About Satellite Internet

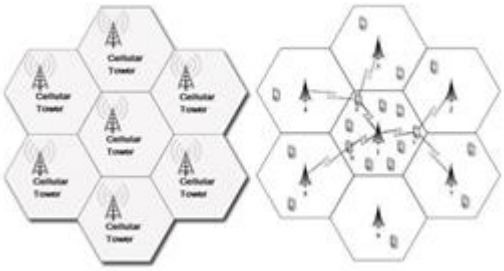
Differences Between Satellite and Cellular Communication

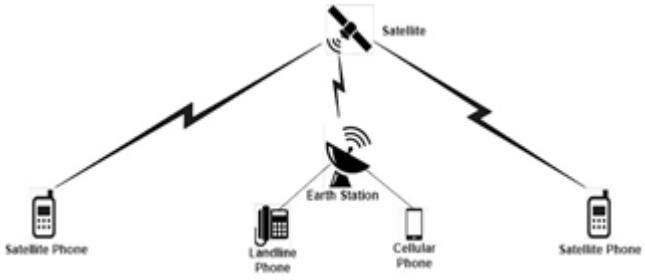
According to VIZOCOM (2016), satellites and cellular differ in 3 different ways.

1. **COMMUNICATION TECHNOLOGY**

Cellular Communications

Cellular communications use land-based towers to transmit and receive signals. The area at which the tower transmitters can cover is called a cell, which is represented by a single tower. The group of towers is referred to as a “cellular network” (Caterpillar, n/d). Despite being wireless, these physical cell towers need to have a power source and backhaul through land-based system circuits to function (X2nSat, n/d). Whenever you are in a certain area, that phone is using the cell of the closest tower where you are in. This is the reason why there are weak signals or dropped calls using cellular technology. The main reason is that there must be no cell towers within the specific range or the cell from another area is too far that it cannot be reached and would result in bad signal receptions.





Satellite Communications

Satellite communication technology on the other hand does not rely on terrestrial-based systems but rather uses a satellite orbiting the Earth. This allows us to receive a signal within a wider range. It needs Very Small Apertures (VSATs) that require power for it to function (X2nSat, n.d). The device can connect everywhere and anywhere if it is covered by the satellite beam. The satellite sends the signal to the land-based system on Earth, then transmits this signal to a receiving device. These devices are smartphones, landlines and other satellite phones.

2. COMMUNICATION COVERAGE

Cellular Communications

In terms of communication coverage, cellular communication networks cannot perform much in a short range because it would require a lot of towers to cover cities. These can be expensive and may require unavailable infrastructures. Putting up cell towers in rural areas or third world countries is not cost effective since there is a low number of usage. Each tower only has a short range, so it would require a great number of cellular towers to create a big network.

The photo shows the area covered by a cellular network. The only area that has cellular receptions are inside the red circle. The area outside of the circles do not receive cellular signals.

Satellite Communications

Satellites on the other hand, send signals from above and they do not rely on land-based systems unlike the tower cells. They can be placed and cover a wide range, especially in a remote area. Therefore, satellite communication technology is very useful especially for people who are travelling to remote and isolated areas.

3. COST

For cost, satellite communication technology tends to be a bit more expensive compared to the cellular one. Satellites are way more expensive because of the materials that will be used to make it and the cost of acquiring it. Cellular communications on the other hand is less expensive than satellites. (Global Data Systems, n.d).

In terms of cost and design, cell phones are cheaper than satellite phones. Satellite phones are costly on the other side as they require expensive materials in making them, and placing them as well in orbit (Caterpillar, n.d). This is also the reason why people only need them on a limited basis since they are only used for emergencies. However, it is still important to contemplate on how satellite phones could be of a great help in times of need without other means of contact.

Satellite Technology in the Asia and the Philippines

Satellite is a crucial field of innovation as carriers and policymakers move towards achieving Universal Access. Satellite technology grew immensely and developed from the moment it was first used for communication. The advantages and characteristics change significantly, depending on how near or distant the satellite is to the earth's orbit. Furthermore, it is mentioned in the study that satellite is the best choice to deliver broadband.

As an archipelago, it is surprising that the Philippines is not taking advantage of satellite technology as much as its Asian neighbors (Brewer, Faustino, & Santos, 2018).

Country	Count of Active Satellites
China (People's Republic of)	188
Japan	158
Indonesia (Republic of)	27
Korea (Republic of)	27
Malaysia	22
Thailand	15
Singapore (Republic of)	9
Vietnam (Socialist Republic of)	7
Lao (People's Democratic Republic)	1
Philippines (Republic of the)	1
Cambodia	Soon to launch (2021)
Myanmar	Soon to launch (2019)

Source: ITU-R's list as of 30 July 2018; https://www.itu.int/net/ITU-R/space/snl/listinuse/index.asp?sel_satname=&sel_orbit_from=&sel_orbit_to=&sel_adm=&sel_org=&sel_date_from=&sel_date_to=&sel_sns_id=&sel_prov=&sel_rec=&mod=asc&order=&spage=1 various press releases.

Note: (a) "Active" means satellites that are actually transmitting, i.e., using spectrum resources.

In the same study, it is discussed that the Philippines has one (1) satellite in orbit under PHL-MICROSAT. Neighboring countries such as Indonesia, Malaysia and Thailand have launched several satellites. Singapore, a city-state only marginally larger than Metro Manila, the National Capital Region of the Philippines, has nine (9) satellites under its name. In the Philippines, there are a few service providers that use satellites for backhaul but on a small capacity. Globe Telecom uses satellite technology to reach remote provinces for its mobile cellular backhaul. Some private sector partners of the DICT are also using VSAT to provide connectivity for the government's Free Wi-Fi program or Pipol Konek. With the "Free Internet Access in Public Places Act", private sector partners of the government in its free Wi-Fi program are encouraged to use satellites and other emerging Internet technologies.

Advantages and Disadvantages of Satellite Technology

According to Ilya (2020), satellite internet is a reliable way of getting internet to remote places in the country. To set it up, you just need 3 satellite dishes, one in space, another at the internet service providers hub and the last being the end user's location. It has a near-global coverage and is easy to install and deploy, meaning, you can access the internet provided you have a dish at your location. Additionally, it is many times faster than dial-up internet, which might be what next alternative people in remote areas are using. It is also cost effective, as there is no need to lay down fiber cables in order to begin serving an area. Lastly, it is very reliable, because unlike cable, DSL or fiber, its points of failure are only 3 things: the satellite dishes.

However, there are also disadvantages to using satellite internet. It has a high amount of latency, as well as low data caps on average. Weather can also have a significant impact on signal strength. It is also relatively expensive, as with the greater reliability, there is a price to pay for it. Satellite internet is also vulnerable to obstructions in the signals, so tall trees can block the connection between the user and the ISP. Lastly, VPNs are mostly incompatible with satellite internet, because they need bandwidth that satellite internet simply can't provide.

Cost of Satellite Technology

According to Brown & Harris (2000), a typical weather satellite can cost about $290 million to make, with specialized satellites potentially costing even more. They are also costs that go towards the maintenance and repair of satellites, costing companies on average $1.5 million. Launching satellites is also expensive, as it can cost between $10 to $400 million, depending on the weight of the satellite. It should be noted, however, that it is more cost effective to launch heavier satellites than lighter ones.

Satellite frequency bands

According to the European Space Agency (n.d.), the application and development of satellite technology is rapidly progressing. Satellites utilize a wide range of network frequency bands to transmit signals across long distances. However, the lower frequency bands are starting to become congested with the increased size and use of satellites and other radio technologies. Currently, research is being done towards utilizing the higher frequency bands efficiently, despite these bands being more susceptible to signal interference from weather effects. Frequency bands are separated into several designations with varying frequency ranges: L-band which covers 1-2 GHz, S-band which covers 2-4 GHz, C-band which covers 4-8 GHz, X-band which covers 8-12 GHz, Ku-band which covers 12-18 GHz, and Ka-band which covers 26-40 GHz

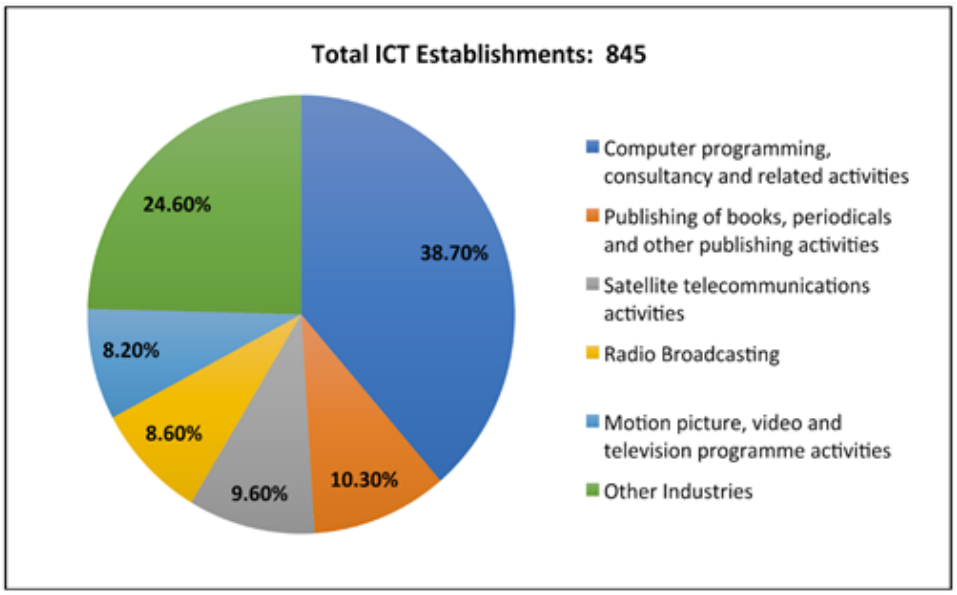


Figure 2. Percentage Distribution of ICT Establishments: Philippines 2013
Source: Philippine Statistics Authority

In the National Broadband Plan of the DICT drafted in 2017, statistics from Philippines Statistics Authority named *'Percentage Distribution of ICT Establishment: Philippines 2013,'* it showed that 81 (9.6%) out of the total 845 Internet and Communication Technology (ICT) establishments were composed of establishments doing Satellite Telecommunications Activities.

The table below shows the 18 Satellite providers in the Philippines as of the time the National Broadband Plan, mentioned above, was drafted. These Satellite Providers deliver Very-Small-Aperture Terminal (VSAT) services in the Philippines. These providers supply internet access services (data, voice and video applications) through C, Ku, Ka bands.

Table 3. Eighteen Satellite Providers in the Philippines
Source: http://www.satproviders.com/en/list-of-all-services/PHILIPPINES

Satellite Internet Service Providers	Country (Address)
TS2 Space	Poland
Qantsat	Spain
Businesscomm Networks	South Africa
BellTel	Philippines
Juch-Tech, Inc.	Canada
TOPH Inc.	Philippines
DOMSAT	Philippines
Enhanced Electronics and Communications Services, Inc.	Philippines
WorkNetPhil International, Inc.	Philippines
IPSTAR	Philippines
NERA Satellite Communications	Philippines
AZ Communications Network, Inc.	Philippines
Jason Electronics Philippines Co, Inc.	Philippines
DelNet	Philippines
iXSforall	Philippines
SpaceX	California, USA
One Web	Canada/USA
We Are IT Philippines	Philippines

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