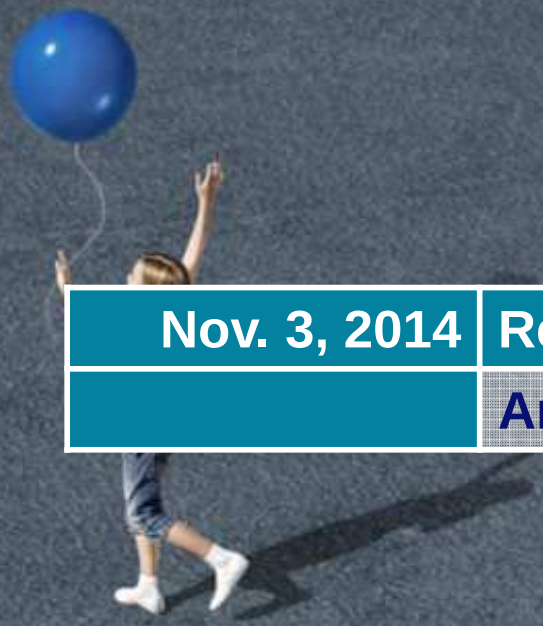
WE LOOK AFTER THE EARTH BEAT



Nov. 3, 2014	Response of Thales Alenia Space to NTIA's
	Arctic Telecommunications Notice of Inquiry

83230910-DOC-TAS-EN-001

2014/10/27

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Introduction (1/2)

- Thales Alenia Space (TAS) is pleased to submit this short presentation in reply to NTIA's Arctic Telecommunications Assessment NOI, published in the Federal Register on October 3, 2014.
  - TAS is a major European-based satellite manufacturer with significant expertise in building geostationary (GEOs) and non-geostationary communication satellites (NGSOs).
  - It is the prime contractor for the Globalstar 2 and Iridium NEXT NGSO mobile communications constellations and the broadband trunking constellation being launched by O3B Networks.
  - Organizationally, TAS is a joint venture between Thales Group (66%) of France and Italy's Finmeccanica (33%), both leading industrial organizations in Europe with significant presence and involvement in the US market.

Introduction (2/2)

- Arctic broadband telecommunication demand is expected to grow in future years. While the NOI properly directs its questions at the needs of communities in the Arctic regions, any business plan for infrastructure improvements in the region should also take into consideration the following trends:
  - Maritime: new shipping routes will increase potential telecom traffic
  - Aeronautical: trend towards cross polar routes to save fuel and time
  - Governmental: increased economic activity will require larger governmental presence (as recognized by recent US Coast Guard and US Navy white papers)
  - Energy: new areas will open up for exploration of natural resources
- Taken together, these trends point towards the basis for either a privately funded business plan or a public-private partnership

Introduction (3/3)

- Commercial GEO satellites cannot ensure reliable coverage above 70° latitude, due to the low “look angles” for earth stations pointing south towards the Equator above which the GEOs are located.

- Therefore, TAS has studied an alternative, scalable solution to support a sustainable extension of telecom services which it presents in outline here.

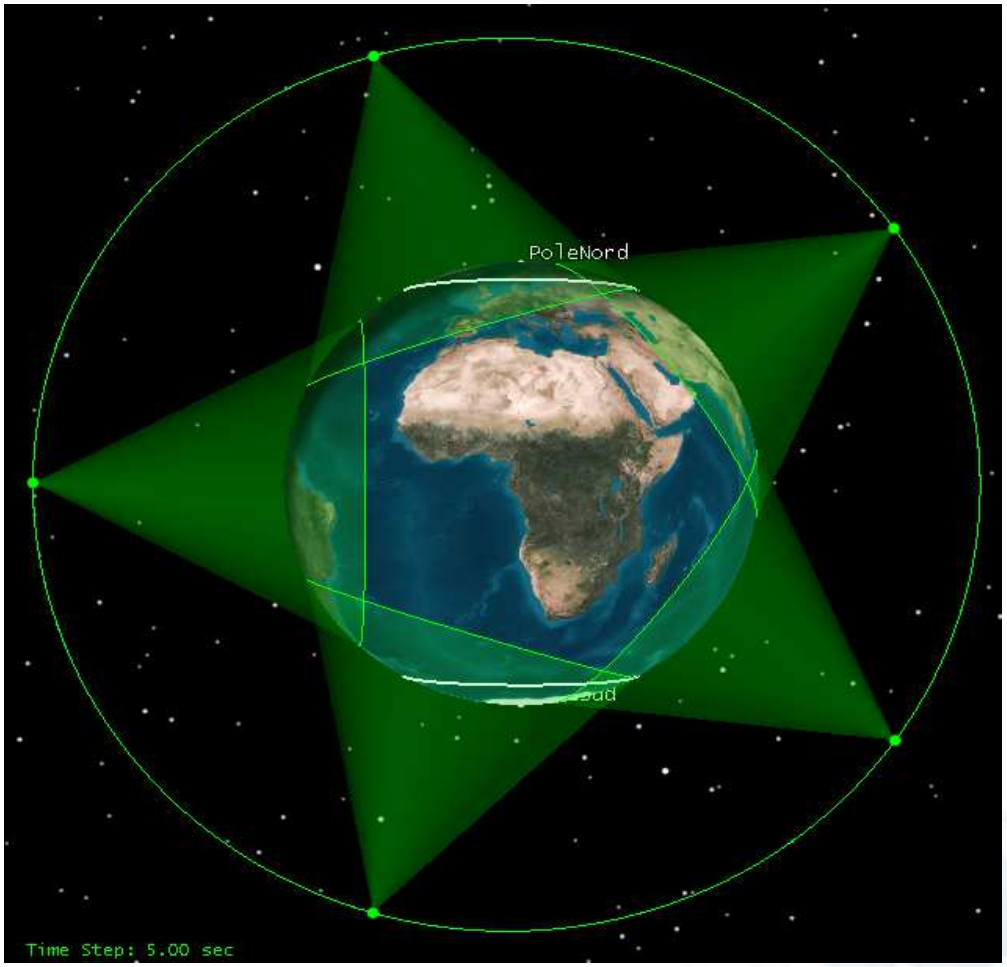
- Key features:
  - Seamless connection to the terresterial infrastructure
  - Flexibility to meet demand for a variety of customers
  - Scalability to match rising demand
  - Reduced risk for a solution based on already developed and launched technologies

Medium Earth Orbit (MEO*) System Concept

* Medium Earth Orbit: above 2000 Km

MEO constellation for Arctic (and Antarctic) Communications

- One 90° inclined circular orbital plane (flying over the poles, similar to some weather satellites)
- 5 satellites (only 1 launch)
- ~7000 km altitude for low latency (<180 ms)
- 15 years satellite lifetime
- Service continuity thanks to hand-over mechanisms
- Steerable spot beams cover anywhere in polar regions >65° latitude



Both north and south polar area coverage, high QoS and high reliability

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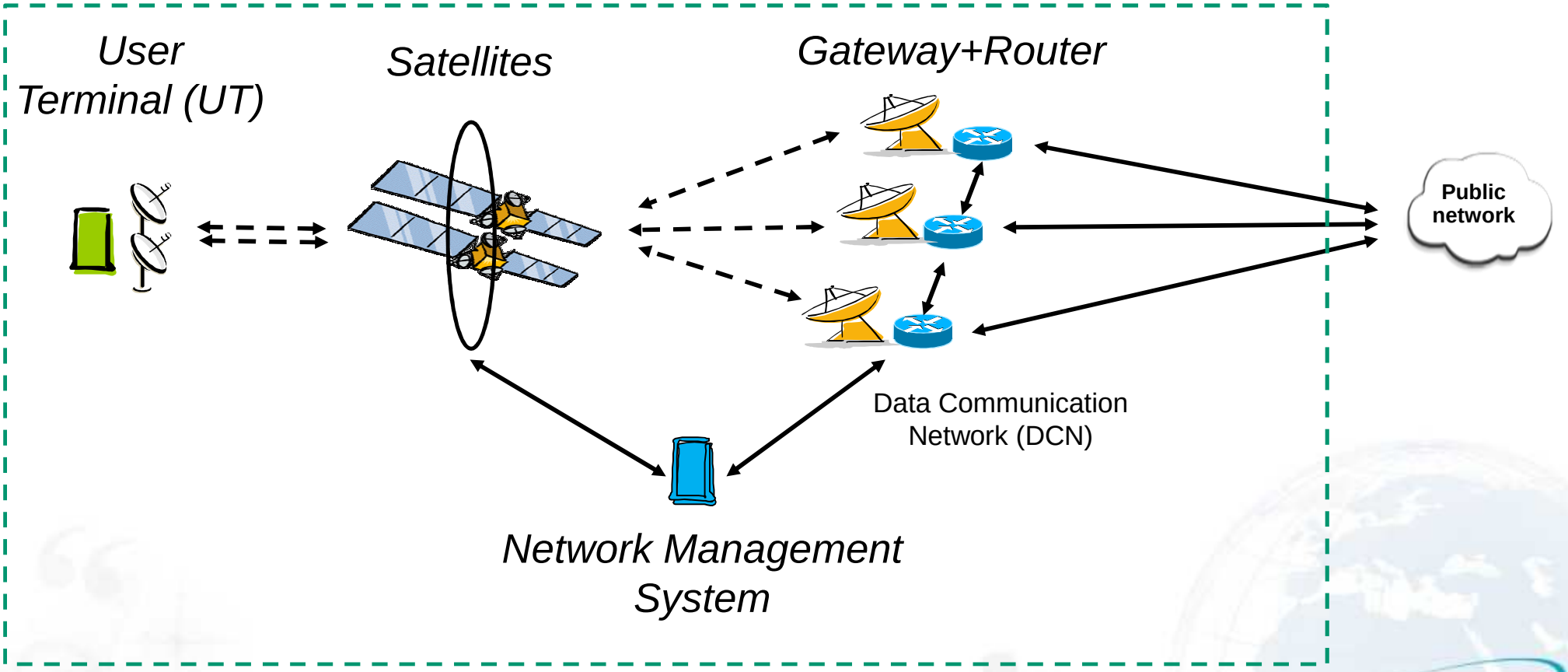
Polarcom infrastructure concept

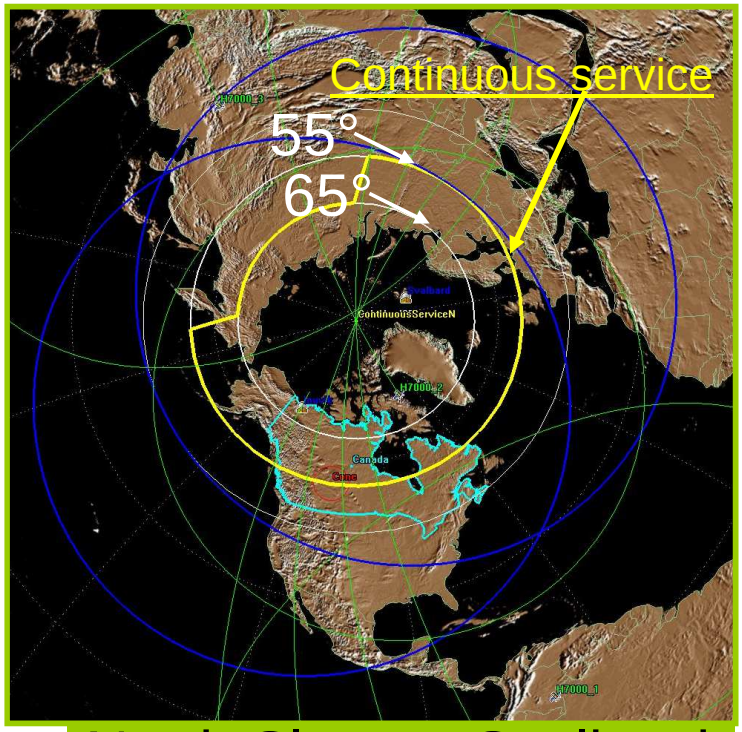
MEO Polar Communication System – Infrastructure design
Shown assumes service extended to Canadian and Scandinavian Arctic



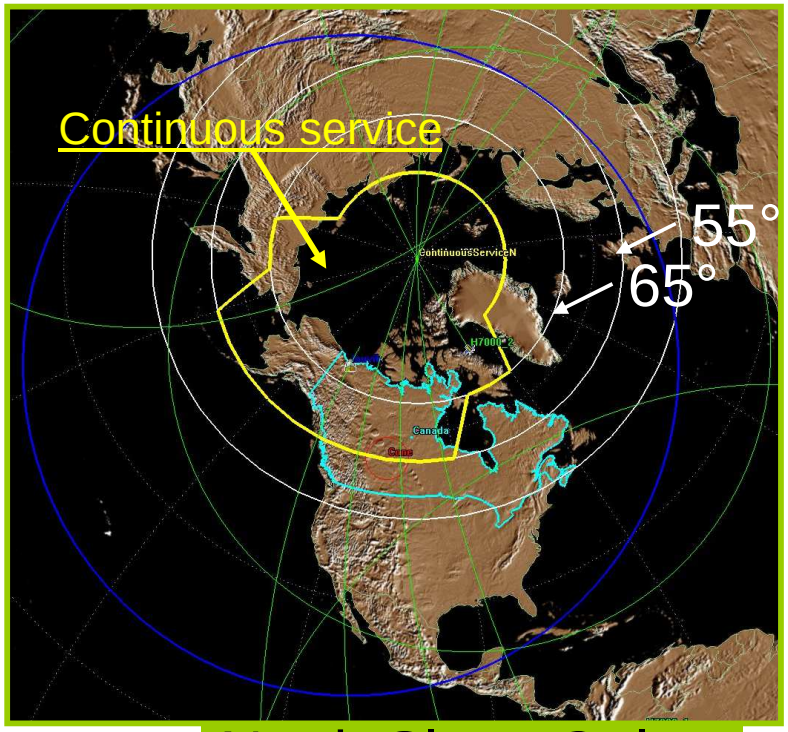
Targeted service offerings

- Broadband
  - User Terminals (UT): antenna dish 60cm to 1m in diameter
  - Service rate: Up to 30 Mbps on the forward link and 5 Mbps on reverse link using Ka-band
  - Total throughput: Up to 2 Gbps forward and return
- Service types
  - Internet: data file transfer, remote monitoring, VoIP
  - Backhauling of mobile phone communications
  - National security Intranet
- Network topology supported
  - Star: Anchor gateway serving a set of UTs in one or several cells
  - Mesh: UT to UT in same beam

Example of Service in Arctic area



North Slope + Svalbard



North Slope Only

- Continuous services areas with 10° elevation minimum
  - Everywhere within Arctic area above 65°N latitude
    - With 2 gateways : North Slope + Svalbard
  - For northern Alaska from 55°N latitude
    - With 1 gateway

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Conclusion

- Use of newer NGSO satellite technologies offers practical alternatives to GEO satellites for high quality telecommunications links to remote Arctic communities and users
- Satellites remain the most practical means for delivering both basic and advanced communications services to remote areas
- The solution outlined here would allow the United States to take the lead as it becomes chair of the Arctic Council

A MEO solution will make polar broadband communications practical and possible

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