

# Norske kommersielle muligheter for små-satelitter (med fokus på jordstasjonstjenester og KSAT)

**Trond Vegard Rokstad  
Project Manager KSAT**

**[trondv@ksat.no](mailto:trondv@ksat.no)**



KONGSBERG

**200**

# Kongsberg Satellite Services

- World leading provider within our business area
- Supports almost 100 satellites
- Worldwide customer base
- Company history since 1967
- 130 employees
- HQ in Tromsø, Norway
- Branch offices at Svalbard, Oslo and in Stockholm.
- Operates 9 ground station facilities including both Antarctica and in the Northern Arctic



*Tromsø city*



SVALBARD



TROLL



TROMSØ



GRIMSTAD



SINGAPORE



HARTEBEESTHOEK



DUBAI



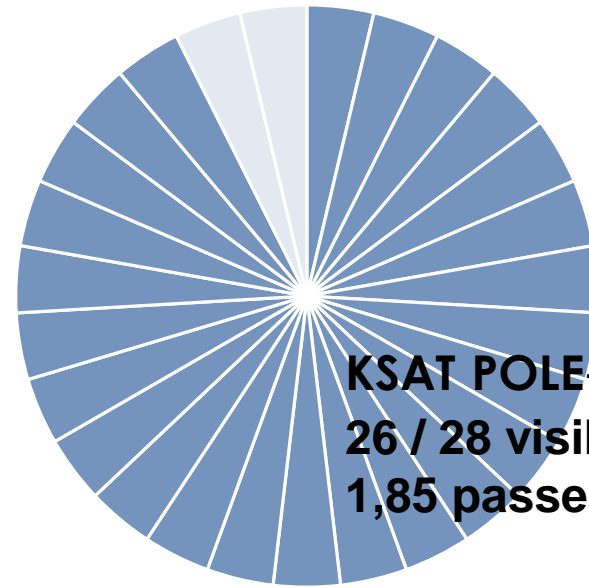
MAURITIUS

- **TT&C**
  - LEOP Phase Support
  - Routine Operations Support
  - Back-up and Anomaly Resolution
- **Data Acquisition**
  - Direct reception
  - Dump of on-board memory
  - Back-up Data Acquisition Station
- **Data Handling**
  - Data Archiving
  - Data Processing
  - Data Distribution
- **Hosting Services**
  - Maintenance and Operation of CFE
- 18000 passes per month
- Proficiency: 99.8% (average)
  - On-site redundancy/back-up
  - Highly flexible services
- High Speed Fiber Communication
- Experienced and Dedicated Staff
- 130 employees Tromsø, Svalbard, Oslo, Stockholm

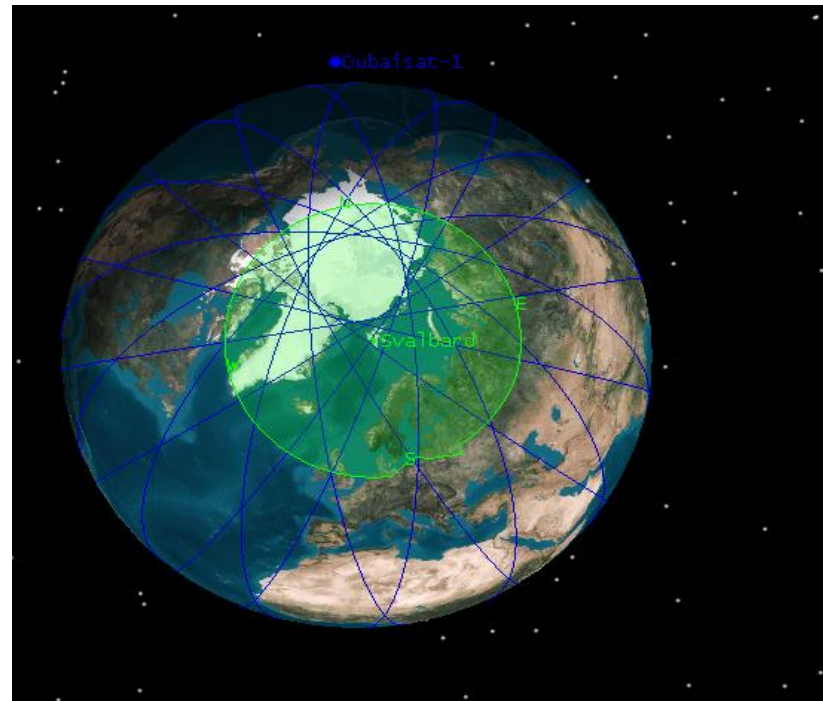
**ARTIC SVALBARD**  
**14 / 14 visible passes**



**ANTARCTIC TROLL**  
**12 / 14 visible passes**



**KSAT POLE-TO-POLE**  
**26 / 28 visible passes**  
**1,85 passes pr orbit**

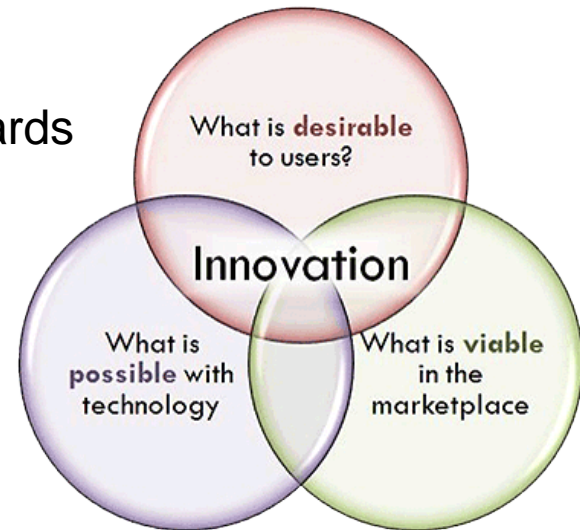


# Small Satellite Market

- Triggered by emerging commercial applications, reduced governmental budgets and new spacefaring nations, the industry move towards more low cost space systems
- Significant increase in number of small-sat launches
  - Mainly commercial, but also governmental.
  - Less expensive launches, less expensive satellites
- Immature market
  - Similarity of dot-com wave;
    - Trend-based Elon Musk «made space accessible» and trendy
    - Easy access of funding
    - Concepts like SkyBox is proof of concept (and Google acquisition 500 MUSD)
    - Market will most likely mature over next years – survival of the companies with a sustainable business plan.
- Analyzes of the Nano/Micro satellite market (1-50 kg) shows a strong trend-line.
- The small-sat market segment is populating and potential revenue is increasing.
- Volume is the key to success, also at ground segment!

# Small Satellite Market

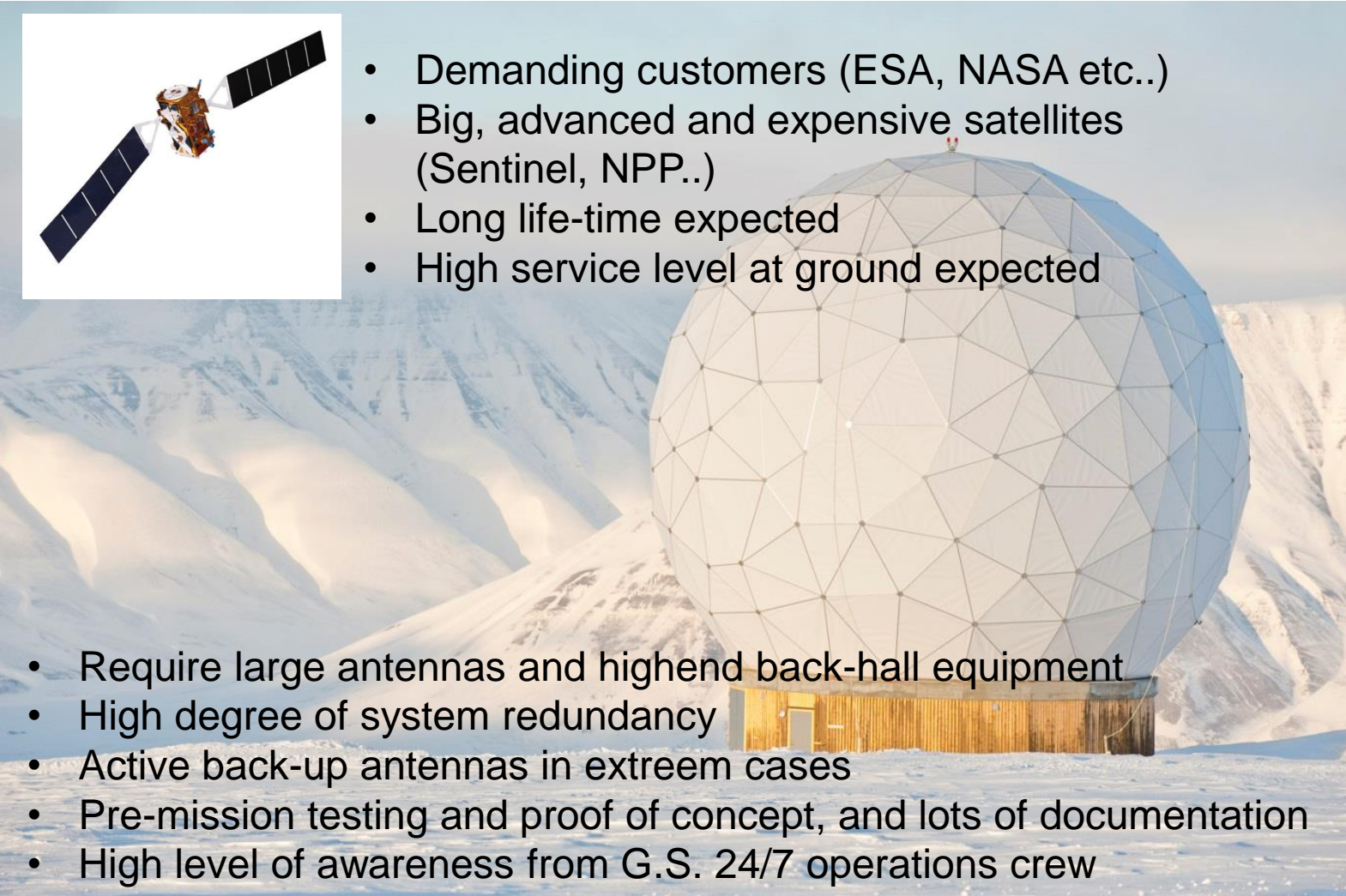
- The small-sat market is
  - using commercial of the shelf components
  - applying other branch standards
    - but also proven traditional low cost standards
  - they launch in volume
  - they hunt for available frequency spectrum from local authorities
  - Highly cost driven!!



# Traditional Ground Station Operations



- Demanding customers (ESA, NASA etc..)
- Big, advanced and expensive satellites (Sentinel, NPP..)
- Long life-time expected
- High service level at ground expected

- 
- Require large antennas and highend back-hall equipment
  - High degree of system redundancy
  - Active back-up antennas in extreem cases
  - Pre-mission testing and proof of concept, and lots of documentation
  - High level of awareness from G.S. 24/7 operations crew

# The bad match!



- Small Satellite Segment, demanding but not willing to pay.
  - Smaller and less expensive satellites
  - Higher volume of satellites
  - Shorter satellite life time accepted
- **Small Satellite segment at sized and expensive Ground Stations**  
=  
**Bad Match!!**



# KSAT adapting for the Small Satellite Segment



Low cost Space Systems -> Low cost Ground Systems



- **Builds up a ground station network tailored for small satellite missions**

# The good match



- **Small Satellite segment at small cost effective ground stations  
=  
good match!!**



# Requirements for low-cost ground station service

KSAT talked to a large number of smallsat players.

These are the top-level requests for smallsat ground stations we concluded:

- **Substantially reduced operational cost with low initial investment**
- High quality antenna systems and professional maintenance to ensure uptime
- Sometimes ok to compromise on operational requirements concerning antenna availability
- High flexibility requirements for pass selection and priority allocation

How did we solve the equation?

# KSAT light Concept

## Substantially reduced cost

- Smaller antennas (with lower RF performance)
- Automated operation and pass booking scheme
- Apply the same concept of large-scale operations to make use of synergies with KSAT's existing antenna network
- Standardized solution with minor tailoring needs

## Low initial investment by users

- KSAT owns and operates antennas
- Well established concept of Multi-mission antennas
- Benefits from existing infrastructure at KSAT sites

## Operational Requirements

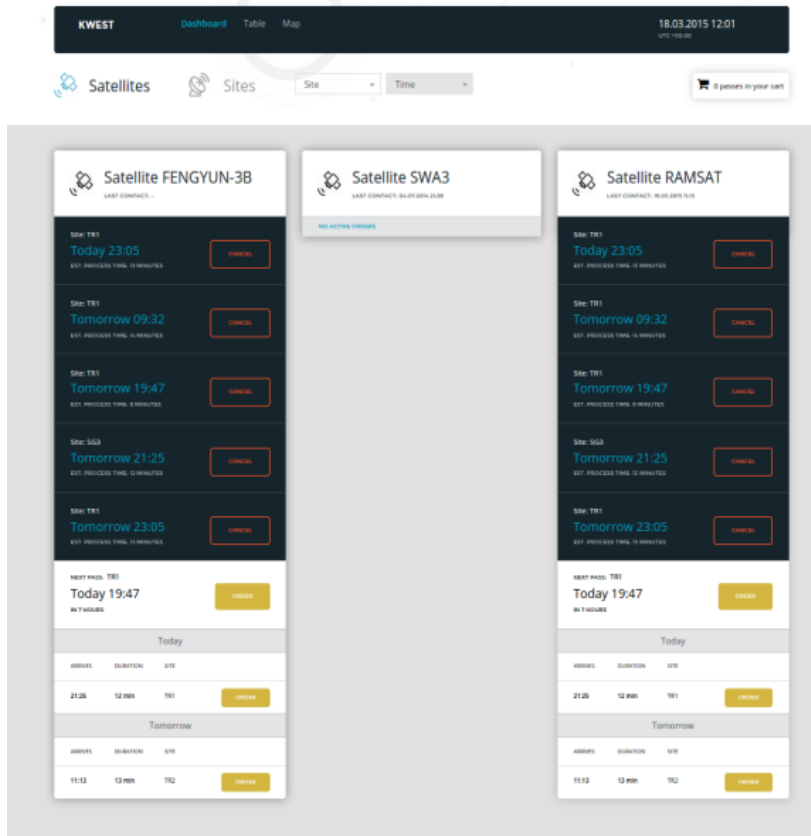
- Standardized SLAs with varying degrees of priority access
- More customers on same antenna lead to reduced cost
- KSAT is able to provide backup antennas through antenna pool concept
- High quality equipment and professional maintenance

## Flexible pass booking

- Web based antenna pass scheduler
- XML based scheduling
- Can be integrated for machine-to-machine scheduling



# KSAT light Concept



- «Web shop» to sell rest capacity
- More automated operations of the small satt antennas
- Cost effective antenna systems
- Cost effective M&C systems
- Find the good locations around the world in order to position also in the non-polar segment
  - Intresting market location?
  - Infrastructure?
  - Political situation?
  - Comm costs?

# What is KSAT edge ?

- **Location**, location, location – Svalbard and TROLL still important!
- Key experience and knowledge about **global ground station operations**
- Large customer base and **good market reach (mature market)**
- **Flexibility**
- **Capacity** – people and capital to build ground assets

# Whats the reward?

- Contracting the «right» small-sat customers will
  - Increase the number of supported satellite passes within our network dramatically
- Finding good ground station solutions will
  - Make our operations cost effective
- Together this will
  - Make KSAT the key player at ground also for the small satellite market.
- ***Cost effective solutions and high volume is our way to success in the small sat segment!***

# Our vision



KONGSBERG

200