

Better to text than call during emergency

By Brad Stone, Bloomberg Businessweek

Toward the bottom of the list of disturbing aspects about Monday's bombing at the Boston Marathon was this: Cellular networks in the area almost immediately slowed down and, for periods of time, appeared to stop working altogether. Runners and their loved ones could not connect, and victims had trouble communicating with emergency responders.

That frustrating scene has become familiar, evoking disasters from the Sept. 11 attacks in 2001 to Hurricane Sandy in 2012. We rely on cell phones to run our lives, but they tend to be useless – or at least far from useful – when we need them most.

Initial reports suggested that authorities deliberately shut down mobile networks in Boston to avoid the possibility that mobile devices could be used to trigger more bombs. The Associated Press reported this and then quickly reversed itself. The major wireless carriers denied it, saying that the networks were simply suffering from congestion: Too many people were trying to use their phones at the same time to get help or tell family and friends they were OK.

“Thinking of those at #BostonMarathon,” AT&T tweeted at around 5:30pm. “For those in the area, please use text & we ask that you keep non-emergency calls to a minimum.”

A Verizon Wireless representative also suggested that customers in the area use text messages or email to free up capacity for public safety officials.

The science behind these failures in wireless networks isn't complicated. In every city, each mobile carrier operates

hundreds or thousands of cell towers, which route calls and data to the carrier's backbone network. Each tower is designed to accommodate a set number of calls per second, per a certain geographic area. In a crisis, when everyone naturally reaches for their phones, that limit is quickly surpassed and the radios on the tower get sluggish.

Mobile analyst Chetan Sharma, who estimates that a cell site can handle 150 to 200 calls per second per sector, said, "We've all had the experience of a fast-busy signal. That is the network telling you, 'Sorry, but your cell is overloaded. There is no more space.'"

In these situations, sending texts or email is a better option because messages can be queued up and delivered as capacity becomes available. Twitter is especially efficient because information can be spread quickly and widely – one reason why the service has become increasingly important and reliable in a crisis. Google's Person Finder, a central digital bulletin board for survivors and families of those in a crisis zone, has also proven invaluable.

Until it was debunked, the rumor that police deliberately shut down cell networks was an intriguing one. This is almost unheard of. When it has occurred, the practice has been controversial.

In August 2011, BART officials shut down underground phone service to prevent activists from coordinating their activities as they protested a shooting by BART police. The shutdown led to criticism that police were hindering the activists' right to free speech, spurring a further round of protests. The police argued that they acted to protect the public.

Monday's situation was different, of course. ABC News reported in a tweet that police were asking people on the scene not to use cell phones because they might set off other explosive

devices. Still, it does not appear there was any widespread directive from law enforcement to shut down cell networks, and authorities appear to believe that cell phones do more to help than hurt in an emergency.

“The belief is that much more good comes from networks being available than the risk of them being utilized for bad intentions,” said Charles Golvin, an analyst at Forrester Research.

Can anything be done to improve network performance during tragedies such as Monday’s bombing? Probably not much. Carriers could engineer networks to handle these situations by adding radios and towers and amplifying connections from the towers to the network’s backbone. But a vast majority of that extra capacity would then be wasted.

“Over the years, a lot of research has gone into analyzing the trade-off between cost and capacity, and today’s networks are designed to provide enough capacity during the vast majority of ‘normal’ conditions,” Golvin said.

Just as landline networks were never meant to allow every person with a phone to place a call at the same time, wireless networks are designed to align resources with normal peak call volumes in the most efficient manner possible. As a result, hearing a loved one’s voice in the tense minutes after an emergency may always be difficult.