SoftBank's Ubiquitous Transformation

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1. Introduction

1.1 The next challenge in the Information Revolution

The spread of the Internet and mobile communications has brought dramatic changes to society, industry, and lifestyle. However, large-scale disasters occur almost daily worldwide as a result of climate change, and there are still regions without an adequate social and communication infrastructure, so some people and industries are being left behind unable to reap the benefits of digitalization. Communication gaps caused by situation and location, such as normal times and disaster times, city and village, and land and sea, are inhibiting factors to the creation of new value creating a challenge to the realization of a sustainable society.

1.2 Vision of a Ubiquitous Transformation (UTX)

Under the concept of 'Ubiquitous Transformation (UTX)," SoftBank envisions a world of uninterrupted communications. The aim of UTX is to hierarchically integrate the Non-Terrestrial Network (NTN) that supplements and extends the terrestrial network and to create a society in which "connectivity becomes ubiquitous" regardless of place or time. This initiative will surmount fragmentation at the time of a disaster and infrastructure disparities between regions and dramatically enhance the experiential value of people and things.

1.3 Concept of a ubiquitous network

As a key element in achieving a UTX, a ubiquitous network is a communication infrastructure that seamlessly switches circuits unbeknownst to the terminal side by merging the terrestrial cellular network with multiple networks such as satellite communications and stratospheric communication platforms

Figure 1: Ubiquitous Transformation (UTX) vision

known as High Altitude Platform Station (HAPS). Here, a terminal moving out of range of the cellular network would be automatically handed over to a satellite or HAPS, and then, on returning to ground coverage, would be reconnected to the cellular network. This concept of viewing the sky-based and ground-based networks in three dimensions and transparently configuring multiple layers is exactly the key to achieving communications "anytime, anywhere, for anyone."

1.4 SoftBank NTN portfolio and partner strategy

SoftBank is lining up a variety of NTN solutions as a foundation for achieving a ubiquitous network. In Low Earth Orbit (LEO) satellite networks, broadband connection services such as Starlink Business and Eutelsat OneWeb are being rolled out tailored to specific needs with different characteristics. In addition, HAPS, which provides communication services from unmanned aerial vehicles stationed in the stratosphere, directly accommodates smartphones with each station covering a wide area up to 200 km in diameter. Our plan is to bundle up these multiple NTNs and the terrestrial cellular network as a "multi-orbit + mobile network" and construct a mechanism for autonomously selecting an optimal circuit according to use case.

1.5 Impact on mobility field

SoftBank regards the mobility field as the most important use case of the ubiquitous network. Moving bodies such as self-driving cars, construction machinery, drones, and ships frequently move in and out of cellular range. If connections can be securely maintained at all times, it will be possible to operate services such as remote monitoring, remote control, preventive maintenance, and high-precision navigation in a reliable manner and dramatically improve transport efficiency, safety, etc. A social infrastructure redesigned with a focus on the mobility field under the assumption that "the ability to communicate is the norm" has the potential to transform industrial structures and daily life.

In this field, SoftBank is proactively collaborating with foreign companies. In June 2025, we concluded a strategic partnership with Cubic[3], a global leader in solutions for software-defined vehicles (SDVs), toward the creation of a ubiquitous network. The plan here is to commercialize ubiquitous network solutions for connected cars within a few years by merging NTNs and the terrestrial cellular network.

1.6 Organization of this article

In this article, we begin by explaining the background and objective of UTX as envisioned by SoftBank. We then discuss the respective technologies of HAPS and satellite communications and their linking with the terrestrial network as key elements in realizing this strategy, collaboration with domestic and foreign partners in each of these areas, and scenarios for social implementation of UTX centered about mobility. Finally, we investigate the conformity of UTX with global standardization trends advanced at ITU and consider a vision for the future brought about by UTX. The authors would be pleased if this article helps readers understand the significance of UTX and its social impact.

2. Efforts toward commercial development of HAPS

2.1 HAPS features: Next-generation communication infrastructure supporting the future from the sky

HAPS focused on by SoftBank is a next-generation infrastructure that is sometimes called "base stations flying in the air" or "stratospheric base stations." It is a technology that

Figure 2: Ubiquitous network configuration

provides communication services to a wide area on the ground via unmanned aerial vehicles that operate in the stratosphere at an altitude of about 20 km. With HAPS, one station can cover a wide area on the ground up to 200 km in diameter enabling the construction of a seamless communication environment whether the target area be an urban area, mountainous area, or remote island.

HAPS boasts three main features as follows.

1. Maintains communications during a disaster: HAPS can help secure a lifeline even at the time of an emergency by providing communication services from the stratosphere even if the terrestrial infrastructure has been damaged.
2. Eliminates the digital divide: HAPS can provide stable mobile communications even in regions in which base stations would be difficult to set up and in areas with a low population density.
3. Supports mobile communications in the sky: HAPS can be used to construct a three-dimensional communication infrastructure with a view to linking with next-generation mobility such as flying cars and drones.

HAPS is extremely effective in dealing with disasters. It can be used to rapidly deploy communications from the sky in isolated regions where ground access is difficult and to greatly improve the immediacy of evacuation guidance and rescue operations. In addition, HAPS can use remote sensing functions to make high-definition observations from the stratosphere and grasp in real time disaster conditions, the range of fires or flooding, etc. HAPS is expected to serve as a new information infrastructure that can support decision-making by local governments and disaster-prevention institutions.

2.2 Technology development and demonstration results: SoftBank meets the challenge of pioneering world-first achievements

After being the first in the world to begin studies on providing HAPS services in 2017, SoftBank has taken on technology development in earnest. In September 2020, SoftBank conducted a test flight using the "Sunglider" Heavier than Air (HTA) HAPS equipped with solar panels. Sunglider stayed aloft in the stratosphere for 5 hours and 38 minutes and successfully delivered LTE communications from the stratosphere as a world's first.

Additionally, in September 2023, in cooperation with the government of Rwanda, SoftBank conducted the world's first 5G communications test from the stratosphere using an unmanned aerial vehicle mounting a 5G communications payload. This test pushed the boundaries of communications technology by establishing a 5G connection for approximately 73 minutes from an altitude of 16.9 km and successfully performing a Zoom video hookup with a team in Japan. These achievements were supported by an accumulation of advanced core technologies supporting harsh environments like the stratosphere. A fusion of technologies from many fields is contributing to the realization of HAPS as in the development of high-energy-density batteries that can operate stably even in extremely low temperatures plus high-efficiency solar panels and lightweight communication devices.

Figure 3: Sunglider (HTA-type HAPS)

2.3 Role as a global leader driving the industry

The international use of new frequencies (700–900 MHz band, 1.7 GHz band, 2.5 GHz band) for HAPS mobile-phone base stations was formally agreed upon at World Radiocommunication Conference 2023 (WRC-23) held from November to December 2023.

In this important decision, SoftBank participated actively as Japan's representative in regional WRC conference preparatory meetings and led technical discussions and international coordination. By building trustworthy relationships with those concerned in other countries and engaging in repeated negotiations, discussions fortunately led to a consensus. As a result, countries can now flexibly select frequency bands when introducing HAPS making it possible to support communications with existing smartphones in many countries. Going forward, the use of HAPS is expected to grow even further as a communications infrastructure in undeveloped areas, as a means of securing communications at the time of a disaster, etc.

As a founding member, SoftBank has also been active in the HAPS Alliance consisting of 103 companies as of July 2025. We have been promoting regulatory development and market creation while coordinating with leading companies in the communications, aviation, and IT fields.

We are also putting effort into intellectual property strategies. In relation to communication technologies that place HAPS aloft in the stratosphere to function, in particular, as wireless relay stations or base stations, SoftBank has obtained more than 90 U.S. patents (Patent Classification H04B 7/18504). This group of patents will be the source of SoftBank's international competitiveness in the future as an indispensable infrastructure technology for the commercial deployment of HAPS.

2.4 HAPS deployment in Japan: Service provision in partnership with Sceye

SoftBank has invested in the U.S.-based company Sceye Inc. as a concrete step toward deployment of HAPS in Japan and has concluded an agreement that gives it exclusive rights to deploy HAPS services in Japan using the Sceye system. Sceye's

Lighter than Air (LTA) HAPS is an unmanned aerial vehicle that rises by the buoyant force of lighter-than-air helium. It can remain airborne for long periods of time and can provide stable communication services.

Figure 4: Sceye (LTA-type HAPS)

SoftBank plans to use this LTA-type HAPS system to launch precommercial services in Japan in 2026. In the initial stage, this system will target the recovery of communications at the time of a disaster. It will operate specifically for securing a lifeline and supporting rescue operations during emergencies while limiting the areas and users covered. In this way, immediate communications support for disaster-struck areas will become a reality in Japan, a country that has a frequent occurrence of natural disasters.

Then, from 2027 on, the outlook is for extending the system to regular communication services, and studies are underway to using it as an observation and monitoring infrastructure. SoftBank will continue to develop LTA-type HAPS in parallel with HTA-type HAPS with the aim of achieving a communications infrastructure with a variety of operation formats in mind.

3. Satellite communication solutions and linking with the terrestrial network

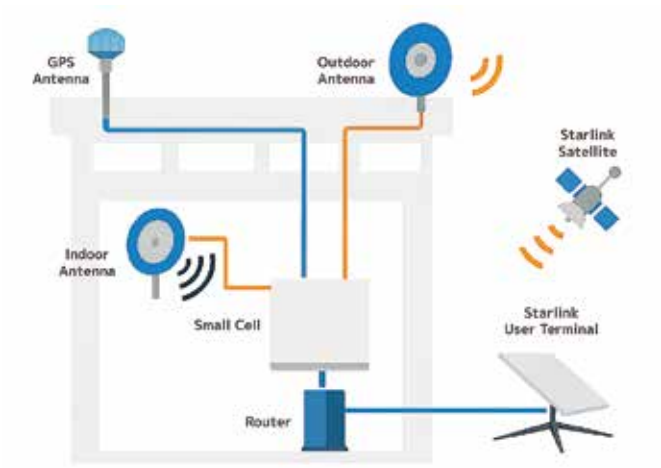
3.1 SoftBank satellite communication solutions and features

SoftBank provides Starlink Business and Eutelsat OneWeb as satellite communication solutions using LEO satellites. Starlink Business features high-speed and low-latency best-effort broadband connections enabling speedy provision of communications over a wide area. Eutelsat OneWeb, on the other hand, supports guaranteed bandwidths and closed network connections making it applicable to business applications requiring secure communications. At present, preparations are being made for the launch of this service in Japan. Flexible network design making best use of the features of both of these services can support a variety of user needs.

SoftBank also provides a corporate service called BizCell that combines Starlink with compact wireless devices. This service enables the use of ordinary mobile phones including emergency calls for SoftBank users and means of communication via Wi-Fi for users of other operators.

In this way, BizCell can be used as an effective communication infrastructure at the time of a disaster or in areas outside the reach of radio waves.

Figure 5: BizCell service using Starlink



3.2 SoftBank internal use

SoftBank proactively uses satellite communications internally. In normal times, geostationary satellites can serve as backhaul circuits for base stations enabling communication areas to be expanded and stable operations to be achieved. At the time of a disaster, they can aid in restoring base stations using portable satellite antennas and in restoring communications quickly by using mobile base stations mounting satellite antennas.

At present, Starlink is also being used in addition to geostationary satellites to secure low-latency and broadband temporary communications. SoftBank is also providing a Wi-Fi service using Starlink at evacuation centers and temporary hubs. This service played an important role during the Noto Peninsula earthquake in January 2024 in helping to confirm the safety of those affected by the disaster and collect information. These operations were constructed based on the lessons learned from the Great East Japan Earthquake of 2011. They aim to secure communications in either normal or emergency situations.

3.3 Satellite communications in an advanced mobility society

Building an infrastructure that enables communications without geographical restrictions is essential to achieving an advanced mobility society of self-driving cars, drones, flying cars, and other mobile bodies. In this regard, one means that is attracting attention is satellite mobile-direct communications. This is a technology that enables ordinary terminals like smartphones to communicate directly with satellites. It features the ability to provide a wide range of communications independent of the existing terrestrial infrastructure. Although SoftBank is not

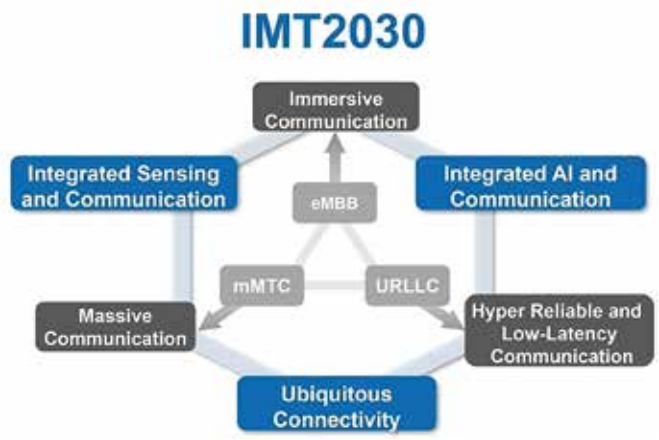
providing this service at present, preparations are being made to launch the service in 2026.

Additionally, with a view to uninterrupted communications in an advanced mobility society, SoftBank and Intelsat began joint technical testing in September 2024 of a hybrid communication solution that will enable automatic switching (roaming) between the terrestrial network and satellite communications (NTN) using 5G standard specifications defined by 3GPP. The ultimate goal here is a mechanism that will allow users to access both networks with a single device and contract while immediately handing over vehicles that move out of range of a terrestrial network to a satellite. The envisioned roadmap calls for the use of existing satellite terminals in the short term followed by the use of a single terminal as the standardization of 3GPP NTN-5G progresses.

3.4 Toward Ubiquitous Connectivity

Ubiquitous Connectivity is positioned as one of the six main scenarios in IMT-2030 defined by ITU-R. This means that in the 6G era, there will be a need for logically merging heterogeneous networks such as terrestrial cellular networks together with Low Earth Orbit (LEO), Medium Earth Orbit (MEO), and High Earth Orbit (HEO) satellites and HAPS so that terminals and applications can be used without having to be aware of the optimal transmission path. Cubic[3], which received investment from SoftBank in March 2024, positions its cloud-native-platform Cubic[3] Cloud at the core of its orchestration operations to provide services that enable the integration of diverse terrestrial cellular networks not limited to those of specific telecommunication operators. SoftBank, through a strategic partnership with Cubic[3], aims to logically integrate the terrestrial cellular network and NTN and achieve Ubiquitous Connectivity by adding NTN communications to Cubic[3] Cloud. In April 2025, in the initial phase of this initiative, SoftBank completed a handoff experiment between the Intelsat satellite communication network and the terrestrial network connected to Cubic[3] Cloud. Through these efforts, the plan is to build an infrastructure that can provide continuous connectivity in the automatic mobility field, which, in the future, will require seamless communications regardless of location for SDVs, transport vehicles, farm machinery, construction machinery, drones, etc.

Figure 6: Relationship between 6G functions and applications



4. Conclusion

This article described SoftBank's vision of a "Ubiquitous Transformation (UTX)" and the technologies and strategies for making UTX a reality. SoftBank aims to integrate the terrestrial cellular network into a multi-layer network including satellite communications and HAPS to create a world that connects "anytime, anywhere, for anyone." Here, HAPS will drive the validation and international standardization of stratosphere communications and serve as a next-generation communication infrastructure from the sky leading to the creation of new services in the mobility field and the restructuring of the social infrastructure. Satellite communications, meanwhile, will facilitate the deployment of communications at the time of a disaster, in out-of-range areas, etc. through flexible designs using services like Starlink and Eutelsat OneWeb. In addition, the development of advanced orchestration technology for mobility applications is now in progress using satellite communications in collaboration with Cubic[3]. These initiatives align with the global vision of Ubiquitous Connectivity at IMT-2030 and are considered by SoftBank to be the key to constructing a communication infrastructure for the next-generation society.

In this way, communications will enter a phase where connections are location-agnostic and instantaneous. SoftBank's UTX lies at the core of this transition, and through UTX, we hope to contribute to society by constructing a sustainable network in which no one is left behind even during disasters and where there is no digital divide caused by being out of range of the terrestrial cellular network.