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Abstract

Introduction of 3G technologies in 2G bands, the example of UMTS-900

Wireless technology has come a long way in its relatively short but remarkable history. moving from 1G basic mobile voice based on analog systems and national service (e.g. AMPS) to 2G digital and international systems based on CDMA or TDMA (e.g GSM) in the 1990's. By 1995, the uptake of mobile systems had grown rapidly, and user were increasingly demanding wireless data services giving rise to third generation (3G) systems such as UMTS.

UMTS allows the introduction of new services, video telephony that allows video communication using the mobile, and high-speed data services.

At WARC-92 (World Association Radio Conference, 170 Mhz of spectrum were reserved for IMT -200 terrestrial components: 1885-1980 + 20110-2025 + 2110-2170 and 60 Mhz for IMT-200 satellite components: 1980-2010 + 2170-2220.

An example of UMTS deployment can be taken from Nortel's deployment of the Vodafone Spain network starting in the year 2000.. Since then Nortel has deployed around 5000 BTS in the Vodafone network. However, despite this extensive deployment, UMTS coverage remains significantly inferior to that of GSM. So what are the factors that put UMTS at a disadvantage compared to GSM? There are two major factors that have had a major impact: the cost of deployment and site acquisition problems. For the first case it has to be noted that in the spectrum allocated for UMTS (2100 Mhz) the number of BTS's needed is bigger than in GSM. Regarding acquisition, the fact that UMTS is an overlay network to GSM, being still most of the operator revenues in GSM, implies the necessity to deploy new sites, that in some countries, such as Spain, this poses serious problems..

However as users begin to migrate from GSM services to UMTS, spectrum in the GSM band of 900Mhz can start to become available.

Due to the needs mentioned before, Orange proposed to allow the use of 900Mhz spectrum at RAN Plenary #26 in December 04, and 11 companies confirmed its support Orange, Nortel, Alcatel, SFR, Lucent, Telefonica, BouyguesTelecom, O2, Qualcomm Europe, Nokia, SagemUMTS900 work item was approved by 3GPP RAN plenary in December 2004. Nortel has been driving UMTS 900Mhz standardizations 3GPP studies from Dec04 to Dec 05 (Nortel is the 3GPP Technical prime) when the specification has been finished. According to the last studies being carried out by the European Regulatory CEPT/ECC, National spectrum re-distribution is expected in 2007.

Nortel has also performed studies in different countries, from which it can be concluded that UMTS 900 may allow up to 60% site count reduction, implying up to 25% in-building penetration gain, and has also the benefit of GSM 900 site reuse, reducing the environmental impact.