FCC Cellular Geographic Service Area (CGSA) Formula

This formula approximates this distance to the 32-dBµ contour predicted by Carey.

$$d = 1.05 * H^{0.34} * P^{0.17}$$

      where d is the distance from the cell site antenna to the reliable service
           area boundary in miles
           H is the antenna height above average terrain in feet
           P is the effective radiated power (ERP) in watts

dBm vs. dBµ

The conversion formula for these 2 units is as follows:

$$dBm = dBµV/m - 20log(f) - 77.21$$

      where f is the frequency in MHz.

therefore
$$dBµV/m = dBm + 20log(f) + 77.21$$

32dBµV/m contour was a "relaxed" version from that of **39 dBµ**V/m contour for cellular. These figures were derived from Carey contour for link-balance (for 2-way system) or forward link only (paging/broadcast) in early measurement by Carey. Actually, Carey only measured in a number of frequencies, and others (non-specific to his actual measurement) were interpolated.

For cellular system, FCC used to stipulate that -97 dBm (39 dBµV/m) is appropriate to have good reception/transmission, and then later relaxed to -104 dBm (32 dBµV/m).
The **43 dBµ**V/m was used for a PCS system to have -100 dBm (or 43 dBµV/m) balanced signal.

In general the higher the value in dBµV/m, the stronger the signal required to be received (as well as transmitted) at the same frequency, as denoted in the formula.