Online Journal of Space Communication

Volume 2
Issue 5 *Satellites Address the Digital Divide (Fall 2003)*

Article 3

June 2021

Current Development: Satellite Newsgathering Crosses the Digital Divide

Eli Flournoy

Satellite Newsgathering Crosses the Digital Divide

Eli Flournoy, CNN

New Millennium Breakthroughs

The date was December 31, 1999. I was an International Assignment Editor doing night duty at CNN when I first realized just how revolutionary the ability to digitally transmit video using satellite phones was going to be for newsgathering.

After months of planning, CNN's millennium coverage was up and running. Live reports were coming in on the hour from every time zone. Combined with the worries about Y2K bugs and threats of terrorism, those 24 hours represented one of the most intense reporting efforts in CNN history.

For our first live report, we sent Correspondent Mike Chinoy, Cameraman Neil Bennett and Producer Tim Swartz to Chatham Island in the South Pacific with a portable store-and-forward satellite uplink. The system worked by plugging a camera into the send unit, essentially a computer with the capability to digitize the video, store it, and forward it via satellite telephone to compatible receivers in CNN's Atlanta and London offices.

The receiving units converted the digital information back into analog video, routed it onto one of CNN's internal video channels for use straight to air or recorded for later use.This equipment was designed to deliver "broadcast quality" images from the field using a satellite phone.

Given the digital compression technology at that time, it took roughly one hour for one minute of video to be transmitted over an Inmarsat satellite telephone with 64K of bandwidth. By using two satellite phones, we could double our capacity to 128K and cut the transmission time in half.

The store-and-forward unit also offered a video-conferencing feature that enabled us to put up a LIVE picture. The constraint was that viewers would see only about six of every 30 frames of video due to the limited bandwidth, which gave the picture a jerky, digital-skew effect. Adding a second satellite phone did improve the quality.

The more stationary the reporter, or whatever subject was being shot, the clearer the live picture. For CNN, this meant Mike Chinoy could be brought to air LIVE from a cliff overlooking the South Pacific to mark the very first moment of the year 2000.

Live From Afghanistan

It took a breaking news story later that same day, though, to make CNN and its viewers really take notice of the potential of digitally-transmitted video.

Indian Airlines Flight 814 enroute from Katmandu, Nepal to New Delhi had been hijacked by Muslim Kashmiri separatists on December 24. After several stops, the plane was allowed by Afghanistan's Taliban leadership to land at the Kandahar Airport. The hijackers held 155 people on board, having stabbed one of the passengers to death in flight. Their demands: the release of three Kashmiri separatists imprisoned in India and safe passage within Afghanistan. One of those militants was Ahmad Omar Saeed Sheikh, believed to have later wired $100,000 to 9/11 hijacker Mohammed Atta. He was eventually convicted in a Pakistani court for masterminding the abduction and murder of Wall Street Journal reporter Daniel Pearl.

India's External Affairs Minister Jaswant Singh authorized the release of the Kashmiri prisoners and in fact was transporting them himself to Kandahar. His plane was due to arrive on New Year's Eve, December 31, 1999.

CNN correspondent Nic Robertson and cameraman Todd Baxter, in the meantime, had wangled their way onto a United Nations flight from Pakistan into Afghanistan. They carried with them a camera, two Inmarsat satellite phones and a store-and-forward unit. Getting permission as a Western television journalist to cover news in Afghanistan under the Taliban was difficult under the best of circumstances. During prior trips to Afghanistan the general Taliban rule for journalists had been: no pictures OF ANY LIVING OBJECT, human or otherwise. With a story as sensitive as a hijacking, and one that the Taliban themselves were trying to mediate, coverage seemed almost impossible, never mind live.

At CNN headquarters in Atlanta, in the midst of the millennium coverage chaos, I sat at the International Desk waiting for Nic Robertson or Todd Baxter to let me know where they were. When Nic reported in, using his satellite phone, the two were already at the Kandahar airport, and Todd was trying to run cable out far enough to get a picture of the plane. Shortly after, Todd called to say he had the camera set up outside the terminal. He had a good view of the plane large as life just a few hundred yards away. So far, no one was stopping them.

Todd instructed me to watch the receiver as he dialed in on video-conferencing mode. Moments later, there it was, pictures of the hijacked plane were coming through to us LIVE from Kandahar, Afghanistan at six fames a second.

All of a sudden, one of the cockpit windows opened up and men began to climb out. CNN carried the hijacking's dramatic conclusion LIVE on all its networks, domestic and international, with Nic Robertson narrating the escape of the hijackers and their freed Kashmiri compatriots, and the safe release of the remaining hostages from the plane.

Viewers around the world, especially those in India with family members on board the flight, were riveted to television screens as the story unfolded before their eyes.

Our New Delhi Bureau Chief Satinder Bindra called me to say that many television stations in India had abandoned their own programming and were broadcasting CNN International. Despite the poor quality of the video, it was a picture they couldn't afford not to have.

Live From Iraq

Hundreds of stories later, with war in Iraq imminent in the Fall 2002, preparations were underway at CNN for coverage beyond the scope of anything in its past - Gulf War I included. In addition to its many fixed satellite uplinks, flyaways, and mobile trucks deployed throughout the Middle East, CNN was ready with more than 50 satphones and 20 transmission units to accompany reporter teams heading into the field. Of the 20 CNN correspondents "embedded" with the U.S. and British military units, most were outfitted with the equipment needed for LIVE television reporting via satellite phone from extreme locations.

The transmission speed and quality of satphone units had greatly improved by 2002. Instead of using one telephone to transmit at 64K, most units were combining two phones for 128K of capacity. Advances in compression technology had accelerated the rate with which video could be captured, stored and transmitted from the field, and the quality was much better. For LIVE video transmissions as well, the satellite phones were delivering a much higher resolution picture. Instead of the video-conferencing functions on the old the store-and-forward machines, CNN and other news organizations in the field were using videophones for real time-to-air reporting.

Two monumental advancements in the technology were put to the test during the Iraq war. News organizations began outfitting reporters with a software-based digital compression technology called "G-4." Rather than the bulky hardware needed for the videophone or store-and-forward units, the same tasks were accomplished using a software program installed in journalists' laptop computers. Cameras were plugged directly into the laptops where the software handles the digitizing and compression of the video, with cables connecting the laptops to the satellite phones. The video transmission could take place one of two ways: a dial-up call from a satellite phone into the remote receiver, or isdn phone line connection for transmission over the Internet.

The G-4 software served to digitize and transmit reporter pieces at broadcast quality via satellite phone or via the Internet. In Iraq, CNN used these G-4 videophones for both LIVE and packaged reports from military encampments, from aircraft carriers and from other difficult to access locations. Most of the live images were of acceptable quality; many of the compressed and recorded pictures were indistinguishable from full broadband transmission.

According to Arnie Christianson of the CNN Satellites and Circuits desk, the software video codecs CNN has been developing to replace the old videophone technology holds steady at about 7 frames per second (using one satphone) at 64K, and 15 frames per second (using two satphones) at 128K. In covering scenes involving fast moving action, the 64K connections can drop to 2 frames per second, but at 128K the 15 frames stay pretty steady. A normal television picture is scanned at 30 frames per second.

The other development, and the flashiest, was a steerable tracking videophone satellite dish. CNN mounted three of these on its own Humvee vehicles, turning them into satellite trucks.

Two of these Humvees were with embedded correspondents Walter Rodgers and Martin Savidge as they rode with the US military from Kuwait into Baghdad, and the other was in Northern Iraq for use by CNN reporter teams there. This innovation enables the videophone to stay connected to the satellite even while in motion.

Frankly, many of us at CNN didn't believe it would work, having been burned during live coverage countless times by a videophone signal that crapped out because the temperature was too hot, the environment was too dusty, or it was raining. There are many things that can interfere with a videophone signal, and movement is one of the worst.

Yet, when Walter Rodgers called in from his embedded post with the 7th Cavalry, the first U.S. military unit to cross into Iraq, that 128K signal held for hours. Walt continued to narrate his stories over live videophone picture as the 7th Cavalry surged through armed resistance, past abandoned and burning military equipment and past dead and surrendering Iraqi soldiers. The images were surreal, cast in the other-worldly hue of deep red that comes from the light of the sun being absorbed and diffused by desert sandstorms.

Having live MOVING pictures lent an almost voyeuristic quality to the war coverage. The fascination of watching in on the exploration of the unknown, not knowing what story, or danger, lay ahead, through the capabilities of the satellite tracking videophone dish, was an experience shared by reporters, those of us at headquarters in Atlanta and viewers alike.

No-where in CNN's coverage was this drama more apparent than in the journey correspondent Brent Sadler and his team made in advance of the U.S. troops through an Iraqi military base and into the city of Tikrit in Northern Iraq. Brent was not one of those embedded with the coalition forces, but took one of the CNN Humvees, with a mobile videophone tracking dish, down to Tikrit to see first hand whether Saddam Hussein's forces still controlled the area. As it turns out, his progress through the region was closely followed by U.S. and British military officials watching CNN. As they later told CNN, Sadler's live coverage helped make their own assessment of the status of the area. And when two cars filled

with hostile Iraqis pulled alongside Brent's team on the road to Tikrit, opening fire at point-blank range, we all watched it LIVE, in horror. Miraculously, no one was seriously injured.

Digital Technology Gets Smaller, Cheaper, Faster

For news organizations, or for individuals, the barriers standing in the way of bringing news stories from the field are breaking down. Digital compression and digital transmission technologies are making it easier, cheaper and faster to bring news to air.

Take the millennium coverage of Mike Chinoy on Chatham Island. Without the store-and-forward equipment, the logistics and cost from that remote location would have made live reporting prohibitive. Prior to this satellite telephone application, the newsgatherer's only other option would have been to haul a full satellite dish uplink and generator along with the regular camera gear and lights up to the top of that cliff, some 30-plus cases of equipment. Chinoy's equipment consisted of only a computer-sized "send" unit and two laptop-sized satphones - a couple cases at most. As it was, the crew remembers, they barely made it up the hill through the mud with the small amount of equipment they had.

The upfront cost of a standard satellite uplink can be in the hundreds of thousands of dollars. The store-and-forward hardware of the Chinoy team cost around $20,000, plus the two satphones at about $6,000 apiece. Imagine the cost in excess baggage alone to fly in 30 cases of equipment, not to mention the extra expense of sending along an uplink engineer to set up and operate the dish.

In comparing transmission costs, a 10 minute satellite feed in analog format from a remote location in 1999 would run about $100 per minute, with 10 minute minimum bookings required. By contrast, Inmarsat satphone airtime costs about $5 per minute for one phone ($10 per minute for two), or ONE-TENTH the price. The catch is, of course, the quality of the satellite uplink feed is a whole lot better for live feeds than the one using the lower bandwidth satphone transmission. Of course, to get video back to headquarters in highest quality, in 1999, the cost of transmitting prepared reporter pieces was still as expensive as using the standard satellite uplink. The reason is that it took 60 minutes to transmit one minute of video (scanned at 30 frames per second) over a single satellite phone at 64K.

If that same Chatham Island coverage were done today, the equipment needed would be smaller and considerably less expensive. Digital technology has left the hardware store-and-forward system behind, and may make even the hardware videophone "transmit only" units obsolete as well. Today, the "G-4" compression software would be loaded onto a laptop computer at a fraction of the cost of the old hardware. Broadcast-quality video editing software is also available for laptops at very low cost, potentially replacing the need for large videotape editing

machines. Satellite phones themselves are also smaller, less expensive and have more features, such as GPS applications, than models just a few years ago.

Digital technology is also making it harder for governments to limit or control access to news stories. In some ways, the technology is developing faster than gatekeeper's ability to understand, identify and ultimately prohibit its use. Satellite phones look more and more like cellphones, video uplinks look more and more like laptop computers. Software with astonishing video production and transmission capabilities remains hidden within the hard-drive. If reporters can access the Internet, they can find way to deliver video and audio. And with satellite phones, it is no longer necessary to have access to the traditional electrical infrastructure to jump on the digital superhighway.

Advanced technology, reduced cost and easier access contribute to another key component of newsgathering - speed. LIVE coverage brings the story immediately, directly, to the viewer. The quicker journalists can get set up at the scene, the sooner reporting can begin. Even if Nic Robertson and Todd Baxter had been able to manage the logistics of bringing a full satellite dish uplink into Afghanistan, the cost and time spent setting up would have been exponentially higher. The timely part of the hijacking story may have been missed in the effort. Having the Humvee, with its mounted steerable satellite dish, in Iraq allowed CNN to tell the story of the progression of war, literally as it was moving forward, without having to wait for a stopping point to file reports.

Field-to-air video production and transmission are moving in the direction of software-based systems, rather than hardware. For CNN, the cost savings mean the same newsgathering budget gets more people into the field covering more stories. The reduction in size and complexity of the equipment means easier access to remote locations and greater mobility.

For the news industry, these digital technology breakthroughs, whether centered around satellite transmission or via the Internet, have contributed to an explosion of outlets for news and information. Competition in the news industry creates more demand for digital technology, which in turn creates greater competition among vendors, bringing innovation, mass production and, ultimately, lower costs.

For freelancers and small businesses, there has never been a better time to get into the video production business. The gap between the performance of top of the line technologies and that available to the public is closing rapidly, and so are equipment costs. For under $15,000, a journalist can set him/herself up with all the hardware and software needed for broadcast quality field production and transmission: a digital video camera, a laptop computer with digital video compression and editing software, and a satellite phone. And it all fits into your carry-on luggage.

Eli Flournoy is a Senior International Assignment Editor for CNN, the first 24 hour global news network. Here he presents powerful examples of how CNN has crossed the digital divide to bring late breaking news from remote locations to the public.