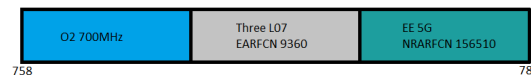


Introduction

Spectrum used in most modernised commercial deployments by mobile network operators in the United Kingdom. Downlink spectrum shown except in the case of TDD.

700MHz (Band 28) FDD



On 27/04/21, Ofcom released details of the completed spectrum auction process. 700MHz paired allocations are as follows: EE UL 723-733MHz, EE DL 778-788MHz, Three UL 713-723MHz, Three DL 768-778MHz and O2 UL 703-713MHz, O2 DL 758-768MHz. EE was the first to launch the spectrum commercially, using it as NR only with NRARFCN 156510. Three were then next, launching theirs as LTE with EARFCN 9360.

700MHz (SDL) FDD



Only EE acquired 700MHz SDL during the auction, gaining 20MHz.

800MHz (Band 20) FDD



All four mobile network operators have spectrum in the 800MHz band: Three with 5MHz paired at EARFCN 6175, EE 5MHz paired EARFCN 6225, Vodafone 10MHz paired EARFCN 6300, O2 10MHz paired EARFCN 6400.

900MHz (Band 8) FDD: Post June 2021



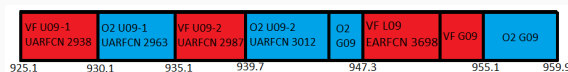
900MHz spectrum is only possessed by Vodafone and O2 but is rather complex. Block 1 (925.1-930.1): Vodafone's main 900MHz 3G carrier UARFCN 2938, sometimes with GSM in range. Block 2 (930.1-935.1): O2's primary 900MHz 3G carrier of UARFCN 2963, sometimes with GSM in range. Block 3 (935.1-947.5) has a range of possible options. The most recent, most modern, is GSM in the base 2.4MHz followed by various possible uses like UMTS 3012/LTE 3624 in the middle of the 10MHz remaining, in time the 10MHz should all become LTE. Final block (947.5-959.9) also can vary significantly, such as having O2's second 3G carrier UARFCN 3050 or 4G EARFCN 3700 (5MHz) or 4G EARFCN 3725 (10MHz) with rest O2 2G.

900MHz (Band 8) FDD: Post Transition Pre Vodafone Retune



As above but 12.4MHz block has UMTS 2987 at the base with the top being GSM/multi use.

900MHz (Band 8) FDD: Pre-transition



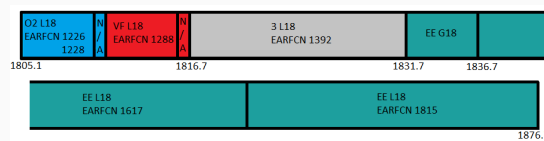
In the most modernised areas, both operated two carriers of 3G: Vodafone at UARFCN 2938 as the primary and 2987 as secondary. Vodafone also operated a 5MHz 4G carrier on their 900MHz in some areas, using EARFCN 3698. In the case of O2, it was 2963 and 3012 respectively, the rest of the spectrum being used for GSM. On some sites in multiple vendor regions, Vodafone and O2 were seen sharing 2938, 2963 and 2987, which enabled Dual Carrier 3G operation from a single site as 2938 and 2963, 2963 and 2987 were contiguous where the operators' native carriers were not.

1500MHz (Band 32) Supplementary Downlink



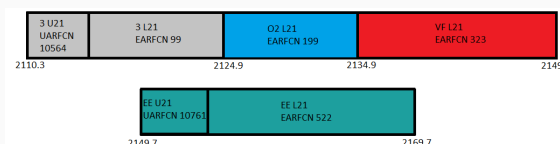
This spectrum is downlink only and therefore must be paired with another band, such as Band 20, for uplink. Vodafone and 3 both have 20MHz with EARFCNs 10020 and 10220 respectively. 3 has this spectrum deployed on multiple sites in Oxford, while Vodafone has it on on their Atlas and Smale offices.

1800MHz (Band 3) FDD



EE is the big holder of 1800MHz spectrum with 45MHz paired, used for up to two LTE carriers: firstly EARFCN 1617 at 20MHz and secondly one of EARFCN 1761, 1788, 1815 at 10MHz, 15MHz, 20MHz respectively, alongside GSM. EE's small cells use EARFCN 1808. Three is the next largest at 15MHz paired, EARFCN 1392, meanwhile Vodafone and O2 each have 5.8MHz paired. Vodafone uses EARFCNs 1288, while O2 uses a few: 1226 for Macro sites generally and 1228 for microcells and small cells but 1229 and 1230 have also been seen. While EE and 3 use 1800MHz as a core 4G layer, O2, and especially Vodafone, have it deployed solely in high load locations as a capacity add.

2100MHz (Band 1) FDD



Originally used for 3G services, the 2100MHz band is rapidly being refarmed in the UK for 4G services. [Vodafone was the first to commence refarming](#), initially of 5MHz (one 3G carrier cleared out of the three), but now the entire allocation is done in many locations, producing EARFCN 323. O2 was next, again initially refarming one

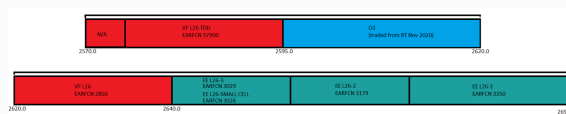
of the 3G carriers' spectrum, though currently full refarm producing EARFCN 199 is present in many cities (albeit predominantly O2 hosted zones). Third was three who immediately refarmed two out of the three 3G carriers on the sites for EARFCN 99. EE was the last provider to start refarming 2100MHz, likely due to their extensive existing 4G bandwidth through the 1800MHz and 2600MHz bands. [EE refarms three quarters of the 2100MHz](#) to have EARFCN 522 and one 3G carrier.

2300MHz (Band 40) TDD



O2 owns all of the allocated spectrum in this band and currently uses 40MHz of it for EARFCN 39250 and 39448 [which is deployed with 4T4R](#)

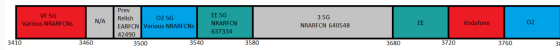
2600MHz (Band 7 [FDD] and Band 38 [TDD])



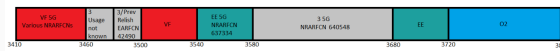
Vodafone deploys 20MHz of TDD, predominantly with [Massive MIMO](#), EARFCN 37900. They also have 20MHz paired FDD of EARFCN 2850, which is used as a widespread urban capacity add, usually with 4T4R on busy sites. EE, through BT, owns 50MHz of FDD 2600MHz. 35MHz is used ubiquitously for two macro carriers: EARFCN 3350 is the primary carrier of 20MHz and 3179 is the secondary at 15MHz. The 'BT' spectrum is used for small cells with EARFCN 3026 or for a third macro carrier EARFCN 3029. 2595MHz-2620MHz was traded to O2 in November 2020. It is expected to be deployed for services soon.

C-Band TDD

3410-3800MHz post-auction, pre-trades



3410-3800MHz post-auction, post proposed Vodafone and O2 trade



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The UK's 2021 spectrum auction added 120MHz to operators in this spectrum, with EE, Vodafone and O2 each gaining 40MHz. Vodafone and O2 agreed a trading arrangement to facilitate O2 contiguous and Vodafone having two nearby blocks. In terms of the previous allocated spectrum, EE was the first to launch their commercial 5G on this spectrum using NRARFCN 637334. Vodafone launched shortly after and have various NRARFCNs depending on vendor. O2's NRARFCNs depend on vendor, commonly: Huawei 633696, Nokia 634656, Ericsson 634666. 3 operate 100MHz 5G on NRARFCN 640548.



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