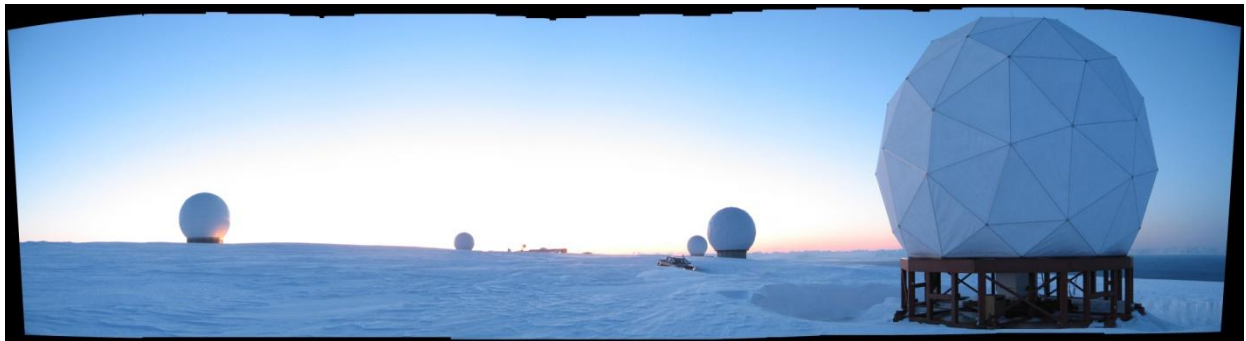




# **Company Profile**



## **World Class**

- through people, technology and dedication



## Kongsberg Satellite Services AS

Kongsberg Satellite Services AS (KSAT), a commercial Norwegian company, is a world leading provider of satellite ground station services and satellite based maritime monitoring services.

KSAT provides services such as;

- Telemetry, Tracking and Command (TT&C)
- Launch and early orbit phase support (LEOP)
- Data acquisition, processing, distribution and archiving
- Hosting and operation of CFE
- Maritime monitoring
- Multi-mission Rapid Response

KSAT support more than 60 satellites, including high resolution SAR and electro-optical satellites, and operates more than 50 antennas.



KSAT owns and operates a truly global cost-effective multi-mission Ground Station Network of both polar and mid-latitude stations. The three polar ground stations are located in Tromsø at 69°N, Svalbard Satellite Station (SvalSat) at 78°N and the Antarctic station (TrollSat) at 72°S.

The SvalSat station is the only commercial ground station in the world able to provide all-orbit-support (14 passes per day for most polar orbiting satellites), and KSAT is the only company that can provide access to satellites from both the Arctic and the Antarctic.

**All KSAT ground stations are operated as one single interconnected service.** KSAT's antennas are controlled from Tromsø Network Operations Centre (TNOC). TNOC is the single point of contact for KSAT ground station services. Operations at KSAT are executed on a 24/7-365 basis.

The head office of KSAT is located in KONGSBERG Tromsø, Northern Norway. KSAT is also present with an operational office on Svalbard and a sales office in Oslo.

KSAT is owned 50 % by KONGSBERG and 50 % by Norwegian Space Centre Properties, a company 100 % owned by The Norwegian Ministry of Trade and Industry, administered by Norsk Romsenter (Norwegian Space Centre).

## The Norwegian Space Centre (NSC)

The Norwegian Space Centre, located in Oslo, is a government entity under the Ministry of Trade and Industry. Among others, NSC guides ESA contracts strategically and is responsible for Norwegian space policies, industrial development and space infrastructure. Public funding are used to support the Norwegian industry and for development

and demonstration of space applications, and to optimize conditions for national space research. In addition to holding 50% of the shares in KSAT, NSC owns 90% of the Andøya Rocket Range.

## Kongsberg Gruppen (KONGSBERG)

KONGSBERG is an international, knowledge-based group that supplies high-technology systems and solutions to customers engaged in the oil and gas industry, the merchant marine, and the defence and aerospace industries. KONGSBERG's main companies are:

- Kongsberg Defence Systems (KDS)
- Kongsberg Maritime AS

Both companies' areas are based on exceptionally high level of technology and the ability to commercialize technical innovations. KONGSBERG's four core areas of excellence; signal processing, engineering cybernetics, systems integration and software, permeate the business areas.

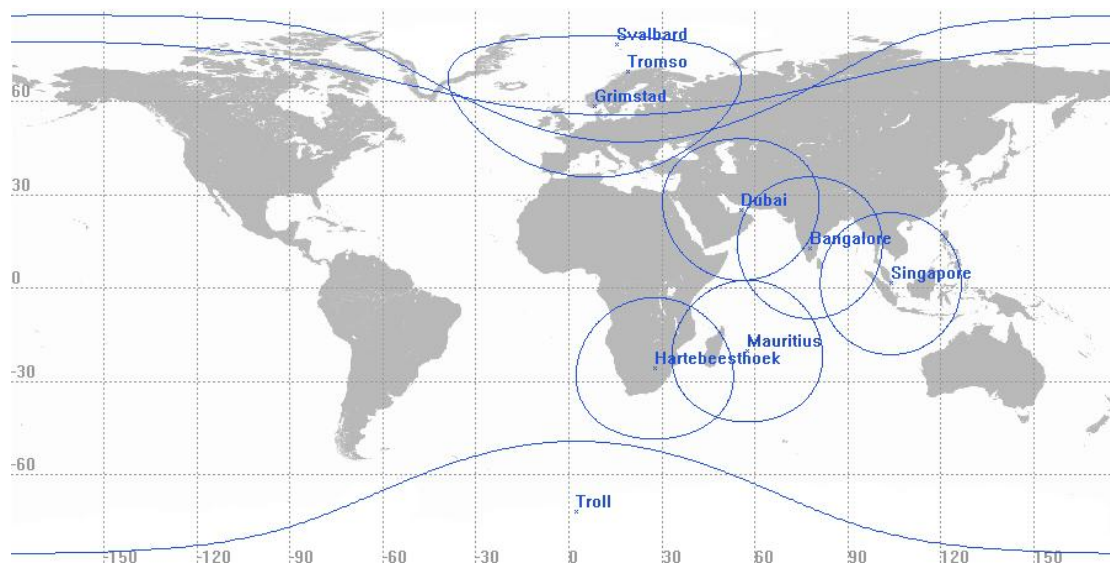


## The KSAT Global Ground Station Network

KSAT is the global leader in providing ground station network services including Telemetry, Tracking and Commanding (TT&C) and Data Acquisition services, with experience going back to 1967.

KSAT is providing a global ground station network consisting of both polar and mid-latitude stations as illustrated below:

With this global interconnected network of state-of-the-art multi-mission facilities, decades of experience and a track record demonstrating constant dedication on quality and customer satisfaction, KSAT is the very leading Ground Network Service provider anywhere and everywhere.



The KSAT owned and operated polar ground stations consist of the Arctic Tromsø (69°N), the High-Arctic SvalSat (78°N) and the Antarctic TrollSat station (72°S). These stations comprise a truly unique Pole-to-Pole capability providing customers with cost-effective coverage.

In addition to the polar ground stations, KSAT own and operate mid-latitude ground stations, including Singapore, Bangalore, Dubai and Hartebeeshoek ground stations. In addition the KSAT network includes a long list of partner sites, provided through well established partnerships around the World. This reflects KSATs effort to offer a truly global network of ground stations.

The complete KSAT network is operated as one single interconnected network out of the Tromsø Network Operations Centre (TNOC). TNOC performs remote control of the KSAT ground stations and provides the customers with one single point of contact to global coverage. This is the perfect solution for satellite owners and operators with exceptional demands on rapid data acquisition and frequent satellite contact.

### Customers include:

- NASA/JPSS
- NOAA
- ESA
- EUMETSAT
- JAXA
- ISRO
- NSPO
- DigitalGlobe
- GeoEye
- Iridium
- RapidEye
- Deimos
- DLR
- KARI
- Iridium
- Arianespace
- MDA
- CSA/RSI
- Galileo

- and others.

## The Tromsø Station



The Tromsø Satellite Station was established in 1967, and the HQ of KSAT is located in Tromsø. Tromsø is the capital of northern Norway, and is situated north of the Arctic Circle.

The main activity at the Tromsø Station is data reception from Earth Observation satellites, data processing, distribution and archiving. Operational near real-time data analysis for oil spill detection and ship detection services are performed here.

Tromsø Network Operations Centre (TNOC) is located at the Tromsø site. TNOC performs remote control of the KSAT ground stations and provides access for clients to the antennas located at the four ground stations.

KSAT operates multi-frequency receiving antenna systems, and KSAT also hosts data reception and TT&C systems owned by customers.

### **Svalbard Satellite Station, SvalSat**

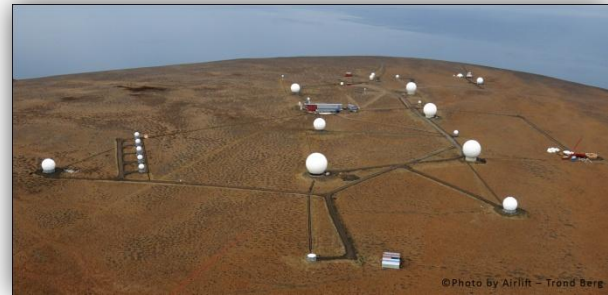
Svalbard Satellite Station, located at 78°N (1200 km south of the North Pole) on Spitsbergen, was established in 1996. It is located 450m above sea level at "Platåberget", 20 minutes outside Longyearbyen. Because of its geographical position, SvalSat is recognized as the best located ground station in the world for satellite control. SvalSat can cover all 14 of the daily 14 passes for most polar orbiting satellites.

KSAT has a crew of highly skilful engineers working continuously at the site.

SvalSat is today the World's largest commercial ground station with more than 30 state-of-the-art multi-mission and customer dedicated antenna systems.

In 2004 a redundant fibre optical communication links between Svalbard and mainland Norway was established. The fibre was initiated to ensure highly proficient and cost-efficient communication.

SvalSat station:



### **TrollSat, Antarctica**

In the spring of 2007, TrollSat, was opened at 72°S 2°E Antarctica.

The station provide S- and X-band support from 7.3 meter systems and communication via geostationary satellites and two independent Earth terminals.

This location enables KSAT to retrieve information twice during polar orbit passes (Pole-to-Pole concept), from both SvalSat and TrollSat. All TT&C services at TrollSat are performed by TNOC.



TrollSat station:



## Ground station services

The number of polar orbiting satellites used for Earth Observation, telecommunications and other scientific purposes are increasing.

KSAT focuses on supporting Telemetry, Tracking and Command (TT&C), LEOP and data acquisition services to owners and operators of polar orbiting satellites. The list below includes the range of ground station services offered by KSAT:

- Pre mission engineering and test support
- Launch support (including launch vehicle tracking)
- Launch and early orbit phase support (LEOP)
- Routine phase support
- TT&C in S-band
- Data acquisition in direct mode/data dump of on-board memory
- Back-up and anomaly support
- Hosting and operation of customer furnished equipment
- Data handling (archiving/processing and distribution)

KSAT has developed a unique concept for operations of the ground stations, with excellent reliability and proficiency. Tromsø Network Operations Centre (TNOC) operates and controls all the antenna systems available in the KSAT network..

With a large number of sites and antennas available, KSAT provides the very high reliability that is needed for Galileo constellation

critical support of satellite operations. KSAT provides services such as backup antennas or additional sites to ensure an uninterrupted service.

KSAT is focusing on providing multi mission ground systems with the capability to support a large range of different missions.

KSAT is a flexible service provider, offering tailor-made services to operators and owners of satellite missions.

Data acquisition, processing and distribution services are provided in direct mode for satellites passing over the station as well as from on-board tape recorders. SvalSat is the only commercial ground station in the world able to provide all-orbit-support to owners and operators of polar orbiting satellites. This is possible due to the extreme northern location on the Svalbard archipelago. This means:

- Global data dump for all orbits of polar orbiting satellites at one single site
- TT&C on every orbit from one single ground station

In addition to regular LEOP supports, KSAT has provided support for several launch vehicles as well as sounding rocket campaigns.

KSAT has also installed customer specific antenna systems for some customers.

These antenna systems are installed in cooperation with KSAT. KSAT will host and maintain these antenna systems and will provide to the customer access to the unique capabilities of SvalSat and/or TrollSat.





## Earth Observation Services

KSAT has supplied multi-mission near real-time services for more than a decade. The main focus has been marine applications, where services for oil spill, vessel detection, wind information and real-time image access for navigation are provided. The capability of providing near real-time customized information has been a key to the success of these services. KSAT focuses on customized multi-mission services, and development of new operational services tailored to user requirements has a high priority. Services for Emergency situations, land applications and ice berg tracking are being established as part of KSAT Rapid response and Near real-time service portfolio. KSAT is now also developing new data services particularly for forestry. KSAT will ensure operational access to multi-mission optical and SAR data products e.g. at a geocoded format suitable for forest mapping and monitoring.

## Multi-mission near real-time services

The distribution of SAR and optical data acquired and processed at the Tromsø Station, Grimstad, SvalSat and the Troll station in Antarctica represents a major element in the business activities. The processing facilities and distribution chain has been designed and developed for very fast deliveries of data to customers with operational needs. Near real-time is by KSAT defined as delivery of data and/or information in 30 to 60 minutes after acquisition.

Worldview -2, WorldView-1 and QuickBird. KSAT also contributes to the Norwegian investment in the Canadian Radarsat program, providing access to data for institutional and commercial customers at favorable conditions.

KSAT has a highly qualified order and supports centre and is a one-stop access point for multi-mission data users. Our services include planning and ordering support, scheduling, data acquisition, processing, value adding and dissemination of information – all through a dedicated and well defined interface.

KSAT is continuously working to reduce delivery time for supported missions. New concepts and service chains are being developed and tested in close cooperation with satellite operators and key end users such as Norwegian Defense and UNOSAT-UNITAR. Through these activities delivery time has been reduced to less than 2.5 hours for optical satellites and less than 15 minutes for SAR satellites. The target is Near Real Time deliver for all supported missions!

## Maritime environment and situational awareness

By utilizing state-of-the-art technology and experienced operators, KSAT provides satellite based oil spill and vessel detection services to coastguards and pollution-control authorities. The services are based on Synthetic Aperture Radar (SAR) in combination with optical imagery and integrated with non-space data.



KSAT process and deliver image products from Envisat, Radarsat-1, Radarsat-2, ALOS, Kompsat-2, Formosat-2 and Terra/MODIS. In addition KSAT has data distribution agreements for infoterra's high resolution SAR satellites; TerraSAR-X and soon Tandem-X, and Digital Globe's high resolution optical satellites;

The overall aim of these services is to provide detection and early warning of possible oil spills and associated sources for regional environmental monitoring, and to provide information about vessels and associated activity in a certain area at a given time. The information is relevant for the Defense, Coastguards and for authorities responsible for fisheries or ship traffic monitoring. The

## KONGSBERG SATELLITE SERVICES AS

P.O.Box 6180 NO-9291 Tromsø, Norway Office: Prestvannveien 38 Tel.: +47 77 60 02 50 Fax: +47 77 60 02 99  
E-mail: [ksat@ksat.no](mailto:ksat@ksat.no) Web: [www.ksat.no](http://www.ksat.no) Enterprise No.: NO 984 079 125 MVA





rapid delivery from the satellite service makes the information effective in support to surveillance means like coastguard vessels and surveillance aircrafts. Oil spill or detected vessels are reported to customers as fast as possible after satellite acquisition, typically 30 to 60 minutes.

The KSAT service has been used operational in Europe for many years and since 2007 a KSAT lead consortium has provided 24 European Coastal States with satellite based oil spill information through the CleanSeaNet service contract with the European Maritime Safety Agency (EMSA).

The KSAT Emergency response service allows rapid set-up of a complete multi-mission satellite based service for any given area. The monitoring density will be adapted to each individual case and can be adjusted as the situation develops. This service was activated and used during the first month of the Deepwater Horizon accident in Gulf of Mexico in April 2010. Such situations are characterized by a huge need for information – and short deadlines. One single satellite system will not meet all requirements, so the rapid set-up of the KSAT multi-mission service concept where end users have one access point to all applicable satellites is the optimal solution.

KSAT is continuously working on service improvement and development of new services. The new generation services is based on information derived from the satellite data, integrated with additional information such as wind, wave and current from SAR-images, numerical models information, observations, and additional geographical database information. KSAT also provides satellite imagery for measuring sea surface temperature and ocean colour. The new generation of integrated services will be a KSAT contribution to the Barents Watch system now being established in Tromsø under the responsibility of the Norwegian Coastal Directorate.



*Example on integrated service information.*

### **Ice navigation services**

Any journey in the ice-infested waters of the Arctic Ocean is a journey into the unknown with no up-to-date detailed map of the ice conditions readily available. Icebergs may represent a threat for offshore oil and gas activities as well as for commercial ship traffic and fisheries. KSAT is now developing a service where the aim is to detect and monitor the drift of the icebergs.

KSAT also provide near real-time access to the satellite images for users operating in the high North. These users can connect to the image server at KSAT in Tromsø to access the latest radar satellite image of the sea ice conditions immediately ahead of them. This enables the users to receive the very latest information on the sea ice conditions and use it for navigation.

