Antenna Downtilt Adjustment

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This document shortly describes the effect of antenna tilting in UMTS networks in order.

The optimal tilt angle depends on:
-base station height
-vertical beamwidth
-site spacing

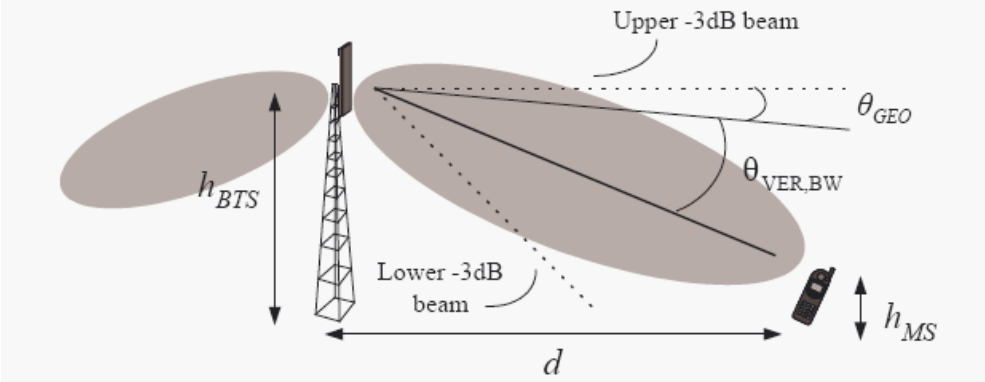


Figure 2: Electrical downtilt scheme and optimum downtilt angle factors.

Antenna vertical radiation patterns show that in real life, the antenna doesn't have the main beam only but additional side lobes. These take effect in case of very high antenna positions and large downtilt values. In this case, an additional downtilt can lead to a stronger signal in big distance as the side lobes are pointing in this direction.

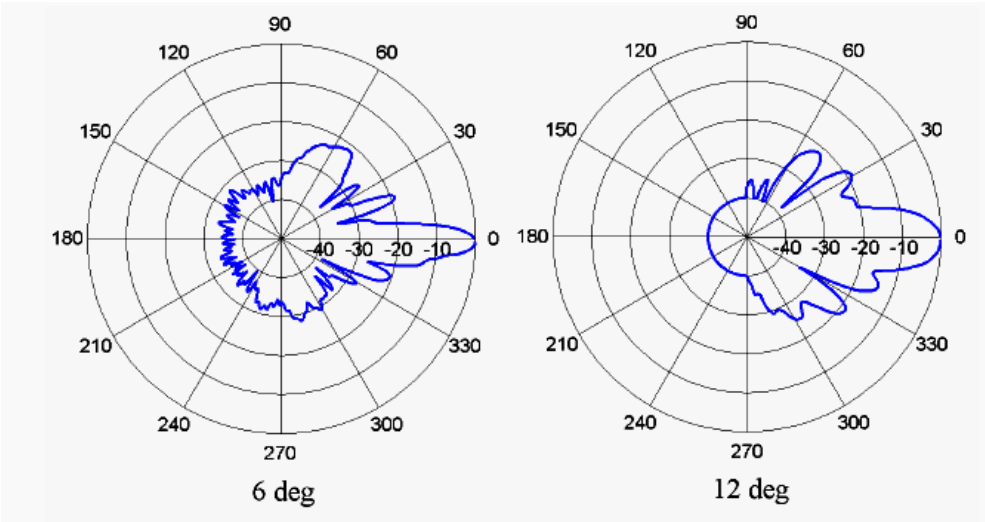
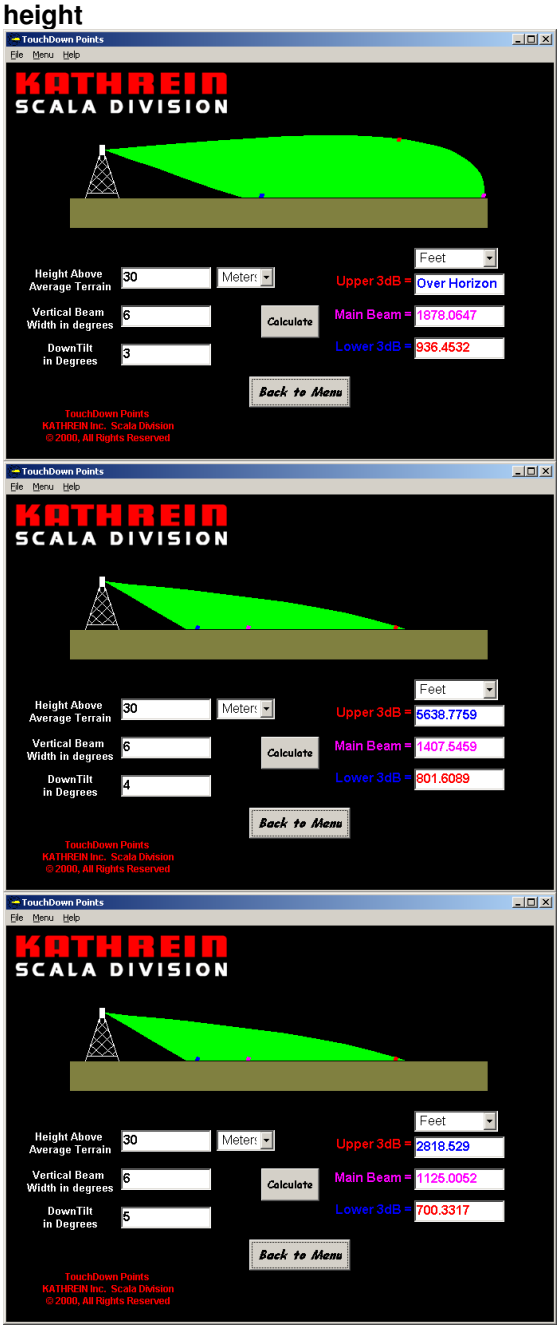


Figure 3. Antenna vertical radiation patterns.

Overview on used Kathrein antennas in Cingular

Antenna	Model	Gain/dBd @4° el. tilt	Beam vertical @4° el. tilt	Beam horiz. @4° el. tilt
10121	800 10121 @1920_Xpol_4dt	14.22	6.8°	85°
10122	800 10122 @1920_Xpol_4dt	15.85	5.2°	88°
742226	742 226 @1920_Xpol_0dt	11.24	11.7°	67°
742262	742 264 @1920_Xpol_4dt	14.85	6.5°	63°
742265	742 265 @1920_Xpol_4dt	16.35	4.7°	63°

Antenna 6° vert. beam, tilt 3°, 4°, 5° at 30m height



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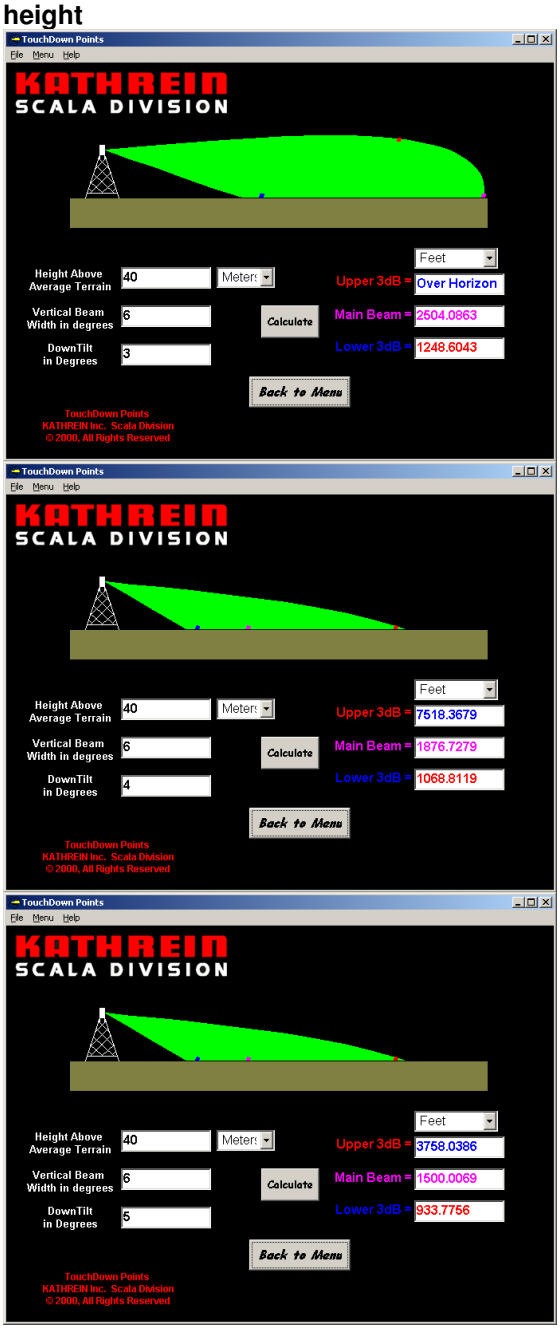
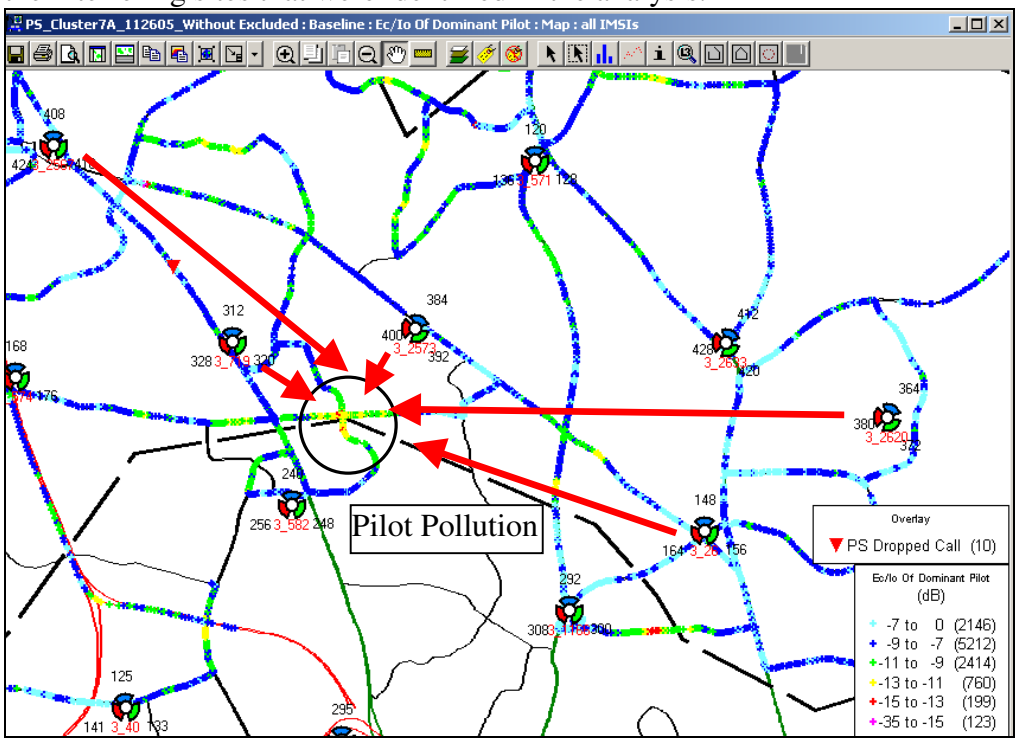


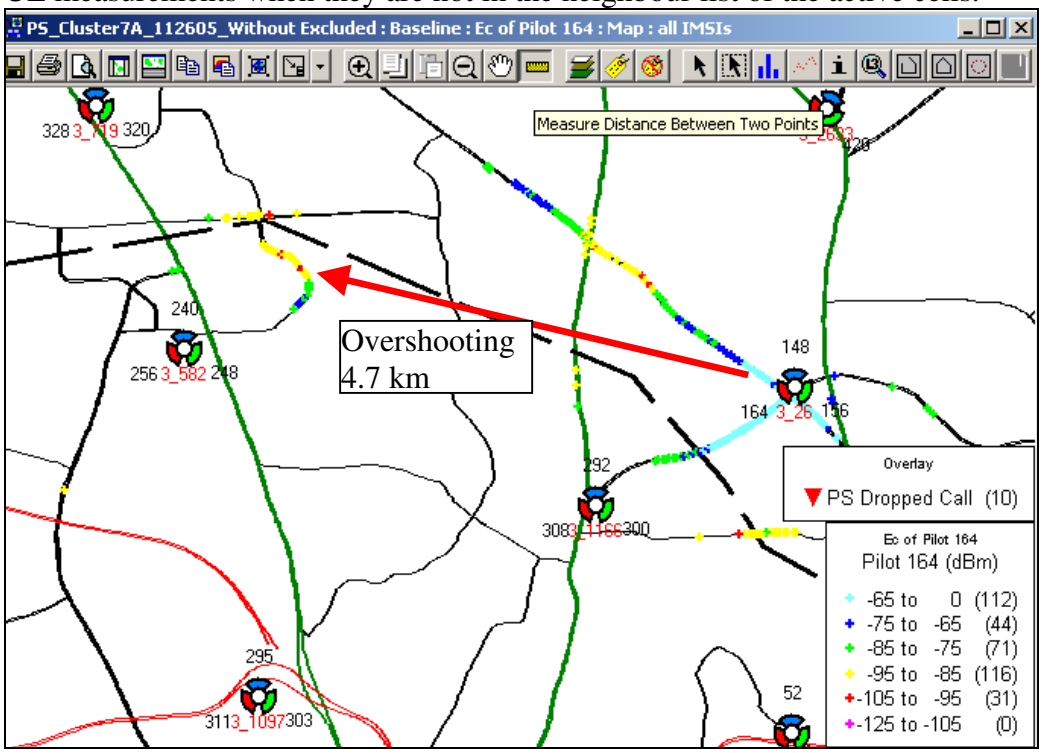
The free Kathrein tilt calculator can be used to calculate recommended tilt adjustments.

Pilot Pollution

This example shows an area of poor Ec/Io close to several sites. The red arrows mark the interfering sites that were identified in the analysis.



It is a useful feature of LDAT3G just plotting the Ec coverage of a single scrambling code (SC) as measured by the scanner. Sometimes, these SCs don't show up in the UE measurements when they are not in the neighbour list of the active cells.



In this example SC164 was turned out to be an overshooter from 4.7 km away. Antenna height was 37m and suggested electrical tilt 4°.