

Orange Class 2.0 GSM1800 BTS cabinet

Introduction

- The Class 2.0 BTS was one of two original BTS site designs implemented by Orange, the other being the Class 3.0
- Class 2.0 and Class 3.0 BTS used Nokia's 2nd generation BTS product which was released in 1992 and supported a maximum of 4 TRX
- The Class 2.0 BTS comprised an external equipment cabinet into which a standard Nokia DF-12 rack was installed, alongside a standard 19" transmission rack, air conditioning unit and rectifier rack
- Orange selected Nokia as its end to end GSM network equipment provider
- The contract covered BSS, NSS and OSS network elements
- Transmission interfaces were provided for each network component however the actual transmission equipment, typically point to point digital microwave radio systems in the access network, was excluded
- Microwave radio equipment was supplied by two vendors; Telesciences and Siae



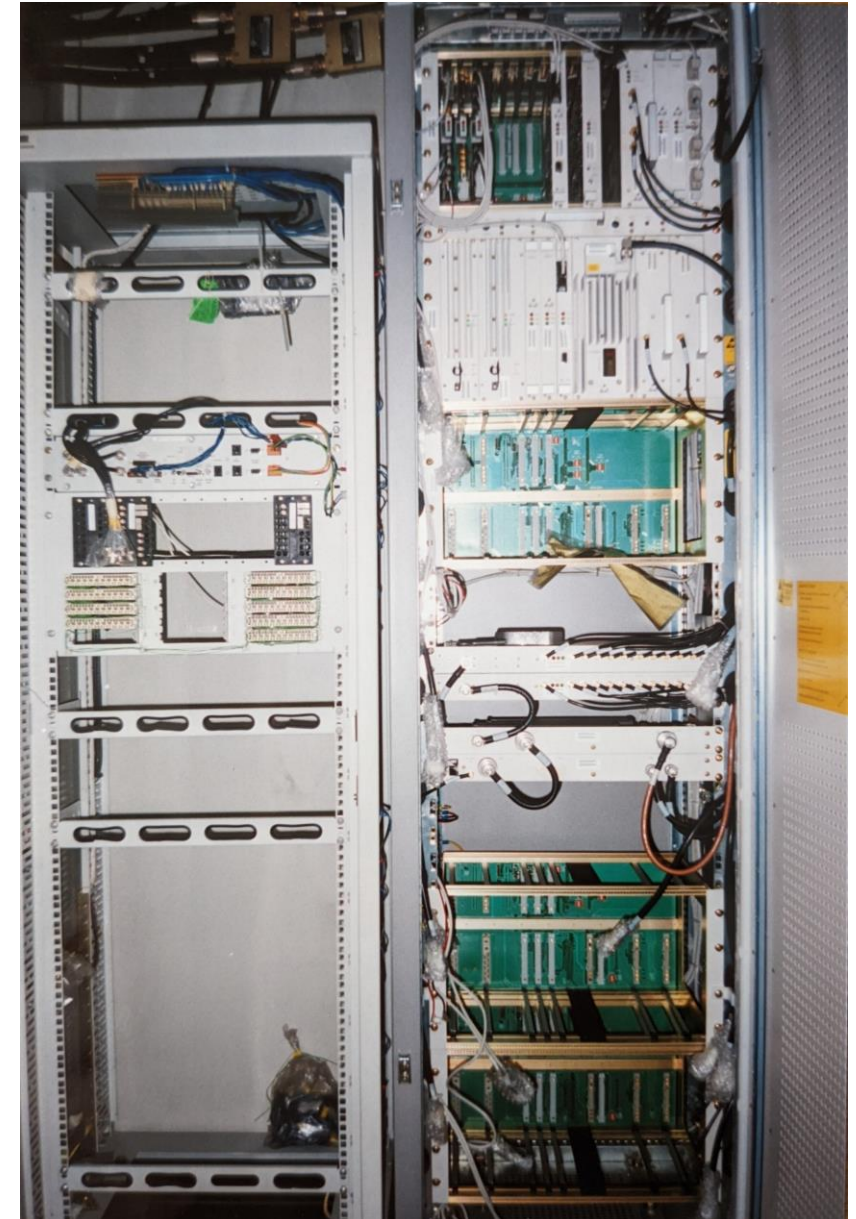
Cabinet

- Outdoor active equipment cabinets are extremely common nowadays however this wasn't the case in the early 1990s
- Analogues TACS equipment of Cellnet and Vodafone was typically deployed in existing buildings or in portacabins, deployed specifically to support the cell site
- To minimise costs Orange required an external cabinet to house base station equipment across a range of cell site types; rooftops, towers and columns
- An additional consideration was the cost of delivering radio coverage, to attract mobile subscribers it was essential for Orange to offer a reasonable level of coverage at launch, although they had no subscribers so didn't need to invest too heavily in capacity
- The Class 2.0 cabinet was an early attempt to meet the necessary criteria for the majority of cell sites - as this was a single TRX solution and therefore the lowest level of investment from an equipment perspective
- Typically a single TRX site would have utilised omni-directional antennas, one for transit and receive and a second for receive only, providing space diversity reception to enhance the uplink path, the Class 2.0 configuration used three sets of antennas...



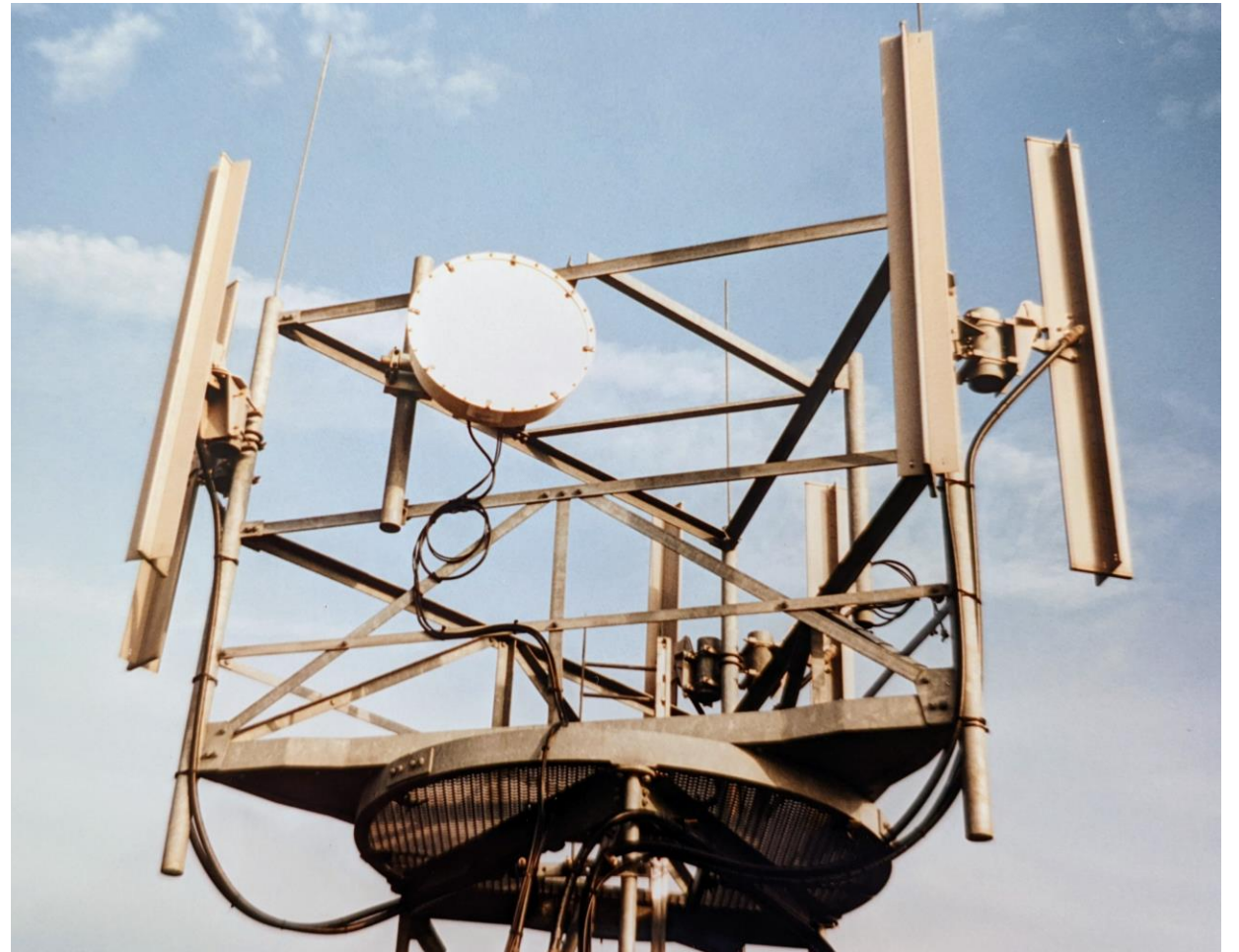
Cabinet configuration

- The unique configuration applied to a Class 2.0 BTS was known as Simultaneous Sectored Transmission (SST)
- This enabled investment in a three cell sectored antenna system while deferring additional investment in base station capacity until it was actually required
- This configuration was facilitated through the use of RF splitters, these can be seen to the top left of the image, above the transmission rack
- One issue with this approach was inter-sector interference, particularly given the wide horizontal beam-pattern of the early antennas - this in retrospect led to some coverage issues...
- The achievable coverage could be compared with that of a Class 3.0 BTS which was a 1+1+1 site configuration, therefore fully sectorised
- Each cell sector covered 120 degrees, antennas had a 115 degrees horizontal beam-pattern
- As traffic started to grow on the Orange network there was a large sectorisation programme - in addition to adding capacity this also significantly improved coverage
- The majority of Class 2.0 cabinets were swapped out during the sectorisation programme, a few were upgraded to 2 TRX configuration while awaiting sectorisation





- Class 2.0 BTS installation on a rooftop with a short stub-tower
- Site is equipped with Marconi antennas and a Telesciences point to point microwave radio with a 60cm parabolic antenna
- Photo taken in 1994, prior to commercial launch and prior to Mast Head Amplifiers (Low Noise Amplifiers) being retrofitted



Alternative views of the Class 2.0 BTS cabinet



Summary

- The image to the right shows a Class 2.0 BTS and a Swann B2-3 15m lattice tower with CSA antennas
- The CSA antennas were deployed after the initial rollout phase which used Marconi antennas, as illustrated on pages 2 and 5 of this document
- The Marconi antennas suffered from water ingress which caused significant issues with radio performance
- While the Class 2.0 BTS cabinet was a brave step away from larger and more expensive walk in enclosures, it was not without its problems however it set a direction towards outdoor equipment enclosures, these quickly became the norm for many GSM BTS installations
- Problems with the Class 2.0 cabinet included some minor water ingress, excessively heavy doors which proved a hazard in high-wind and a locking mechanism which seized, therefore requiring doors to be prised open and in some cases, the locking bar had to be cut off with an angle grinder!
- While a few Class 2.0 BTS were upgraded to 2 TRX as capacity grew, experiments to sectorise the BTS within this cabinet were unsuccessful and in time the cabinet was replaced with Class 3.0 or Class 3.1 BTS cabinets
- The series Class 3.x BTS and the Nokia DF-12 BTS equipment will be covered in a later document

