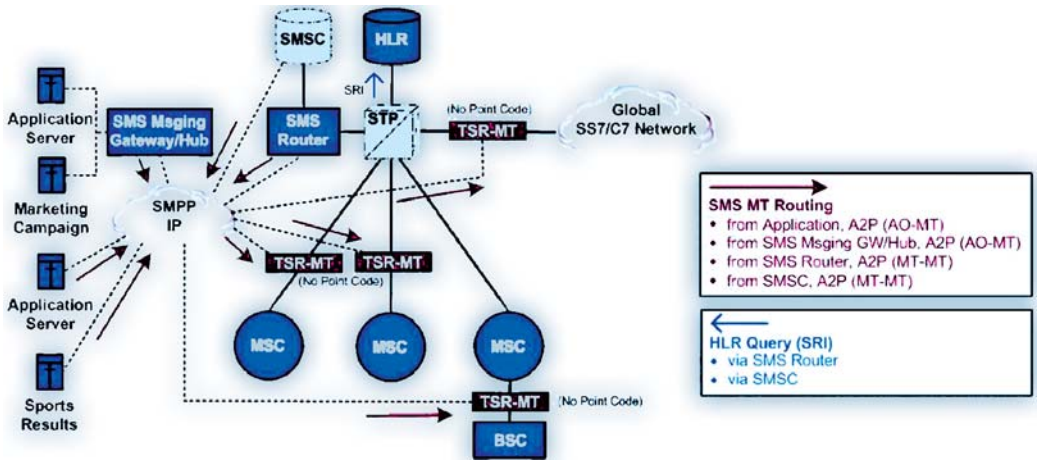
C*MAS Delivers SMS Without Throughput Issues

The major bottlenecks for the speed of delivery of an SMS text message exists at the SMSC, (Short Message Service Center), and the MSC, (Mobile Switching Center), within the carriers' network. Technology exists today that will bypass the SMSC and MSC and send the text messages directly from the BSC, (Base Station Controller), to the Base Station, (Tower location), (1). This bypassing is accomplished by offloading the SMS data onto the SS7 signaling channel from the BSC that is connected directly to the Base Station (2). This technology will allow carriers to turn up new, revenue-generating services without costly MSC, STP, and SMSC upgrades by offloading SMS traffic at the "A" interface.



Now that we have that bottleneck solved, the next issue is the air interface which is where the Base Station actually communicates with the mobile device. SMS delivery from the tower location is handled by a control channel or SDCCH. The data throughput of the SDCCH is 98 bytes per second (3). This equates to 9 milliseconds for every SMS character (4). Let's take the following emergency text message as an example:

NWS Emergency Weather Alert. Tornado Imminent for the Orlando Area. Take Shelter Immediately.

This text message is 90 characters in length, including spaces, which means it will take 890 milliseconds of delivery time or .89 seconds. The SMS setup takes 235 milliseconds of acknowledgement and 235 milliseconds of return acknowledgement, (ACK and NACK). This totals 470 milliseconds of setup, and the tear down or disconnect follows the same pattern of 470 milliseconds. Add it all up and the SDCCH is delivering an SMS every 2 seconds or 30 every minute.

Next, let's discuss how many SDCCH's, or control channels, are available in the wireless network. There are typically 8 control channels on a sector, or 1 for every 3 voice channels (5). There is usually 3 sectors per carrier on any given tower location (6).

This gives a total of 24 control channels per carrier per tower location. The typical tower configuration has 3 carriers on it, but for the sake of our discussions will keep the number at 2. This would give us a total of 48 SDCCH's on a free standing tower.

There are of course roof top installations, with only 1 sector, which would provide 8 control channels.

To get to the total number of SDCCH's we have to calculate the total number of tower locations. There are 124,272 free standing towers in the US today (7). The number of rooftop locations and "others" totals 73,304 (8). Taking the conservative number of averaging 2 carriers per free standing tower, that would give us 5,965,056 control channels on the free standing towers. The total number of available control channels on the roof top locations would be 586,432. So, a conservative number of total available control channels would be 6,551,488. If we utilized half of those SDCCH's available, (3,275,744), for a SMS emergency alert, we could hit all 235 million cellular users in 2 minutes and 24 seconds. The average single tower location would be contacting 720 people every minute. If we only utilized one eighth of the available channels, we would still be reaching every cell phone in America within the 10 minute deadline established by the WARN Act.

References: (1) http://www.sevis.com/TSR.asp (2) http://www.sevis.com/PDFs/TSR-MT%20DS.pdf (3) http://www.gsmworld.com/gsmeurope/documents/positions/2006/Options_for_eCall_MSD_signalling_210406.pdf (4) Nilesh Agarwal Leena Chandran-Wadia Varsha Apte Indian Institute of Technology Bombay Powai, Mumbai 400 076, India CAPACITY ANALYSIS OF THE GSM SHORT MESSAGE SERVICE K. Pahlavan and P. Krishnamurthy Principles of Wireless Networks, Pearson Education, 2002. V. K. Garg and J. E. Wilkes, Principles and Applications of GSM, Pearson Education, Inc., 1999 (5) National Communications Systems Technical Information Bulletin, 3.2 SMS over SS7, 2003 (6) http://www.privateline.com/mt_cellbasics/iii_cell_sector_terminology/ (7) http://www.cellreception.com/towers/ http://wireless2.fcc.gov/UlsApp/AsrSearch/asrRegistrationSearch.jsp (8) http://www.ttmi.info/knowledge/ With information provided by the CTIA