

The Changing Landscape of Cellular Access for Video Surveillance
By Daniel S. McLeod, President, Crime Point, Inc.
Retired sergeant, Los Angeles County Sheriffs Department

With the availability of 3G mobile broadband service, cellular networks have become a widely used, economical, and reliable method of both mobile and fixed video surveillance systems. For government agencies, restrictions on the amount of usage have generally been waived as the major cellular providers position themselves for the much sought-after government contracts. Compared to most data plans, which have both a limit on the amount of data -- normally 5GB per month -- and restrictions on video streaming, agencies have been able to have their cake and eat it too, with low rates, generally around \$49-59 per month, and unlimited access. For very definable reasons, the days of these low cost, open ended accounts may soon be coming to an end, not only from cellular, but other broadband networks such as cable and fiber optic.

The burdens facing the cellular carriers are complex and varied, ranging from technical challenges to marketing strategies. First, let's grasp the technical challenges. A typical description of bandwidth is the garden hose and water analogy, i.e., for a given hose size only a limited amount of water can be forced through with a specific amount of pressure. While useful for introduction purposes, the analogy falls significantly short of the real picture. Rather, take a close look at an oil refinery. A refinery covers a vast geographic area with a maze of pipes, pumps, valves, and storage tanks, which lead to a distribution system: often buried pipes which stretch for miles to another refinery or distribution center, each with its own maze of pipes, pumps, valves, and storage tanks, leading -- you guessed it -- to other sites of various sizes. Now to make the picture a little more complex, the facilities, built at various times with different technologies, have different capacities at multiple points to move petroleum products. For instance, a pipe installed in 1940 might have a bursting point lower than a pipe installed in 1996. Now take the actual petroleum, which comes from a variety of sources with different molecular makeup, weights, and sludge for each source. Consider that not all end products are the same, including engine oil, gasoline (different types), byproducts, etc. And somewhere in this analogy are engineers whose sole job is to keep the refinery going. They are, naturally, a little cantankerous when someone makes minor, or major, changes to their operation.

Similarly, cellular carriers are not generally comprised of one data system throughout the entire network. Rather, each carrier is a blending of technologies from acquisitions made over time spanning rapidly changing technology bridges. For instance, simple merger announcements, such as AT&T with Cingular, Sprint with Nextel, and recently Verizon with Alltel hide the hard work of making the different technologies, from hardware to software, mesh smoothly together -- or not.

As engineers try to move huge amounts of data through their networks, often sharing equipment and access through agreements with other carriers, their hope is very steady, measured, data flow with few, if any spikes. The less data that's flowing, the smoother the process and everyone is happy.

Now remember that broadband data is a commodity. Only so much data can be moved at a time throughout a network or portion of a network. Therefore, because software systems, hardware, and monitoring are constantly being used to move data, costs are incurred. Yes, carriers are in the business to make money, but without the infrastructure and people to make the networks ever larger and more reliable, they wouldn't exist. And these things cost money. So where does law enforcement video fit into this picture? Although data costs money, and carriers need to show a profit (or go out of business -- bailouts notwithstanding), the more individuals, businesses, and government agencies buying accounts for phones and modems, the more money a company has available for salaries and technology improvements. Generally, carriers have determined that a reasonable usage for an account is about 5GB a month, within which most data plans can be accommodated, and have calculated a cost for which they can offer that service and at least break even. And then there's law enforcement.

Initially, law enforcement is a refreshing change in the day of an engineer and manager who is used to dealing

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with just keeping a network up and running the corporation. Suddenly, their network is being used in real, honest, life and death situations where every second (and byte) may make the difference in a successful, life-saving investigation. So, in good faith, carriers offer unlimited data at basic rates. After a while, however, the attraction begins to dim as huge amounts of potentially disruptive data is moved across networks at well below cost. Compounding the cost formula is that some of the data may be flowing over leased lines, which means in addition to the indirect cost of lots of data moving below cost, the carrier may be having to pay a direct cost for the above average data movement.

So how much data does a camera move over a month? Remember, 5GB is a normal, acceptable monthly rate, from the carriers' perspective. As a contract provider of cellular service, our company is able to observe different types of equipment and their monthly data usage. These can be broken into two categories for investigations: those with a digital recorder on board and those which stream video continuously and are recorded at the station. Those with on board (local) recorders typically utilize less than 5GB a month. In those cases, the recorder and live view are accessed several times a day, and the system sends notifications when movement or other alarms are set up. Sometimes there is a spike, but it can be absorbed into the overall usage profile. Systems without digital recorders, on the other hand, regularly exceed 220GB a month, a whopping 44 times the level determined to be acceptable by carriers.

As cellular carriers are grasping the importance of the cellular system to law enforcement investigations and are trying their best to make the technology available for a good and just cause, they are also challenged to find a balance between bandwidth and cost for their services. At decision making levels, word is leaking out that cellular providers want to provide the maximum flexibility to law enforcement while maintaining some cost control. Now is a good time for agencies to evaluate what they really need and provide feedback to carriers. Remember that regional representatives from the cellular carriers may not be fully aware of the discussions at higher corporate levels and the conversation may need to be at higher levels where corporate decisions are made.

Some of the discussion includes a 5GB plan, with overage costs for additional data, or government plans of say 20GB a month at a higher monthly cost, again with overage costs. A key question is this: what additional recurring costs can agencies support for their critical investigations? An underlying premise in the monthly packages is that with few exceptions, cellular carriers have accounting systems which require a standardized billing process, meaning it will be difficult, if not impossible, for them to service an account which is 5GB one month, 20GB the next, and something else the following. With one exception, they need to have one billing rate throughout the contract period.

That exception, which is more useful to tactical deployments, is having an account open but not activated until an incident occurs and a call is made by the agency to the carrier. For instance, Sprint has the "go phones", which are leased to the agency but only cost 1 penny per month to hold the account. When an incident occurs, a call is made and the data amount is charged to the customer. This works well with phones; but remember a video system can burn through 5GB in one critical incident, and costs may become significant with multiple deployments in the same month.

So what can law enforcement do? All of the cellular carriers will market aggressively to government agencies, so agencies in themselves are a commodity. Large agencies with hundreds, if not thousands, of cellular accounts have quite a bit of leverage and may be able to negotiate special, low cost accounts for a few video systems. Smaller agencies may have to be a little more creative and manage their systems closely to avoid overage costs. A significant concern is whether systems currently being used can be grandfathered in so that they are not prematurely cost-prohibitive. One scenario is that the video systems may need to be modified with external DVR's for recording.

Crime Point, Inc. was one of the first manufacturers to install cellular technology in its vehicle and mobile video systems, and is participating in a national study group with cellular system providers on a range of topics including service, hardware, and system usage. Input from NATIA readership regarding cellular bandwidth issues is encouraged and will be included in discussions. Comments can be addressed to Crime Point, Inc. at info@crimepoint.net or 888-484-9901.