Case Study

AWI: The Alfred Wegener Institute IP-Based Videoconferencing from Antarctica

VCON

Background:
The Alfred Wegener Institute (AWI),Germany's leading polar and marine research organization, coordinates Polar expeditions from its main research facilities in Bremen, Germany. The Institute provides equipment and logistic support to its Neumayer Station located on the Ekström Ice Shelf in the Antarctic. The Neumayer Station houses meteorological, geophysical and air chemistry observatories.

The Need for a Videoconferencing Solution:
A videoconferencing solution provided two primary benefits to the Institute. The Institute was seeking a unique method of sharing their research with the public. According to Hans Pfeiffenberger, AWI Information Technology Department manager, "We wanted to provide an opportunity for children and young students to observe, in the most direct way possible, how the Institute conducts research. We wanted to whet their appetite for the natural sciences and especially polar and marine research." Students had the opportunity to speak directly to the scientists and technicians about their work and living conditions on the remote ice shelf.

From young children to the elderly, the public was transfixed by the lively conversations they were able to conduct via the interactive communications capabilities made available. It was clearly beyond anything which could be achieved via a simple telephone call. Suddenly students were able not only to hear the remote scientists, they were able to view actual performances with polar logistical equipment in addition to engaging in interactive communication with words, facial and hand gestures - As if they were right there on the ice shelf with the scientists! Clearly a vast improvement over simple telephone interviews or even a live video presentation. This was truly interactive.

Not only did the public benefit from AWI's teleconferencing capabilities, the Neumayer staff had much to gain from the technology as well. No more than ten people, including scientists, engineers, a doctor and a cook winter at Neumayer, often remaining in Antarctica for as long as 15 months at a time. The Station, completely isolated from the outside world for nine months of the year, can only be contacted via satellite communications during those months.
In seeking a solution which would allow direct communications between the isolated staff of the Station and AWI scientists in Germany, planners needed to consider both the distances involved and the extreme temperatures of the Antarctic which would normally cause much of the equipment to freeze. The Institute partnered with CeBeNetwork and VCON to develop a system enabling direct interaction between the Station's staff and scientists and support staff providing guidance from their home base in Germany.

"Videoconferencing will greatly improve communications between researchers, especially in fields related to climate which require global collaborations thereby enhancing researcher capabilities." According to Pfeiffenberger.

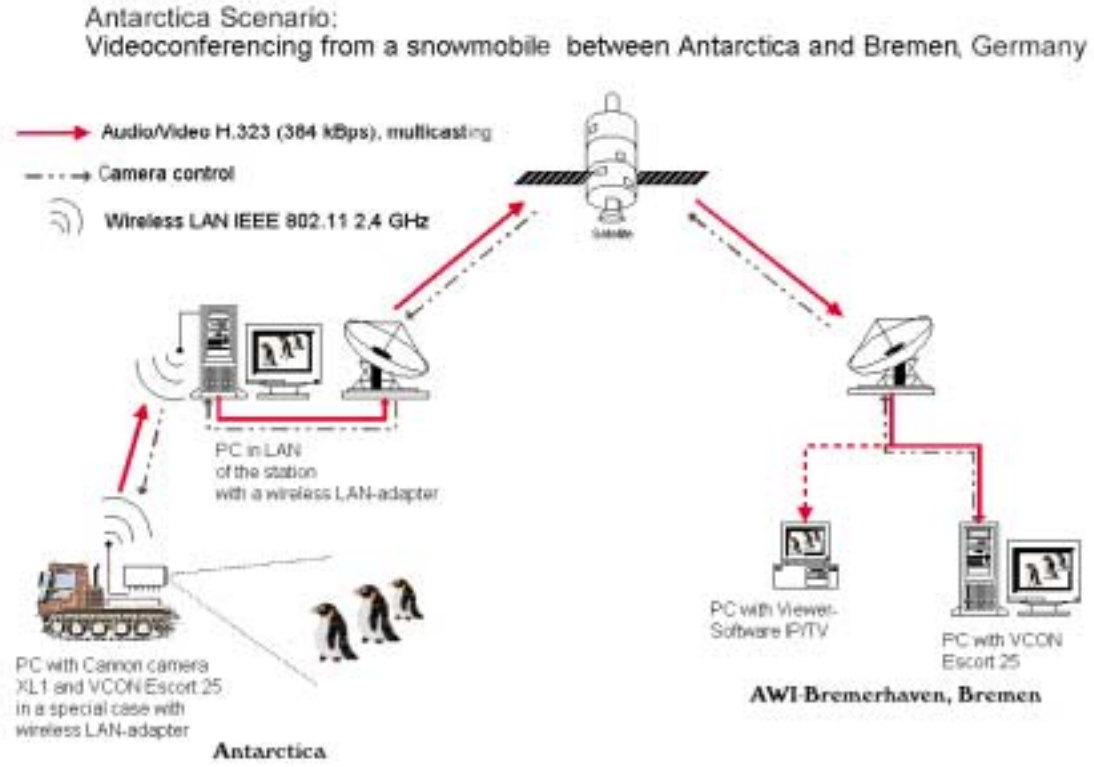
Installation and Operation:

The inherent challenges of operating under the extreme weather conditions of the Antarctic required a unique set-up. Since the scientists in Germany needed to be able to directly observe the experiments being conducted outdoors, they required a solution that would protect the equipment from the extreme Antarctic conditions. A portable PC was packed into a heated box to protect it from snow, ice drifts and vibrations and to ensure that the display wouldn't freeze. The entire system was then mounted on a snow mobile for outdoor use. The new canon XL1 digital camera was used along with a microphone especially designed to withstand wind velocities of up to 80 km/h. All the electronic equipment including PC, heating system, camera, and the adapter for the wireless LAN, was powered by a separate generator located on the snowmobile along with the rest of the hardware.

Two Escort 25 Pro models were installed at the Neumayer Station. An Escort Pro and a Cruiser 384, for large conference rooms, were installed in the Bremen headquarters. The systems were configured and installed by CeBeNetwork GmbH.

A wireless LAN connecting the Neumeyer station with the snow mobile, was split by a relay station. BreezeNet components with a range of up to 20 km and bandwidth of 1-3 Mbps. were installed. A unidirectional antenna link for each direction overcame the challenge of linking the Neumayer station with the relay station separated by 20 km of ice shelf. A bi-directional link with one antenna capable of supporting video conferencing from moving vehicles connected the relatively short distance (1000 m) from the ice shelf to the coast.

The scientists in Bremen were connected via a 155 Mbps satellite link provided by Deutsche Telekom AG. Before shipping the components to the Antarctic, the satellite connection was tested by simulating the runtime of the signals between Bremen and



the satellite with equipment provided by Deutsche Telekom AG.

Benefits of the System:
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It would have been difficult to perform such experiments in remote and inhospitable locations without teleconferencing capabilities to link researchers with remote sites. According to Michael Schmidt, CEO of CeBeNet, "All those working with the system have shown enormous enthusiasm for its capabilities. The scientists based in Germany are able to observe their experiments in Antarctica via teleconference technology". Not only does this allow them to view, first hand, the operation of experiments planned in Germany, but it also provides an invaluable opportunity for them to make any necessary updates to their experiments, in real time.

On a personal level, videoconferencing capabilities have meant that the Neumayer Station staff members who spend over a year cut off from civilization, are now able to maintain personal contact with their loved ones in Germany. The system also provides an invaluable opportunity for students to see remote Polar experiments performed, first hand.

Global Interest:
The unique setup generated an enormous amount of interest in AWI's videoconferencing application. In July, the World Expo 2000 in Hanover included a videoconference with the Neumayer Station and various television stations in Germany have held classes for students from regional schools providing them the opportunity to communicate with the remote Neumayer Station team. The results of AWI's videoconferencing capabilities were presented at MegaConference II, where speakers situated throughout the world used H.323 video conferencing technology to communicate their real-world applications. It was truly an event of science in action. Their presentations were presented in real time, except neither the presenters, nor the chair, were physically present in Atlanta. The lectern was empty. This was the world's first totally remote-by-Internet conference. The German Maritime Museum of Bremerhaven was also able to utilize AWI's setup to hold weekly conferences.

An Eye to the Future:
As a result of their successful operation of VCON's teleconferencing hardware under extremely adverse physical conditions, the AWI (Alfred Wegener Institute) has decided to utilize teleconferencing solutions more widely, throughout their organization. AWI has a research station location on Spitzbergen Island as well as additional locations throughout Germany. The Institute's vision for the future involves eventually connecting these various locations via a network of video conferencing solutions to eventually provide remote lectures and create virtual universities, thus significantly reducing the high cost waste of time involved in travel between various sites.

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Rev 1 12/03