

Spectrum developments in the APT region

Regional focus on satellite broadband mobility and connecting the unconnected

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About GSOA: Global Satellite Operators Association

Satellite operators and their services **represent two thirds of the entire space economy** which is **valued at 250 billion dollars in revenue**. The satellite sector creates more than 900 000 direct jobs worldwide; **it enables independent launch and defense capabilities and puts all world regions at the edge of innovative technology**. Satellites are vital in cost-effectively bridging the Digital Divide for the ultimate benefit of people everywhere.

- GSOA is the global platform for collaboration between satellite operators
- World's only CEO-driven satellite association
- Leads the sector's response to global challenges and opportunities
- It offers a unified voice for the world's largest operators, important regional operators and other companies that engage in satellite-related activities
- GSOA is recognized as the representative body for satellite operators by international, regional, and national bodies including regulators, policymakers, standards-setting organizations such as ITU, 3GPP and WEF
- More than 37 satellite operators are members of GSOA



About Viasat



1986
year founded

45+
offices around the globe

6
satellites in orbit



7,000+
team members

\$2.8B
FY22 revenue



Americas
United States
Brazil
Mexico

Asia Pacific
Australia
China
India

Europe
Ireland
Israel
Italy
Netherlands
Switzerland
United Kingdom

Business Verticals in the APAC Region

- **Residential** – Viasat is a market leader today and poised to grow
- **Education** – Viasat connects students today in across North and South America
- **Business** – supporting financial, oil and gas, industrial, tourism and hotels, etc.
- **Mobility** – anywhere people can go – at sea, on land, in the air
- **Telemedicine** – ensuring all citizens can receive healthcare where they live
- **Disaster Recovery and Response** – resilient infrastructure to help when most needed
- **Connecting the Unconnected** – Viasat's Community Internet connects millions



Spectrum developments:

Significant uptake of the full 28 GHz for satellite broadband in the APT region

27.5 – 29.5 GHz globally used FSS and ESIM

28 GHz spectrum, the global choice for Ultra High Throughput satellite: broadband mobility ESIM and FSS to connect the unconnected

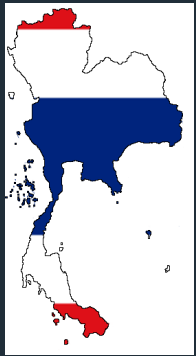
Regions	26 GHz	28 GHz (27.5 – 29.5 GHz)
Europe (28 countries)	5G	Satellite, FSS, ESIM
Australia	5G	Satellite, FSS ESIM
China	5G	Satellite, FSS ESIM
Brazil	5G	Satellite, FSS ESIM
+ Rest of the world	5G	Satellite, FSS ESIM in 100+ countries

- Plus many others are planning the introduction of satellite broadband in 28 GHz...

More 28 GHz uptake in APT region: significant economies of scale and interoperability



**China (October): 27.5 – 29.5 GHz (full 28 GHz for satellite)
allocated in full to satellite to serve the needs of ESIM**

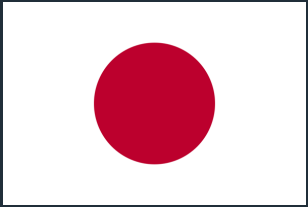


**Thailand (November): 27.5 – 29.5 GHz (full 28 GHz for satellite)
allocated in full to satellite to serve the needs of FSS, ESIM**



**28 GHz planned for primary use by satellite:
Indonesia, Vietnam, Philippines, Cambodia,
plus many others in APAC**

5G pioneer countries in APT **re-thinking the economics of 5G in mmWave:**
pioneers now seek introduction of ubiquitous ESIM satellite broadband for mobility



Japan (2022): begun studies and undertook industry consultation for ESIM options in 28 GHz



Singapore (2022): begun studies and undertook industry consultation for ESIM options in 28 GHz



South Korea (2022): government announces **removal of 5G licenses in 28 GHz** due to lack of investment in terrestrial 5G

- Ubiquitous ESIM broadband for air, sea and ground and ubiquitous terrestrial 5G IMT require separate bands

5G

KT and LG Uplus lose their 28 GHz spectrum licenses

By Sue Marek • Nov 21, 2022 11:30am

LG Uplus

KT

SK Telecom



As a condition to use the 28 GHz spectrum, the South Korean government required each operator to build 15,000 cell sites in that spectrum band. (Image by csk from Pixabay)

South Korea's Ministry of Science and ICT revoked the 28 GHz spectrum licenses of KT and LG Uplus because it said that the operators didn't deploy enough cell sites in the spectrum band and didn't invest enough money to deliver 5G services over the 28 GHz band.

Korea recalls mobile operators' 5G licences



Written by [Mary Lennighan](#) | 24 November 2022 @ 12:33



Two of South Korea's three mobile network operators have been asked to hand back their 5G licences in the 28 GHz frequency band, it emerged recently.

Staggeringly, for one of the world's most advanced mobile markets, the telcos have failed to meet rollout requirements for their high-band spectrum and as such the government is flexing its regulatory muscle.

KT and LG U+ have had their 28 GHz licences cancelled for falling far short of installing the required number of base stations in that band, the Ministry of Science and ICT announced last week, in a Korean language statement that for some days escaped the notice of the Western media.

"There is no way the telecommunications companies will be able to make it work at this point," said Kim Yong-hee, a business professor at Dongguk University

Korea's 5G a flop as chicken-egg problem keeps speeds low

"The 28-gigahertz ecosystem has not been established yet," the source said.

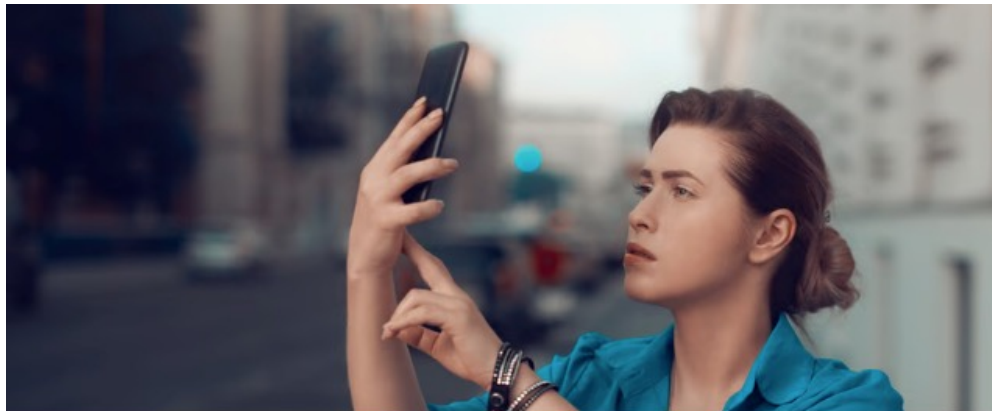
"To make it a public network available in a broader range, the smartphone manufacturers need to make chipsets and related modules, but that is also lacking at this point," the source added.

"Manufacturers have no reason to roll out devices that support the 28-gigahertz band as there is no infrastructure".

"Experts say that deploying the 28-gigahertz band for public 5G network service is not — and never has been — a viable option"

...meanwhile outside APT...

USA



Opensignal users connected to mmWave 5G less than 1% of the time on average across each of the three nationwide carriers. (Getty Images)

Despite early millimeter wave spectrum auctions and large carrier holdings in high-frequency bands, new analysis from Opensignal shows mmWave 5G connections are still rare for U.S. consumers.

Over a 90-day period, Opensignal users connected to mmWave 5G less than 1% of the time on average across each of the three nationwide carriers.

Viasat^{WI}



Wireless Private Wireless 5G Tech



5G

mmWave 5G remains elusive for U.S. consumers - Opensignal

By Bevin Fletcher · Apr 28, 2021 05:03pm

5G

midband spectrum

millimeter wave

testing

Regional study: no economic benefit from 5G FWA & 5G private networks in 28 GHz

Lowest Capex: satellite broadband

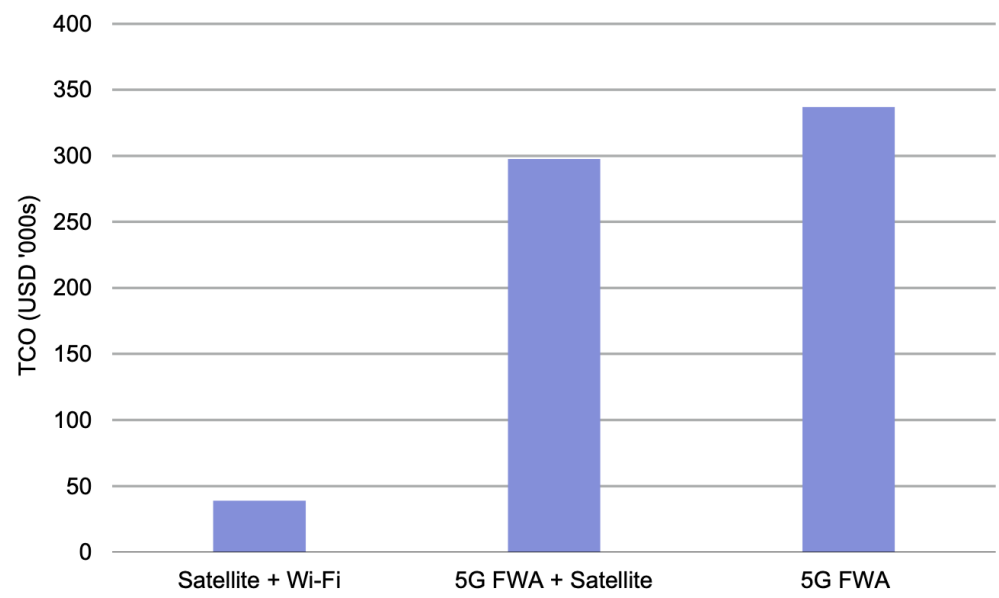


Exhibit 4.7: Case study 2: Total cost of ownership of connecting a rural school using various technology options [Source: Network Strategies]

Highest Capex per subscriber: terrestrial IMT

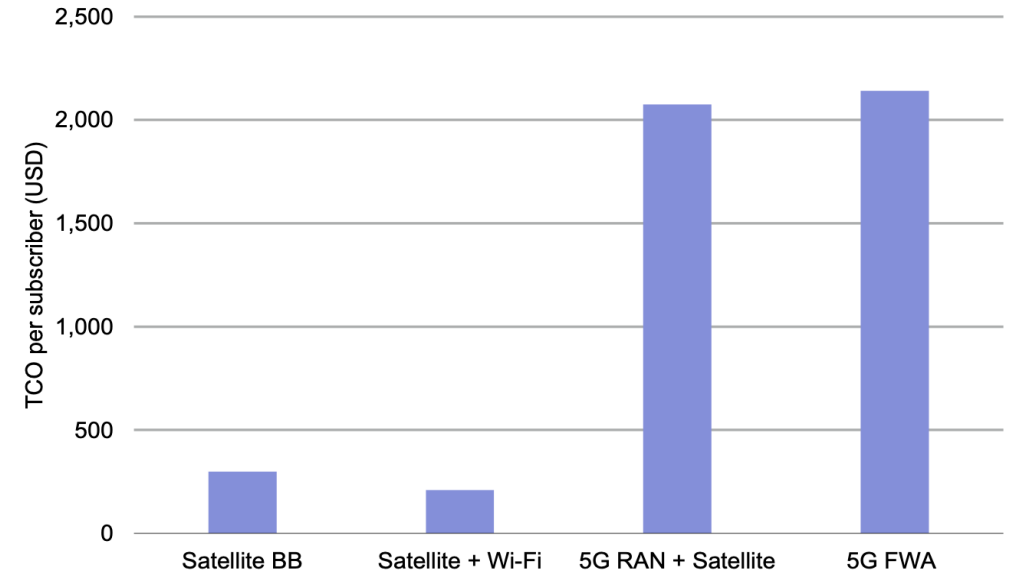


Exhibit 4.5: Case study 1: Total cost of ownership per subscriber over five years for providing broadband at 28GHz using various technology options [Source: Network Strategies]

Global assignment of satellite spectrum: administrative licensing

Satellite spectrum is a globally-shared resource and coordinated internationally through ITU

Terrestrial spectrum uses (mobile)	Non-terrestrial spectrum uses (satellite)
Seek exclusive access rights, closed national market	Shared amongst all players, <u>big or small, national and foreign</u>
Networks designed and operated for one country	Networks designed and operated for regional and global footprints
Do not need to coordinate frequency use with ITU	Must coordinate globally through ITU
Licenses sold for immediate use over a defined period	Frequency coordination alone can take years
Operators do not share spectrum – each takes an exclusive portion	<u>GSO and non-GSO share bands</u> , and must coordinate
Used for commercial purposes	Used for commercial and non-commercial purposes
Few players on exclusivity requires ongoing competition review	Greater, unlimited number of players guarantees greater competition
A mobile spectrum license resembles a national property rights title	Non-terrestrial spectrum use resembles “global commons”, managed through global regulations and administratively by the ITU

Outcome: market and non-market assignment may be applied. But auctions have failed in many cases

Outcome: shared satellite spectrum is managed by ITU under the International Radio Regulations. Only fits administratively

Same service, same rules is a fallacy. Terrestrial and non-terrestrial spectrum uses have major differences

Conclusions

- > APT countries, along with other regions, are now refocusing their **5G spectrum requirements on mid-band spectrum**. This is because the economics of terrestrial 5G in mmWave are challenging (see case of South Korea) and because **28 GHz has become the preferred band for ESIM**
- > **Very few countries have not yet adopted 28 GHz** for satellite broadband, and even those few countries are now **looking for ways to bring satellite ESIM in the 28 GHz band** (see cases of 5G pioneer countries in APT)
- > To benefit from higher economic gains and lower deployment costs, **5G FWA / 5G private** network uses should be **accommodated in the bands harmonised for IMT**, where there is no need to impose deployment restrictions on either 5G uses or satellite uses (FSS / ESIM)
- > Satellite spectrum is a globally-shared resource. **Market allocation** mechanisms thought for exclusive rights in terrestrial spectrum are **not feasible for non-terrestrial spectrum uses**. Satellite operators do not seek exclusive spectrum access. As a shared resource, satellite spectrum generates the highest competition.
- > Harming competition in the satellite sector and **reduction in allocative efficiency of shared spectrum** resources should be seriously considered. Experimenting with untested and economically/ technically flawed approaches brings irreversible costs to businesses and consumers.