Wireless Arctic Network Prototype

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Wireless Arctic Network Prototype
2-Year User Needs Assessment Completed for...

• Telemedicine
• Education
• Public
• Scientific Research
• Local Government
• Federal Government
• Hydrocarbon Exploration
Wireless Arctic Network Prototype
2-Year User Needs Assessment …

Needs are summarized in a pending NSF proposal to CISE and OPP. General arctic communications needs are...

• Improved Bandwidth (variable depending on application)
• Real-time, integrated, standards based (IP) data, voice and video (extensible, interoperable) communications
• Redundancy (improved reliability)
• Distribution (improved reliability)
• Mobility
• Security
Wireless Arctic Network Prototype
2-Year User Needs Assessment Completed for…

Need for a primarily commercial arctic wireless communications infrastructure (supplemented by temporary government communications infrastructure during research and development when and where necessary) to make the network sustainable and cost effective.
Wireless Arctic Network Prototype
2-Year Market Analysis Completed

<table>
<thead>
<tr>
<th>User Community</th>
<th>Current ($/year)</th>
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</thead>
<tbody>
<tr>
<td>Telemedicine</td>
<td>$140-180 Million</td>
</tr>
<tr>
<td>Education</td>
<td>$60 Million</td>
</tr>
<tr>
<td>Public/Gov Internet</td>
<td>$8-12 Million</td>
</tr>
<tr>
<td>Public Voice</td>
<td>$30 Million</td>
</tr>
<tr>
<td>Hydrocarbon Exploration</td>
<td>$2 – 3 Million</td>
</tr>
<tr>
<td>Hydrocarbon Development</td>
<td>$10-14 Million</td>
</tr>
<tr>
<td>Aggregate Usage</td>
<td>$250-300 Million</td>
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</tbody>
</table>
Wireless Arctic Network Prototype
2-Year NASA-funded Technology Evaluation

*Partners*...
University of Cincinnati
University of Alaska at Fairbanks
Barrow Arctic Science Consortium (NSF)
NASA Glenn Research Center
AT&T
Wireless Arctic Network Prototype
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Technologies considered...
Iridium-like LEO
Iridium-like LEO (bonded)
LEO or MEO/GEO mesh
Terrestrial Microwave Links
Flying Platforms – Tethered
Flying Platforms – Stratospheric UAV
Flying Aircraft Network
Traditional geo-synchronous satellite
Molniya Orbit satellites
General Conclusions....

Major technology gaps...
IP network protocols for secure, mixed-latency, adhoc mesh architectures.

Major infrastructure gaps...
Wireless arctic networks.
Wireless Arctic Network Prototype
2-Year NASA-funded Technology Evaluation

*General Plan...*
Phased, real-world, wireless arctic network technology demonstration of improved protocols and infrastructure with increasing coverage, bandwidth and standards-based communications technology heterogeneity, redundancy and reliability.

(Not everything works as advertised so we plan to test and phase investments iteratively in the prototype.)
Wireless Arctic Network Prototype – Phase 1

WAN Prototype (Early) - Dedicated C-band, T-1 Geosynchronous Backhaul into BASC at Barrow

BASC at Barrow

Anchorage, Alaska
Success…

Phase 1 will be complete in late May.

This provides a test-bed with which to refine the original needs assessment and to support a refined installation of Phase 2.
Wireless Arctic Network Prototype – Phase 2

WAN Prototype (Year 4) - UAV/FAN (Proxy) network with C-band GEO, Ka-band TDRSS, Iridium and Fibre Optic Backhauls for Mobile and Ad Hoc Networks
Wireless Arctic Network Prototype – Phase 3

WAN Phase 3 - UAV network with Molniya Orbit, MEO/GEO Mesh and Fibre Backhaul Ad Hoc Network = WGN

Prudhoe Bay, Alaska

BASC at Barrow
Wireless Arctic Network Prototype

Opportunity...

Leverage the Wireless Arctic Network Prototype for international polar and global wireless network technology development and scientific research support.