Cellular re-broadcast over satellite

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<html> <div> <p>I've recently attended a seminar that (among other topics) also covered RF interference hunting. The speaker was talking about various real-world cases of RF interference and illustrating them in detail.</p> <p>Of course everyone who has any interest in RF or cellular will know about fundamental issues of radio frequency interference. To the biggest part, you have</p> <ul class=„simple">
cells of the same operator interfering with each other due to too frequent frequency re-use, adjacent channel interference, etc. cells of different operators interfering with each other due to intermodulation products and the like cells interfering with cable TV, terrestrial TV DECT interfering with cells cells or microwave links interfering with SAT-TV reception all types of general EMC problems <p>But what the speaker of this seminar covered was actually a cellular base-station being re-broadcast all over Europe via a commercial satellite (!).</p> <p>It is a well-known fact that most satellites in the sky are basically just „bent pipes", i.e. they consist of a RF receiver on one frequency, a mixer to shift the frequency, and a power amplifier. So basically whatever is sent up on one frequency to the satellite gets re-transmitted back down to earth on another frequency. This is abused by „satellite hijacking" or „transponder hijacking" and has been covered for decades in various publications.</p> <p>Ok, but how does cellular relate to this? Well, apparently some people are running VSAT terminals (bi-directional satellite terminals) with improperly shielded or broken cables/connectors. In that case, the RF emitted from a nearby cellular base station leaks into that cable, and will get amplified + up-converted by the block up-converter of that VSAT terminal.</p> <p>The bent-pipe satellite subsequently picks this signal up and re-transmits it all over its coverage area!</p> <p>I've tried to find some public documents about this, an there's surprisingly little public information about this phenomenon.</p> <p>However, I could find a slide set from SES, presented at a Satellite Interference Reduction Group: Identifying Rebroadcast (GSM)</p> <p>It describes a surprisingly manual and low-tech approach at hunting down the source of the interference by using an old nokia net-monitor phone to display the MCC/MNC/LAC/CID of the cell. Even in 2011 there were already open source projects such as airprobe that could have done the job based on sampled IF data. And I'm not even starting to consider proprietary tools.</p> <p>It should be relatively simple to have a SDR that you can tune to a given satellite transponder, and which then would look for any GSM/UMTS/LTE carrier within its spectrum and dump their identities in a fully automatic way.</p> <p>But then, maybe it really doesn't happen all that often after all to rectify such a development...</p> </div> </html>