

Air Safety Over Egypt Globecomm Delivers Next-Gen Air Traffic Management Communications

The National Air Navigation Services Company (NANSC) of Egypt has a long history of using satellite to help control air traffic. Beginning in 1990, NANSC tied together its airports and remote radar stations with a Multiple Channel Per Carrier (MCPC) network that carried radar data as well as voice traffic from the radio communications between pilots and controllers. The network coordinated the coverage of most of Egypt's airspace and represented a big step forward in air safety.

The Nineties was a time of strong growth in air travel, and by 2003, it became clear that the surveillance radar and the communications network were in need of an upgrade. After a highly competitive bidding process, NANSC awarded a contract for a new satellite-based communications network to Globecomm.



"The network we proposed," says Globecomm Senior Vice President Steve Yablonski, "represented the next generation in Communications, Navigation and Surveillance, Air Traffic Management (CNS/ATM) applications. It's a standards-based network that encodes all of the data and voice traffic into a TDMA frame relay platform running over satellite. Nobody had ever done it before. But we believed it would deliver higher reliability and would be achievable with today's technology."

Challenges of Complex Traffic

Achievable it was – but easy it was not. The job was awarded in February 2005 and Globecomm was ultimately to devote more than eight months

to developing the network solution before shipping the first equipment to Egypt.

The technical challenges were significant, according to Senior Vice President Paul Johnson. "The network connects 20 CNS/ATM sites including the Cairo hub and other airports, radar and VHF stations around Egypt," he says. "It provides a unified transport layer for phone calls, wire circuits, asynchronous data service, IP data, and 4-wire voice for VHF air-to-ground circuits. Each kind of traffic has its own issues. We aggregated it all onto a frame relay network for efficiency, and then worked to meet the requirements of each kind of service. Some of the traffic is very sensitive to jitter; a 20-30 millisecond variation in delay in the air-to-ground voice creates echoes that would make it hard for controllers and pilots to hear each other clearly. The solution was to run permanent virtual circuits under the frame relay layer. It took a total of five main circuits, plus two backups for each circuit, to give each service the kind of channel resilience needed for optimum performance."

The multiplexer became a mission-critical component in managing this level of complexity. "In the R&D phase and during integration, we worked closely with the Mux subcontractor," says Steve Yablonski. "By the end, we had gone through 15 revisions to the Mux firmware to deal with timing and other issues, as well as adding automatic failover to backup equipment."

Paul Johnson offers an example. "The VHF air-to-ground traffic has FSK signaling tones and other data embedded in it. At first, the multiplexer codec was disturbing this. Our Mux vendor worked with us to develop a version of firmware with the right quality and compression rate to pass the audio, the signaling and the embedded data."

Technology Teamwork

The need for technical partnerships did not end with the multiplexer. The communications network also had to integrate with the new and upgraded radar systems being installed by NANSC's radar contractor. "Getting the satellite segment

data transportation algorithms to deliver the radar data correctly was definitely a challenge," says Paul Johnson. "However, using Globecom's well-proven ability for co-contractor teamwork, ably supported by our in-country partner, Adcom, we built a chain of technical collaboration extending from Egypt through France and the UK to the USA."

Eng Tarek Amin Malash, CEO of Adcom, said. "Adcom's previous relationship with the radar contractor's in-country representative fostered the cooperative working relationship, which allowed our teams to deal with issues that crossed otherwise rigid contractual boundaries".

Paul Johnson adds, "As well as dealing with these kinds of issues, Adcom's know-how also enabled them to be the in-country prime contractor for the buildings and other civil works, E&M and HVAC systems. That teamwork, coupled with these broad ranges of technical competences within the key players' organizations, was fundamental to the project's success."

Knowledge transfer was another success factor. NANSC made a substantial commitment to it, and Globecom conducted classes and provided one-on-one training to ensure that NANSC staff understood the network and could manage its evolution.

Total, Flexible, Cost-Effective Coverage

On the 10th of June 2008, the Ministry of Civil Aviation held an inauguration ceremony for the new network at the Cairo Air Navigation Center. Aviation Minister Ahmed Shafiq, Gen. Ibrahim Manaa, president of the Egypt Air Holding Company, and NANSC Chairman Gen. Ahmed Said joined NANSC staff and executives from Globecom and Adcom to celebrate the start of operations. In his remarks, General Said said that "Globecom performed the design, development, integration and installation of this Next Generation Network for NANSC in an extremely professional manner and on schedule. We give our highest recommendation to Globecom."

NANSC has much to be proud of. For the first time, it can provide total coverage of Egyptian air space for radar, VHF and UHF services, as well as extending its network of aviation information systems and controller-to-controller hotlines. Designed with high levels of redundancy, the new

communications network delivers the 99.99% availability recommended by the International Civil Aviation Organization (ICAO). Even so, the old network was not retired. Because it uses a different satellite than the new network, Globecom re-integrated it into the overall solution to provide an additional level of network resilience for such events as sun outages. Globecom's AxxSys Orion monitor and control system provides remote control of every element of the network.



"The new network also provides NANSC with a high degree of flexibility," says Paul Johnson. "Some of the circuits have a committed information rate while others have bandwidth assigned from a demand pool as they need it. Operating costs are already lower than before, and our solution affords NANSC the option of shifting to a full mesh configuration in future. That will let them either reduce the recurring costs of satellite bandwidth even more, or add channels and circuits without increasing their costs."

Globecom Chairman and CEO David Hershberg notes the importance of the NANSC network assignment to the company he founded. "We are proud to contribute to greater air safety in Egypt and North Africa. We are also excited by the broader opportunities for new CNS/ATM networks and upgrades. With airlines looking for more economical routes and countries needing to bring their Air Navigation Services systems up to ICAO standard before granting flyover rights, we look forward to bringing our next-generation network solution to other nations and regions of the world." ■

A little bit of satellite goes a long way



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