easy setup, spontaneous sharing of information's within a small group of people, suffers from major problems and incur challenges same as that of the adhoc network networks [47] such as storage, for the application that necessitates huge storage capacity and [50] security as the network framed could be liable of being hacked. They also suffer from various other problems such as mobility, privacy, short battery span and so on. The section below include the possible remedies for the personal mobile network through the cloud services. Fig 1 shows the issues suffered by the personal mobile network.

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4. Ubiquitous Cloud for Personal Mobile Network (PMC)

The Service provisioning of the cloud listed in the table 2 shows the ubiquity trend of the cloud service provisioning. The different services that were rendered by the cloud such as storage, security, recovery, workflow, resource allocation, could be utilized to enrich the personal mobile network in terms of the storage, security, resource allocation and energy saving serving as the remedy for the problem arising in the personal mobile networks due to their limitations in the storage, processing and the battery. From the survey proceeded for the review, the cloud services ensures the remedies for the issues in the personal mobile network, the integration of the personal mobile network to the cloud that offers a ubiquitous service would enhance the performance of the personal mobile network thus providing a quality service.

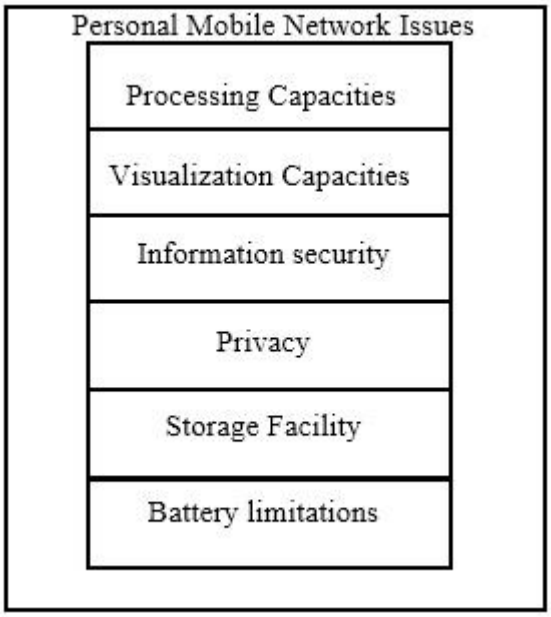

Fig 1 Personal Mobile Network Issues

4.1. Improving the Storage capabilities of PMC

The personal mobile network that suffers from the shortage of the storage for the applications that require high storage capabilities could be overcome by adopting cloud environment that offers storage as service, the researches

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done on the storage service for the cloud by Somula, et al [6] describes the cloud computing storage service rendering for the mobile networks by framing cloudlets, the storage Lee et al [21] speaks about the inabilities of the mobile networks in terms of storage as they process and store huge amount of data and the storage augmentation through the cloud services. The high definition pictures captured and the videos downloaded could as been saved in the cloud and retrieved whenever necessary. Yang, et al [43] describes the intention of the users to adopt the cloud storage as service, and the fascinating feature of the cloud that attracts more users towards the cloud storage as service, Goode et al [45] and the Aminzadeh et al [45] also details the research explored on the benefits of cloud storage as service for the mobile networks. The personal mobile network for the purpose of storage augmentation could incorporate the cloud service, to enjoy the storage service provided by cloud and overcome the limitations of the personal mobile network in terms of the storage. The storage facilities of the cloud also act as a backup for the information on the times of disaster that is natural or man-made.

4.2. Improving Processing In-Capabilities of the PMC

The researches proceeded on the cloud services by Alkhalaileh et al [7] and Koubâa et al [19] shows the efficient management and the resource allocation services provided by the cloud to enhance the processing capabilities in the application used. The personal mobile network, that is often reframed due to is mobile nature can improve its processing capabilities by adopting the cloud service, the researches proceeded by the Toosi et al [25] and Meneses et al [30] gives details of the cloud communications with extended connectivity, the bandwidth on demand and the reduced communication loss for the mobile networks that handle increasingly large number of connected user components, this ensures that the personal mobile network also would experience the same when adapted to the cloud environment. The handling of the large number of user's components would be easy, with negligible connection and the communication loss, and full utilization of the bandwidth of the cloud on-demand.

4.3. Improving Security and Privacy of the PMC

The security and the privacy issue of the personal mobile network can be improved using the cloud services, the security provisioning of the cloud services explained Rath et al [5] describes the security provisioning of the mobile networks through the authentication eluding the misuse of the information's, the security features added to the mobile networks stops the unnecessary utilization of the network details, by the unauthorized users. Kaur, et al [11], Colman-Meixner et al [14] and Cheng gives the details of the security and the privacy preserving's of the cloud services in various applications, the security and the privacy preserving's adapted in terms of key generation,

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authentication and encryption and decryption from the cloud could be incorporated in the personal mobile network, to elude the mishandling of the information's.

4.4. The Efficiency in Terms of Cost and Energy

The cloud doing a fascinating job providing with the service of storage, recovery, security, resource allocation and so are also efficient in terms of the cost [33] and energy, [34], the efficiency, the pay as you go concept of the cloud requests the pay only when the resources are used. Some cloud based services that demands the pay on the hourly bases allows the users to enjoy all the service for the time period on the limited pay mentioned. Its speedy processing capabilities enables the energy conservation, improving the efficiency of the client. So this makes the cloud more attractive and the personal mobile network incorporating the cloud would improve in the terms of storage, processing, battery with security for the information's the table 3 below gives the overview of the few remedies presented for the personal mobile network by cloud for its issues

Issues of Personal Mobile Network	Cloud services	Remedies
Storage limitations	Storage provisions [6],[21],[43],[45],[49]	Augmented storage, making it capable of handling memory-intensive applications.
Processing incapability's	Resource allocation, [7],[19], network connectivity [25], [30], [37],[38]	Improves the processing capabilities of the PMC in terms of resource allocation, bandwidth utilization, communication and connectivity.
Security and privacy	Security provisioning' and privacy preserving's [5],[11],[14],[15],[23],[21]	Would provide protection for the PMC from the mishandlings and hacking
Energy and cost efficiency	Cost-awareness [33] , the energy-awareness [34] and the speedy processing [9] of cloud services	Would enable the PMC to have an efficiency in terms of cost and the energy consumption

Table.3 Remedies for the personal mobile network Issues

The solutions obtained from the cloud survey performed, for its services and the deploying models proving its ubiquity, on various other applications could be used in the personal mobile network to improve its performance overcoming the issues related to the storage, processing, security and battery, the paper presents the possible solutions that could improve the personal mobile network from the survey conducted. The development of the personal mobile network with the inclusion of the solutions could be proceeded as the future enhancement.

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5. Conclusion

The exploration on the cloud computing done by surveying through different research works proceeded with the cloud based on its key characteristics, the service provisioning ,and the deployment models, helps in the understanding of the cloud attributes and the reason for its increased popularity. The capability of the cloud to provide its service irrespective of time, person and place makes it ubiquitous, this ubiquitous nature enables the cloud to become the promising paradigm for a wide range of applications such as, heath, national security, education, industry, banking etc. The paper reviewing the ubiquity of cloud, proceeds with the usefulness of the cloud services in the personal mobile network, by presenting the remedies of the personal mobile network insufficiencies from the various research surveyed based on the cloud services. This review would enable a personal mobile network in future to be developed with the enhanced performance by clubbing with the cloud services. In future the review presented would be utilized in developing the personal mobile network that is efficient in terms storage, processing capabilities and security.

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