Questions:
Do you have an idea for an innovative product in one of the below mentioned domains?
Do you want to see your idea turned into reality?

Answer: Yes

Solution:
Submit the abstract using the submission form before 01 May 2014 to info-cmt.ro@siemens.com with subject: "*Abstract for the Siemens CVC – 2014 University Innovation Competition*".

Domains of interest:

- **4G / LTE**

The ITU defines the fourth generation of networks within the IMT-Advanced initiative as a set of „mobile systems which include the new capabilities of IMT and will provide access to a wide range of telecommunication service, supported by mobile and fixed networks that are increasingly packet-based". So what does this mean?

To understand the ITU definition, one must essential comprehend that in telecommunication networks technology changes occur in a controlled fashion, due to many reasons out of which the most important ones are: the stability of the network and continuous service during such a transition phase (the services are never interrupted in the best case scenario).

As a result, the progress towards 4G (which is generally defined as a combination of „low to high mobility and a wide range of data rates in accordance with user and service demands in multiple user environments") is meant to pass through a series of evolving technologies that in the near future will deliver the quality defined in the standard.

So what about LTE? The Long Term Evolution is such a technology proposed by the 3GPP consortium to provide 4G services, and aims to improve the network architecture by adding new concepts capable of providing faster data rates and higher mobility. While most operators already market their LTE networks as 4G, one must understand that according to ITU, the fourth generation of networks is yet to come.

As part of the 4G-LTE thematic there are two areas interested in researching:

1. Services:
   New models of services, and improvements in existing services, that can generate new revenues for operators as well as equipment vendors. Some notable examples here are over-the-top services that use the operator network as an internet service provider given that in 4G networks „*mobile broadband*" is the keyword, monetization services such as payment of parking through SMS, content delivery platforms etc.

2. Products:
   New products and improvements in existing products that help the communication service providers (operators) reduce costs, generate new revenues, and optimize resource utilization.

A notable aspect is to consider all the stages a mobile network passes through, such as customization and integration (at ramp-up), operation monitoring and upgrade (during the lifetime of the technology) and decommissioning (in the ramp-down phase). Some notable examples here include: Session Manager for handling authentication, authorization and accounting throughout an operator network across multiple access technologies such as 3G/LTE, DSL and WiFi, WiFi offload solutions (for operators trying to reduce the cost of radio licenses) , software applications that help optimize the network usage and thus reduce operating costs.

A fundamental aspect that needs to be noted is the close dependency between the two areas: that is new services are in most cases backed by new software components, network elements (which in fact represent products). The two combined may represent the next revolutionary thing in telecom business.

- **Security and Civil Protection**

Over years in the increasingly complex societies new threats continue to arise and citizens expect a high degree of security to be maintained on matters of security in general and of civil protection in particular. In fulfilling these goals there are several institutions like European Space Agency (ESA) seeking a consensus on actions required to enable full use of space communications in civil protection.

During time the satellite telecommunications systems were regarded as complementary solutions for overcoming the limitations of land-based technologies but not as complete alternatives to terrestrial solutions. An integrated system should combine terrestrial with satellite components and providing mobile, broadband and data relay services in order to become a key asset for crisis management.

- **Cloud**

Some analysts and vendors define cloud computing simply as „virtual servers available over internet" and others are arguing that anything you use outside the firewall is „in the cloud".

According to the United States National Institute of Standards and Technology (NIST), cloud computing can be described as follows:

"Cloud computing is a model for enabling convenient, on-demand network access to a shared pool of configurable 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."

The above definition along with details like cloud characteristics, service models and deployment models can be seen in Figure 1 (above).

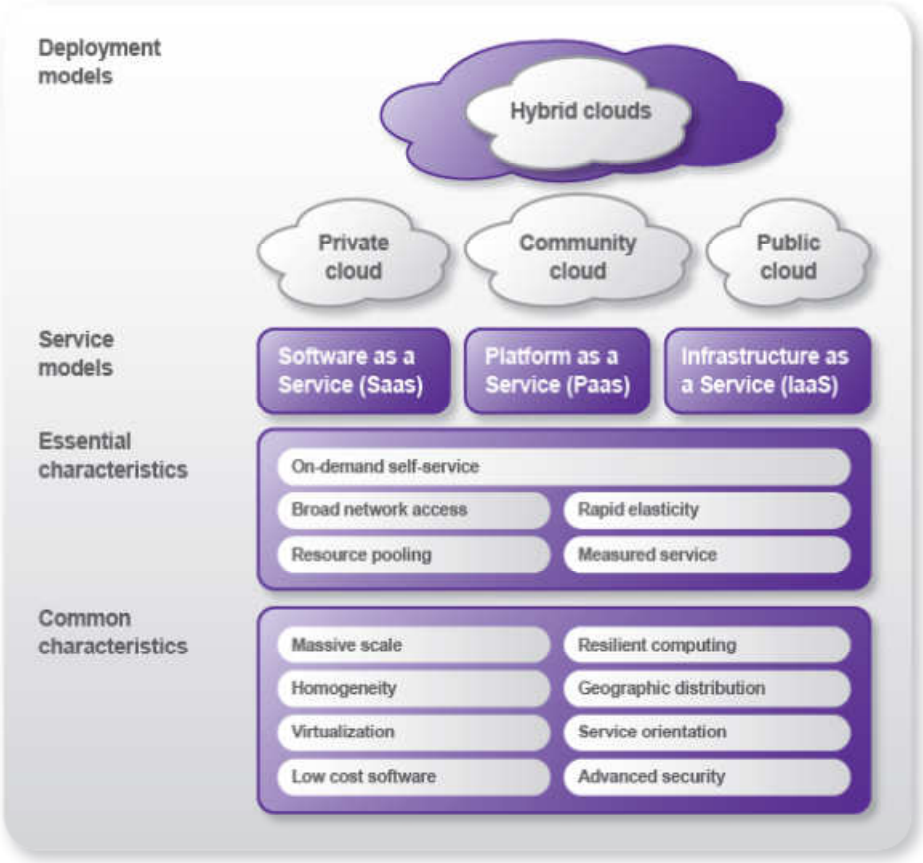


Figure 1: The NIST cloud definition framework

Cloud security or cloud computing security refers to a set of policies, technologies and controls deployed to protect data, applications and the associated infrastructure of cloud computing.

Cloud communications are internet-based voice and data communication where telecommunication applications, switching and storage are hosted by a third-party outside of the organization using them, and are accessed over the public Internet.

- **Earth observation**

Telecommunication, Navigation and Earth Observation systems and services are world-wide developed with a multiplicity of standalone terrestrial and space systems that operate in diverse frequency bands.

Together with communications and navigation, earth observation constitutes one of the main purposes of satellite-based services. In this connection, the main aspect involves an imaging system based on radar observation as well as passive remote exploration in the visual and infrared spectrum.

The applications include monitoring specific land regions and oceans in order to observe weather conditions and the composition of the atmosphere.

Another technology offering great potential is hyperspectral sensors that are providing a new dimension in the quality of geodata evaluation by measuring the electromagnetic spectrum on an ongoing narrowband basis. In this way, surface materials can be identified with a great deal of precision based on their unique spectral signatures.

- **Disaster monitor**

"Communication is the precious "life" line. There were many cases where Satellite was the only way to communicate especially in the initial occurrence phase of the earthquake and tsunami"

As mentioned by Yutaka Nagai, President of Asia-Pacific Satellite Communication Council after the Great East Japan Earthquake from March 2011.

Disasters can be natural or generated by peoples, either way it is evident that by no means they can be fully prevented but the loss caused by these events can be prevented or minimised.

Applications and technologies can be used in order to prevent a disaster, reduce the chance of happening a disaster or minimize the impact.

During disasters, telecommunication infrastructure failure occured through a variety of mechanisms and causes like phisical destruction of network components, disruption in supporting network infrastructure or network congestion.

- **GSM-R**

In the early `90s , „driven by the intention of the member states of the EU to introduce a Pan-European Traffic Network and assure railways bussines , 32 countries decided to work togheter on the specification of a European standard for train control and communication system". Considering that comercial mobile networks were blooming and GSM was gaining much popularity it was decided that railway communication should use an improved version of the technology (GSM-R) that met the high demands of security and performance required in a transportation system.

As of 1997, the GSM-R is the only approved world telecom standard for railways and according to the GSM-R industry group 56 countries in 5 continents are expected to select GSM-R untill 2016. The standard aims to provide interoperability (seamless border crossing, high speeds , improved track capacity) and efficiency (reduced infrastructure cost, one radio system for all applications, standard products).

- **Universal authentication while switching between different technologies/vendors**

Until recently, mobile operators have viewed Wi-Fi not as a viable extension of their mobile business but as an extension of their fixed broadband business or as a complementary hotspot business. With the introduction of smart phones such as Apple's iPhone and Google's Android and the transition from a mobile voice model to a mobile data model, more operators are taking a closer look on taking advantage of the Wi-Fi and unlicensed spectrum as part of their strategy.

On our days based upon user preferences and network optimization mobile devices discover and automatically select and connect to Wi-Fi networks and automatically grant access to the network based upon credentials such as SIM cards, which are widely used in cellular devices.

It is desirable to have no user intervention required while such actions are performed and to have over-the-air transmissions encrypted using the latest-generation security technology.

Along with all existing data and communication technologies Wi-Fi networks are an essential component to meet the ever-growing demand for mobile broadband. By offering to users consistent

and portable connectivity their business value will continue to expand but the highest value will be realized via seamless authentication, provisioning, and roaming.

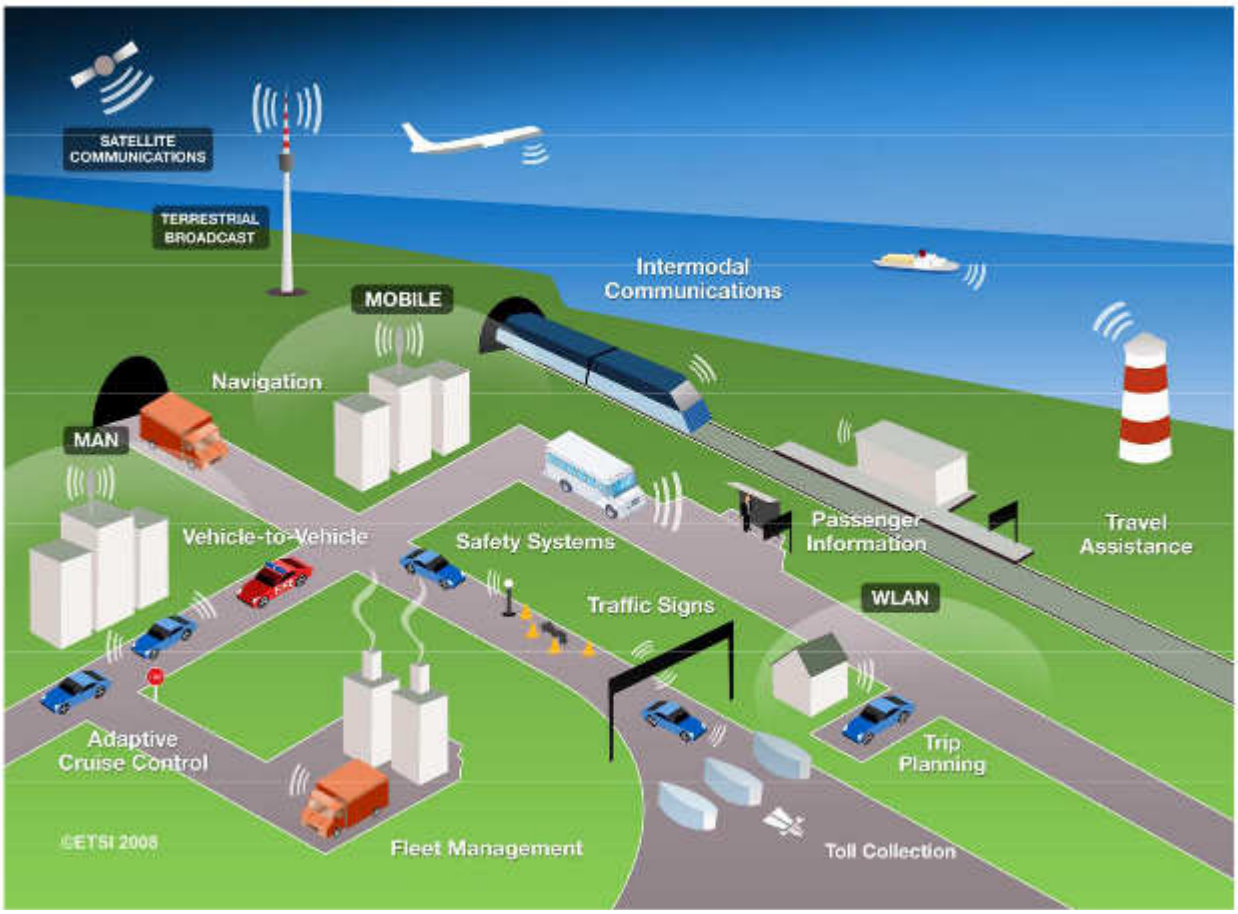
When moving between buildings or around cities, mobile users increasingly need to stay connected to applications, services and technologies which they typically access from their office, home and/or hotels.

- **<u>Cooperative vehicle (train to train,car to train, train to boat,boat to land...)</u>**

During years traffic (air, water, road…) accidents have been taking thousands of lives each year all over the globe outnumbering sometimes any deadly diseases or natural disasters. Studies show that most of them could be avoided if there would have been a warning at last some seconds prior to collision. Also it is known that human suffer from perception limitations on emergency events resulting in large delay in propagating warning in case of emergency.

An cooperative vehicle system automatically implies the existance of an communication part that is available wherever and whenever a vehicle is present in the traffic. and can be made vehicle to vehicle and vehicle–roadside communication in a transparent way.

The term *Intelligent Transport Systems* (ITS) is used to illustrate the application of information and communication technologies in the transport domain. As seen below *European Telecommunications Standards Institute* in 2011 pointed out indicative ITS applications containing several components addressed to various components (train, plain, ship, car, terrestrial operators,…).



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