



# The Kinuvik concept

## Unmatched polar connectivity for your satellite

**“Kinuvik” is the name describing the combined use of SSC’s dual polar stations in Kiruna (Esrange Space Center) and Inuvik (Inuvik Satellite Station Facility). Operated and bundled as one site, the Kinuvik concept provides the best arctic coverage available for LEO satellites by offering contact opportunity on every orbit.**

Launched in 2010, the Kinuvik concept was developed to optimize SSC’s ground station coverage on every orbit for sun synchronous (SSO) LEO satellite missions, as well as to increase redundancy and capacity by leveraging on its existing capabilities at Kiruna and Inuvik stations.

### **BENEFITS**

The unique features of the Kinuvik concept enable unmatched satellite commanding, payload tasking and significant data download opportunity on every orbit for LEO polar satellites, regardless of the orbit altitude.

The easy-to-implement and effective concept provides optimal polar coverage to the increasing needs of satellite operators’ missions. The unified combination of those two stations also provides the availability and scalability needed.

Kinuvik provides remarkable advantages thanks to its geographical diversity:

- Optimal Arctic coverage for regular large data volume
- Longer contact time on each orbit
- Reduced risk of radio frequency interference
- Increased availability and redundancy
- Scalability of mission needs and volume maximization with highly available Ka-band ground station services
- Reduced latency
- Cost efficient

#### Contact information

For further information please contact [info@sscspac.com](mailto:info@sscspac.com) and we would connect you with a representant from our regional sales or engineering team.

## REDUCED RADIO FREQUENCY INTERFERENCE

Kinuvik provides an extended coverage and contact time duration bypassing by far the capabilities of any single Arctic station.

The combined use of the Esrang and Inuvik satellite stations enables satellite operators to handle lower orbit altitudes with increased coverage for their passages. Kinuvik can provide significant contacts on every orbit, as low as down to below 500 km, suitable for many LEO missions with lower reference orbits.

For a single coverage area, the optimal coverage of Kinuvik exceeds most operator's requirements for data volumes and data delivery latency, while optimizing coverage of various areas of interest or complementing Direct Receiving Stations areas.

Meanwhile, the available apertures of the Kinuvik sites make it possible to provide parallel tracking, extended visibility, or tandem support for combined satellites (pair-/combined/tandem satellites) however needed.

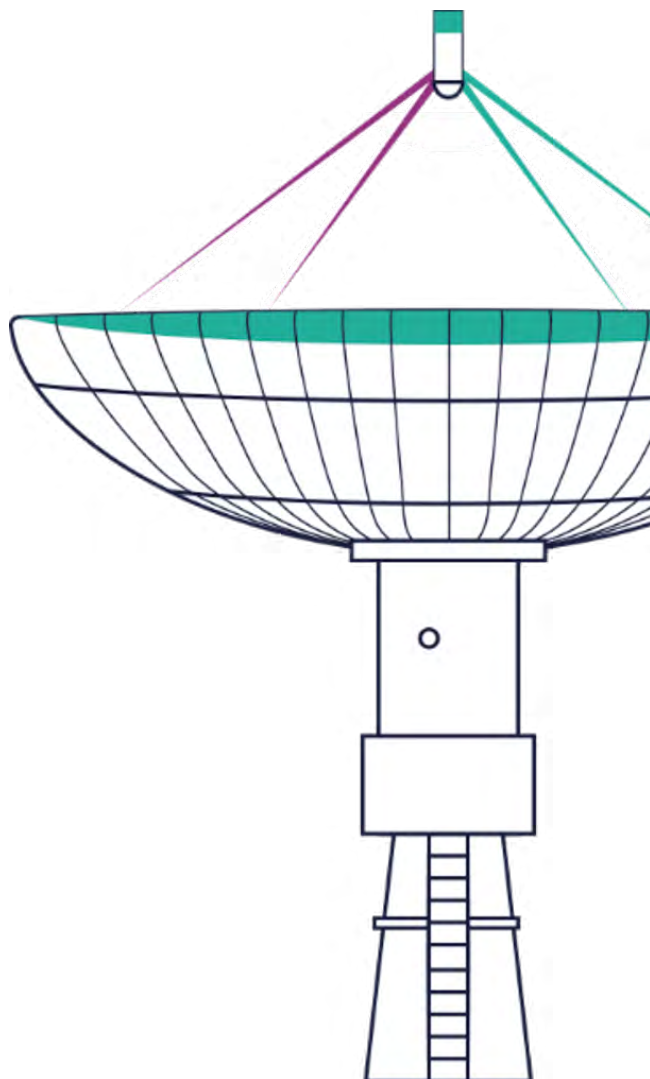
## OPTIMAL ARCTIC COVERAGE FOR REGULAR LARGE DATA VOLUME

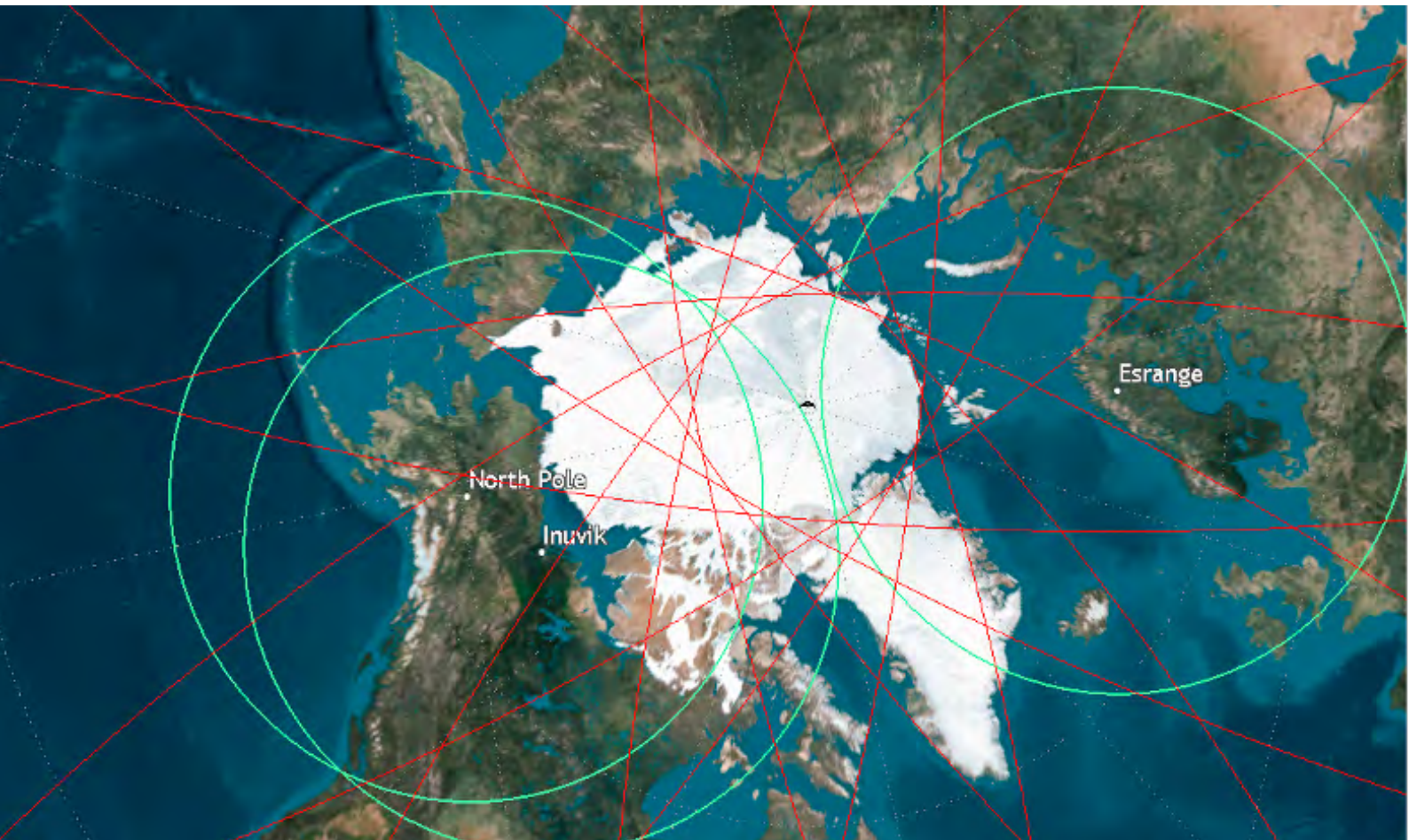
Esrang and Inuvik satellite stations share the same latitude and are separated by almost 180° in longitude. This geometric balance and distance make the Kinuvik concept optimal for satellites requiring long contact times for data dumps, as well as satellites in polar orbits, even below 500 km altitude, with one contact on every orbit.

The Kinuvik 'per orbit contact time' can reach up to 25 minutes or more per pass depending on the satellite's altitude. This long hand-over pass offers many benefits for satellite operators looking to optimize their operations.

Thanks to the combined force of the Kinuvik concept, SSC can provide every orbit at high elevations in the combination. The graph below highlights the contact times that can be expected over one pass for one ground station. Those who won't need the full duration of the pass can use a higher elevation and thus have a better link condition.

In addition to the beneficial contact duration that comes with the Kinuvik concept, the additional stations of the SSC's ground network offer added possibilities. Our ground stations in Florida, Hawaii, Thailand, Southern Chile and Western Australia line up with the shorter contacts from our polar stations, allowing for natural and balanced growth in global contact times and with reception of larger data volumes from polar satellite constellations.





SSC site combinations: Kinuvik and North Pole coverage at 600 km

## LONGER CONTACT TIME ON EACH ORBIT

Radio frequency interference issue between satellites in orbit is an increasing concern in the northern arctic region. The impact is significantly increased with larger antennas and use of low elevations.

Using not one but two polar stations, in different geographical locations, Kinuvik enables satellite operators to reduce the risk of radio frequency interference from simultaneous X-band downlinks closer to the North Pole.

Site diversity is the most effective mitigation of radio frequency interference. The Kinuvik solution enables both the use of smaller antennas and a proactive diversity scheduling between the two station facilities.

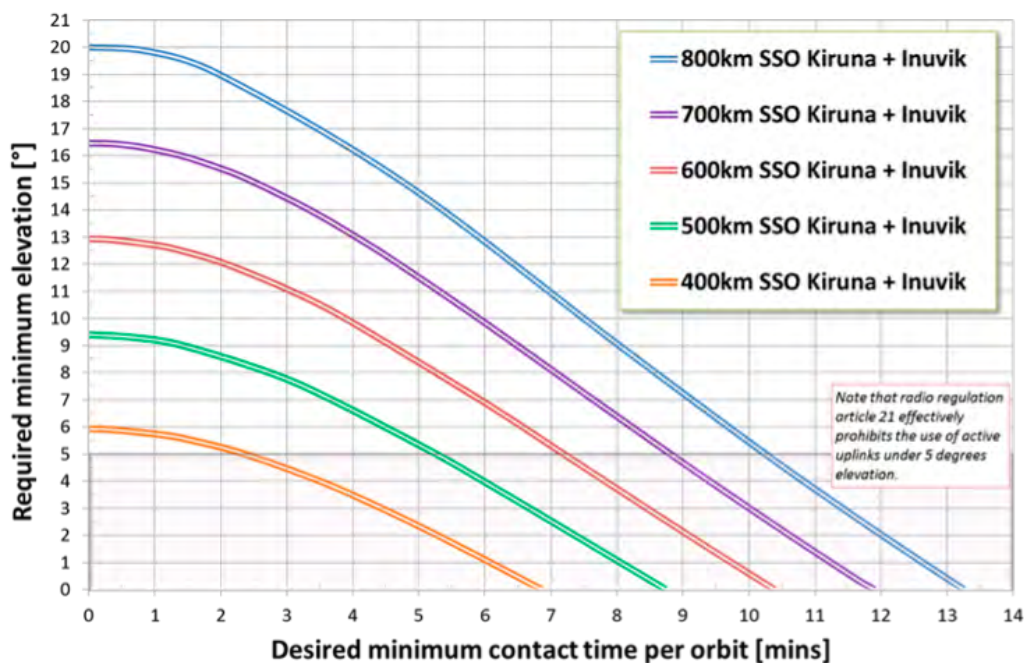
In addition to these features, the satellite stations in Kiruna and Inuvik both provide a latitude geometry where the majority of the satellite contacts are outside of the most susceptible high arctic region.

## INCREASED AVAILABILITY & REDUNDANCY

By combining the antennas available at each site, the Kinuvik concept guarantees a high level of antenna availability and flexibility to support every customer's mission. The availability of ground segment resources and the possibility to quickly adapt load sharing offers a significant advantage for satellite operators to optimize the connectivity between their satellite and the ground.

Selecting this combination of geographically diverse sites ensures the continuity of services in case of scheduling conflicts, emergency operations, failure, or even natural disaster. Simply, a reliable concept for high availability and flexible scheduling of redundant resources, which is a requirement for Ka-band and future optical communication.

**Kinuvik Contact Time**



## SCALABLE MISSION NEEDS & MAXIMIZED VOLUME

The ideal geometry and separation between the two stations in Kiruna and Inuvik allow greater volumes of data download by avoiding overlapping coverage.

The Kinuvik concept enables data downloads that are non-intrusive with respect to imaging areas, and avoids radio frequency interference issues from simultaneous downlinks closer to the North Pole. It also allows satellite operators to use both Inuvik and Kiruna stations at the same time with no scheduling issues, which is a huge advantage for higher data download possibilities and maximum reliability.

Having experienced a high demand and success for the Kinuvik concept, SSC is dedicated to upholding a high quality of service to its customers, adding additional polar support capabilities from Inuvik and Kiruna with more antennas in higher frequencies.

## SECURED CONNECTIVITY

Depending on the mission needs, the Kinuvik concept offers multiple ways to a secured connectivity. For missions that require reduced latency (i.e. more frequent contacts per orbit), we obtain latency and reactivity by the two-station contact. For missions that require real-time data download, the concept offers possibilities to do so per-orbit.

The Kinuvik concept can also be advantageously combined with SSC's southern hemisphere stations coverage, providing a strong offer through even longer coverage and connectivity.

## HIGH PERFORMANCE

The Kinuvik solution is an attractive and solid concept used by many operators with excellent performance levels.

## COST EFFECTIVE

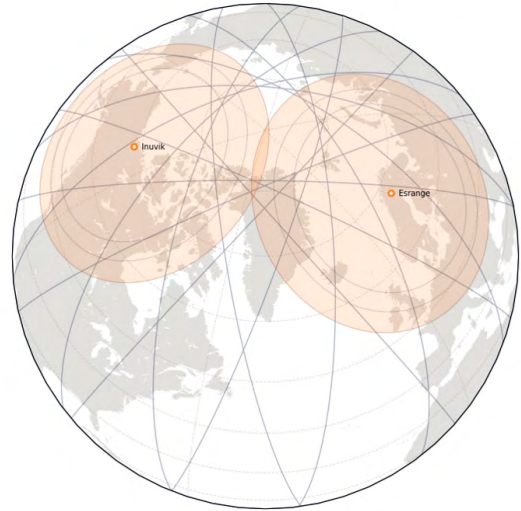
Today, the ground network is recognized as a strategic component that contributes to the overall organization's success.

Consequently, the ground station network planning comes early in the satellite mission design and operation concept phase. Most satellite operators aim for an early organization to better optimize their missions in a cost-efficient way.

Kinuvik offers a unique and cost-effective ground station solution for optimizing a mission's ground network design, where contacts can be balanced between the sites and short-low elevation contacts can be

avoided. The two-station solution also offers the opportunity to redo the link budgets and performance requirements using a balanced operational minimum required elevation per station based on required contact time.

In addition, the Kinuvik solution does not require presence in both Canada and Sweden to obtain the benefits of the two stations combined. By default, SSC routes the communication for both stations from one point of contact. Thus, satellite operators only need one local connection to access SSC's whole satellite station network.



The Kinuvik ground station combination at 400, 550 and 750km altitude



The Kinuvik concept combines the force of two stations