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IMPLEMENTATION OF BEACON SCHEDULING IN CLOUD COMPUTING TECHNIQUE FOR WIRELESS NETWORKS

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ABSTRACT

In this paper, the Beacon scheduling is proposed and implemented in wireless networks. They act as the beneficial source to enhance security and reduce the latency in Cloud Computing. Generally a digital communication system suffers from errors due to the delivery of multiple packets or datas to the destination at the same time. This causes collisions, distortions and interference. Cloud computing is the usage of remote services through a network using various resources which is the current attraction of 4G. They are of particular commercial interest not only with growing tendency to outsource IT but also to reduce management overhead. The prevalent problem associated with cloud computing data privacy, security anonymity and reliability. The proposed work plan is to eliminate the concerns regarding data security by the usage of encryption algorithm in Beacon scheduling in order to prevent the wireless networks and providing an optimal connectivity for an enhanced output.

Keywords- Cloud computing, Beacon Scheduling, virtualization

1. INTRODUCTION

In computer networking, cloud computing is a the attraction of 4G in the advanced technological world that are used to describe a variety of computing concepts that involve a large number of computers connected through a real-time communication network such as the Internet. It is very similar to the concept of utility computing. In science, cloud computing is a synonym for distributed computing over a network, and means the ability to run a program or application on many connected computers at the same time .The phrase is often used in reference to network-based services, which appear to be provided by real server hardware, and are in fact served up by virtual hardware, simulated by software running on one or more real machines. Such virtual servers do not physically exist and can therefore be moved around and scaled up or down on the fly without affecting the end user, somewhat like a cloud becoming larger or smaller without being a physical object. In common usage, the term "the cloud" is essentially a metaphor for the Internet. Marketers have further popularized the phrase "in the cloud" to refer to software, platforms and infrastructure that are sold "as a service", i.e. remotely through the Internet. Typically, the seller has actual energy-consuming servers which host products and services from a remote location, so end-users don't have to; they can simply log on to the network without installing anything. The major models of cloud computing service are known as software as a service, plat form as a service, and infrastructure as a service.

The smart phones in the world today use their internal memory likewise the phones coming nowadays are having their storage capacities like 16gb to 32 gb, etc. so it is seen that the memory is required on each mobile phone device is to save applications and files of its users and it is also seen that main cost for a mobile phone (especially the smart phones) is of memory storage like if getting a phone with memory space of 16gb in 200 US dollars then the same phone (same model) with 32gb internal memory will cost approximately 300 US dollars which mean that the payment is more 100 dollars for some more 16 GB memory i.e. 50% more cost for the device just for memory space. So cloud computing is used which means the device with interaction between the user and the server and all the apps and data is stored at some other location i.e. at server, so any memory space is not required at the end. This saves from spending some extra money on getting some extra memory space on the phone; secondly the option to increase that space on the server by renting it which gives freedom to use nearly unlimited space to store data. This also gives the security to data and applications in case of loss or damage to the device, the data will remain safe

2. BEACON SCHEDULING

In wireless networks, a beacon is a type of frame which is sent by the access point (or wifi router), to indicate that is on. The Beacon Frame is a speculative, functional response to the general absence of information. *Beaconing* is the process that allows a network to self-repair network problems. The stations on the network notify the other stations on the ring when they are not receiving the transmissions. Beaconing is used in Token ring and FDDI networks. The beacon schedule determines packet delivery latency from the end devices to the coordinator at the root of the tree.

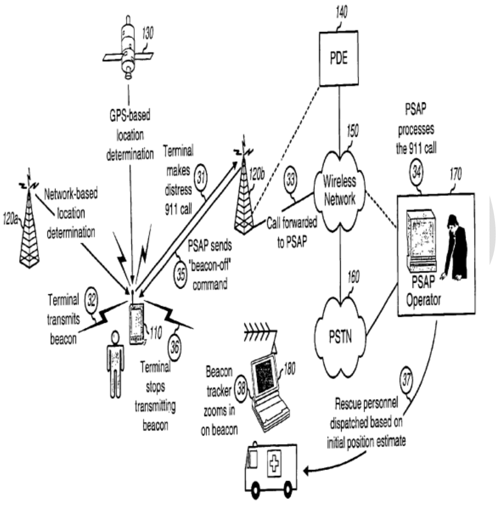

Figure 1: example for beacon locating and tracking in wireless networks

This method can prevent overhead in a manner that a base station (BS) transmits beacon slot information to a carrier sense multiple access (CSMA)/collision avoidance (CA) node (CN) and a gateway (GW) through contention-free time division multiple access (TDMA) communications at initial clustering, the CN and the GW performs a sequential clustering to forward the beacon slot information to a cluster head (CH), the CH aggregates joining messages from nodes and assigns non-colliding beacon to the nodes, and the GW uses a beacon slot frame of a beacon transmission period (BTP) used by its selected CH in a beacon reply period (BRP) as well. IEEE 802.15.4 networks can optionally be beacon-Enabled. The PAN Coordinator sends a beacon frame to Synchronize and delineate Super frames Access to the channel is Slotted Super frames can contain Guaranteed Time Slots (GTS), each of which can be assigned to a specific device preventing media access contention. Beacon-enabled networks enable devices to consume less power, because the receivers can be switched off during the parts of super frame. Beacon Frame is Sent by the Coordinator to set up the super frame structure. A typical beacon frame is approximately fifty bytes long, with about half of that being a common frame header and cyclic redundancy checking (CRC) field. As with other frames, the header includes source and destination MAC addresses as well as other information regarding the communications process. The destination address is always set to all ones, which is the broadcast Medium Access Control (MAC) address. This forces all other stations on the applicable channel to receive and process each beacon frame. The CRC field provides error detection capability. The beacon's frame body resides between the header and the CRC field and constitutes the other half of the beacon frame.

Each beacon frame carries the following information in the frame body: Beacon interval: This represents the amount of time between beacon transmissions. Before a station enters power save mode, the station needs the beacon interval to know when to wake up to receive the beacon (and learn whether there are buffered frames at the access point).
Timestamp: After receiving a beacon frame, a station uses the timestamp value to update its local clock. This process enables synchronization among all stations that are associated with the same access point.

Service Set Identifier (SSID): The SSID identifies a specific wireless LAN. Before associating with a particular wireless LAN, a station must have the same SSID as the access point. By default, access points include the SSID in the beacon frame to enable sniffing functions (such as that provided by Windows

XP) to identify the SSID and automatically configure the wireless network interface card (NIC) with the proper SSID. Some access point vendors have an option to disable the SSID from being broadcast in beacon frames to reduce security issues.

Supported rates: Each beacon carries information that describes the rates that the particular wireless LAN supports. For example, a beacon may indicate that only 1, 2, and 5.5Mbps data rates are available. As a result, an 802.11b station would stay within limits and not use 11 Mbps. With this information, stations can use performance metrics to decide which access point to associate with.
Parameter Sets. The beacon includes information about the specific signaling methods (such as frequency hopping spread spectrum, direct sequence spread spectrum, etc.). Likewise, a beacon belonging to frequency hopping network would indicate hopping pattern and dwell time.

Capability Information: This signifies requirements of stations that wish to belong to the wireless LAN that the beacon represents. For example, this information may indicate that all stations must use wired equivalent privacy (WEP) in order to participate on the network.

Traffic Indication Map (TIM): An access point periodically sends the TIM within a beacon to identify which stations using power saving mode have data frames waiting for them in the access point's buffer. The TIM identifies a station by the association ID that the access point assigned during the association process.

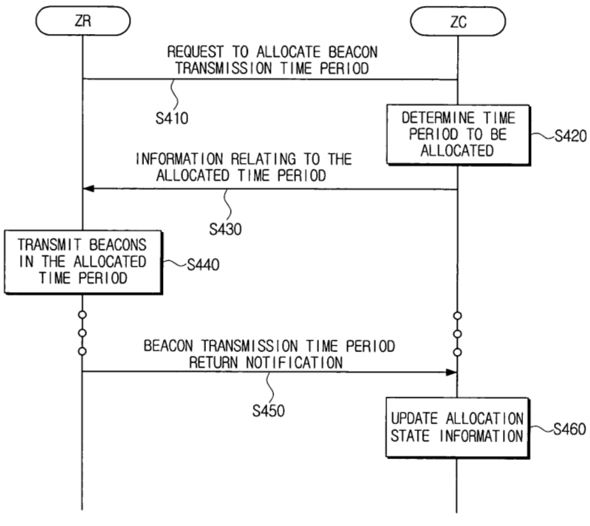

Fig ure2: beacon scheduling method in wireless networks

A beacon scheduling method of a router by a coordinator in a network system that includes the coordinator and at least one router, includes: receiving an allocation request signal of a time period in which a beacon of the router is transmitted; determining the time period to be allocated to the router based on information relating to a time period allocation state; and transmitting information relating to the determined time period to the router. The determining of the time period may include determining a Tx offset which corresponds to an allocable time period. The allocable time period may be selected by excluding beacon time periods of other routers positioned under a parent of the router. The Tx offset may be determined based on a time period in which the router receives a beacon. The allocation request signal of the time period may include an address of the parent of the router. The information relating to the determined time period may include the Tx offset. The router may transmit a beacon after the Tx offset from the time period in which the router receives the beacon. The beacon scheduling method may further include receiving a return notification signal of the allocated time period; and updating the information relating to the time period allocation state when the return notification signal is received. The beacon scheduling method may further include transmitting an operation check signal at regular intervals to a router having the allocated time period; and updating the time period allocated to the router to an allocable time period when the operation check signal is not received from the router.

In ad hoc networks, there are no access points. As a result, one of the peer stations assumes the responsibility for sending the beacon. After receiving a beacon frame, each station waits for the beacon interval and then sends a beacon if no other station does so after a random time delay.

This ensures that at least one station will send a beacon, and the random delay rotates the responsibility for sending beacons. By increasing the beacon interval, you can reduce the number of beacons and associated overhead, but that will likely delay the association and roaming process because stations scanning for available access points may miss the beacons. Can decrease the beacon interval, which increases the rate of beacons. This will make the association and roaming process very responsive; however, the network will incur additional overhead and throughput will go down. In addition, stations using power save mode will need to consume more power because they'll need to awaken more often, which reduces power saving mode benefits. There are no reservations for sending beacons, and they must be sent using the mandatory 802.11 carrier sense multiple access / collision avoidance (CSMA/CA) algorithm. If another station is sending a frame when the beacon is to be sent, then the access point (or NIC in an ad hoc network) must wait. As a result, the actual time between beacons may be longer than the beacon interval. Stations, however, compensate for this inaccuracy by utilizing the timestamp found within the beacon.

3. BEACON FUNCTIONS

The amount of overhead that the transmissions of beacon frames generate is substantial; however, the beacon serves a variety of functions. For example, each beacon transmission identifies the presence of an access point. By default, radio NICs passively scan all RF channels and listen for beacons coming from access points in order to find a suitable access point. When a beacon is found, the radio NIC learns a great deal about that particular network. This enables a ranking of access points based on the received signal strength of the beacon, along with capability information regarding the network.

The radio NIC can then associate with the most preferable access point. After association, the station continues to scan for other beacons in case the signal from the currently-associated access point become too weak to maintain communications. As the radio NIC receives beacons from the associated access point, the radio NIC updates its local clock to maintain timing synchronization with the access point and other stations.

In addition, the radio NIC will abide by any other changes, such as data rate, that the frame body of the beacon indicates. The beacons also support stations implementing power saving mode. With infrastructure networks, the access point will buffer frames destined for sleeping stations and announce which radio NICs have frames waiting through the TIM that's part of the beacon. On the other hand, the beacon in ad hoc network marks the beginning of a period where stations buffering frames can alert sleeping stations that frames are waiting for delivery.

4. CLOUD COMPUTING

Cloud Computing is evolving as a technology for sharing information. The importance of Cloud Computing is increasing and it is receiving a growing attention in the scientific and industrial communities. A Cloud Computing provides users to access resources through Internet from anywhere without worrying about any maintenance or management of actual resources. Besides, resources in cloud are very dynamic

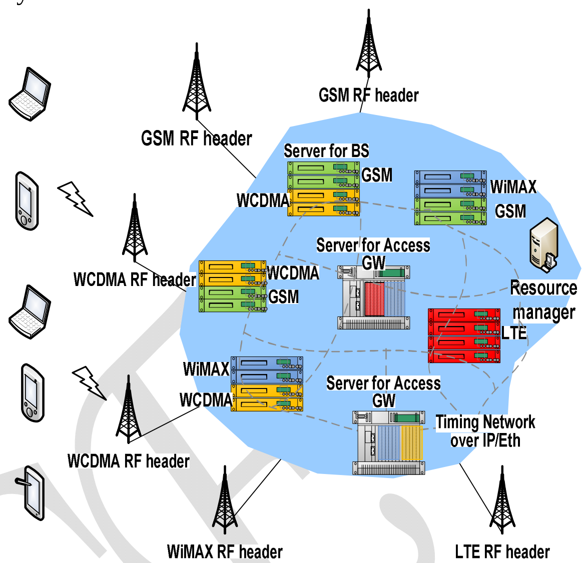

Figure 3: IT and Cloud Computing Techniques

This service allows the users to wirelessly backup their data .They usually consists of front end user devices and back end cloud servers. This gives users to access a large volume of storage on cloud. Cloud Computing as the first among the top 10 most important technologies and with a better prospect in successive years by companies and organizations. It enables ubiquitous, convenient, on-demand network access to a shared pool of configur-able computing resources (e.g., networks, servers, storage, applications, and services) that can be rapidly provisioned and released with minimal management effort or service provider interaction. They appear as a computational para-digm as well as a distribution architecture and its main objective is to provide secure, quick, convenient data storage and net computing service, with all computing resources visualized as services and delivered over the Internet. The cloud enhances collaboration, agility, scalability, availability, ability to adapt to fluctuations according to demand, accelerate development work, and provides potential for cost reduction through optimized and efficient computing

They combine a number of computing concepts and technologies such as Service Oriented Architecture (SOA), Web 2.0, virtualization and other technologies with reliance on the Internet, providing common business applications online through web browsers to satisfy the computing needs of users, while their software and data are stored on the servers.

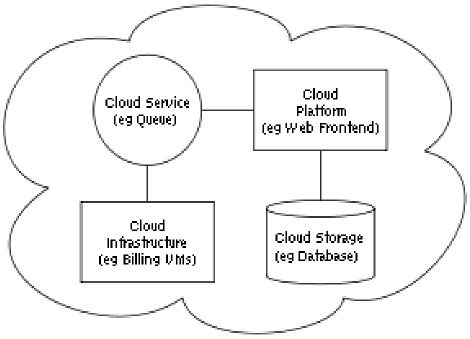

Figure 4: cloud computing architecture

A. Characteristics Of Cloud Computing

Elasticity and scalability: Cloud computing gives you the ability to expand and reduce resources according to your specific service requirement.

Pay-per-use: cloud services are payable only when they are in use, either for the short term (for example, for CPU time) or for a longer duration (for example, for cloud-based storage or vault services).

On demand: Because by invoking cloud services only when needed, they are not permanent parts of IT infrastructure a significant advantage for cloud use as opposed to internal IT services. With cloud services there is no need to have dedicated resources waiting to be used, as is the case with internal services.

Resiliency: The resiliency of a cloud service offering can completely isolate the failure of server and storage resources from cloud users. Work is migrated to a different physical resource in the cloud with or without user awareness and intervention.

Multi tenancy: Public cloud services providers often can host the cloud services for multiple users within the same infrastructure. Server and storage isolation may be physical or virtual depending upon the specific user requirements.

Workload movement: This characteristic is related to resiliency and cost considerations. Here, cloud-computing providers can migrate workloads across servers both inside the data center and across data centers (even in a different geographic area). This migration might be necessitated by cost (less expensive to run a workload in a data center in another country based on time of day or power requirements) or efficiency considerations (for example, network bandwidth). A third reason could be regulatory considerations for certain types of workloads.

B .Virtualization On Cloud Computing

Virtualization in computing, refers to the act of creating a virtual (rather than actual) version of something, including but not limited to a virtual computer hardware platform, operating system (OS), storage device, or computer network resources. Virtualization software is used to run multiple Virtual Machines (VMs) on a single physical server to provide the same functions as multiple physical machines Known as a hypervisor, the virtualization software performs the abstraction of the hardware to the individual VMs.

C. Layers of cloud computing

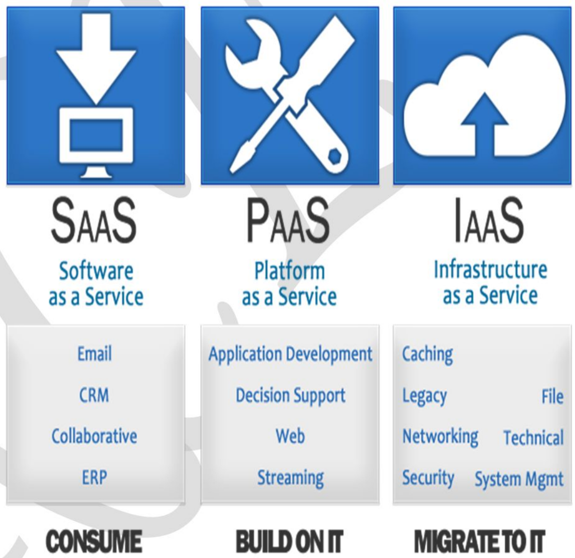

Figure 5: Three layers of cloud computing

a. Software AS A Service

The Software as a service (SaaS), sometimes referred to as "on-demand software" supplied by ISVs or "Application-Service-Providers" (ASPs), is a software delivery model in which software and associated data are centrally hosted on the cloud. SaaS is typically accessed by users using a thin client via a web browser.

SaaS has become a common delivery model for many business applications, including Office & Messaging software, DBMS software, Management software, Computer Aided Design software, Developmentsoftware, Gamification, Virtualization,accounting, collaboration, enterprise resource planning (ERP), invoicing, human resource management(HRM), content management (CM) and service desk management. Software as a service (or

SaaS) is a way of delivering applications over the Internet as a service. Instead of installing and maintaining software, you simply access it via the Internet, freeing from complex software and hardware management. SaaS applications are sometimes called Web based software, on-demand software, or hosted software. The provider manages access to the application, including security, availability, and performance. SaaS has been incorporated into the strategy of all leading enterprise software companies. One of the biggest selling points for these companies is the potential to reduce IT support costs by outsourcing hardware and software maintenance and support to the SaaS provider. The term "software as a service" (SaaS) is considered to be part of the nomenclature of cloud computing.

b. Infrastructure As A Service

If an infrastructure such as a storage server or an application server is accessed over the internet on rental basis instead of using it by purchasing and installing it is called IAAS.

c. Platform As A Service

If a platform that is used to develop a software applications can be accessed over an internet on rental basis instead of purchasing and installing it on servers or systems it is called a cloud platform and this service is called PAAS.

5. CONCLUSION

As a result, collisions and latency during the delivery of datas are reduced by the beacon scheduling. where the cloud computing becomes beneficial as it makes the document compatible , provides unlimited storage space, makes the group collaboration easier, access universal files, reduces the cost of hardware maintenance and software, improve the performance and forms reliable data storage. Thus, by implementing the beacon scheduling technique with the use of csma/ca algorithm the networking connectivity gets enhanced and provides an optimal output performance in wireless networks.

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