Installation and commissioning of 7 x 5G masts/base stations in Milton Keynes

Technical Requirements

Issue Date: 27th September 2019

Issue C

Version History

Version No.	Date	Change Author	Summary of Changes
Issue A	17/09/2019	PM	Initial Issue
Issue B	24/09/2019	PM	Updated lat/long data
Issue C	27/09/2019	PM	Updated with additional scope following internal review
Issue D	30/09/2019	PM	Updated to reflect requirement for standard and non standard services

Contents

1. OVERVIEW

1.1 INTRODUCTION AND BACKGROUND

SAC wish to install a small 5G RAN system in the Milton Keynes area.

Figure 1: Approximate survey area within Milton Keynes

Figure 2: Example of Huawei 5G antenna system

This project will entail the design, construction, installation and commissioning of seven 5G masts and base stations in Milton Keynes. SAC is looking for a complete turnkey solution with the successful supplier undertaking all the necessary planning applications, liaising with local authorities/land owners etc in addition to the actual installation and commissioning.

5G has distinct challenges over and above those for 4G LTE systems which need to be taken into account when designing and planning 5G systems.

The 5G cell radius in LOS areas can be up to 1- 1.5 km but for good 5G coverage in non-LOS urban areas its recommended to dimension/plan 5G coverage to 600-700m (from tower to UE). For this reason, SAC is undertaking a separate coverage analysis to determine the precise location, power, height, tilt etc for each of the seven base station sites. This will be available to the successful bidder. It will then be upto the successful bidder to determine how each site is designed/installed in compliance with any local planning regulations (eg re-use of existing sites, use of buildings, erecting new towers etc).

The following are extracts from one of the Huawei 5G planning white papers.

- In order to meet the requirements of massive connections and ultra-high data rates, 5G networks are designed to be deployed in high frequency bands, such as 28 GHz and 39 GHz, in addition to sub-6GHz bands. Compared with the radio propagation features of low frequency bands, the signals in high frequency bands are more susceptible to issues such as architecture materials, vegetation, rain attenuation, and oxygen attenuation. For instance, in the line of sight (LOS) and non-line-of-sight (NLOS) scenarios, the link loss in high bands is 16–24 dB and 10–18 dB, respectively higher than that in low bands. In the same frequency band, the link loss caused in NLOS scenarios is 15–30 dB more than that in the LOS scenarios. In the High Loss and Low Loss scenarios, the penetration loss in high bands is 10–18 dB and 5–10 dB, respectively higher than that in low bands.
- Higher accuracy of site location and engineering parameter planning is required to compensate for the limited coverage scope of a 5G high-frequency network. The high-precision of 3D modelling and ray-tracing propagation models can accommodate for the demanding technicalities involved in the many different stages of planning. However, these technologies can inadvertently reduce simulation efficiency and increase overall engineering costs.

1.2 Proposed site locations

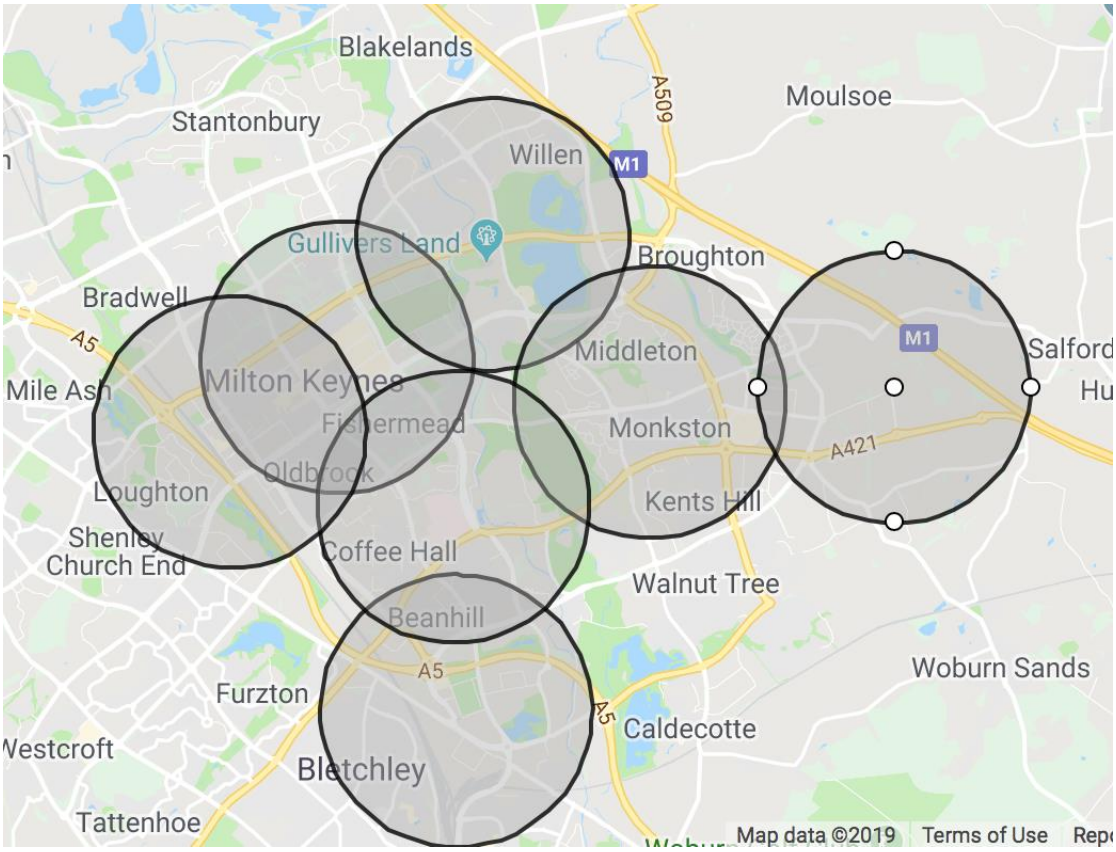

Figure 3: Initial suggested siting of seven sites in Milton Keynes area based on a 1500M radius

	Site 1	Site 2	Site 3	Site 4	Site 5	Site 6	Site 7
Description	Distribution Centre 1 – John Lewis Magna Park 1	Distribution Centre 2 – John Lewis Magna Park 2	MK Dons stadium	Hospital	Central Railway station	The Point bus station	Blakelands
Site reference	MK-1	MK-2	MK-3	MK-4	MK-5	MK-6	MK-7
Lat-Long (assumes 1500M coverage radius)	52.035500,-0.771175	52.042888,-0.753979	52.055054,-0.728865	52.038448,-0.703642	52.028068,-0.735184	52.007873,-0.734748	52.039912,-0.664359
No. of antenna sectors	3	3	3	3	3	3	3
No. of antenna elements	192	192	192	192	192	192	192

Antenna EIRP	78dBm	78dBm	78dBm	78dBm	78dBm	78dBm	78dBm
Port gain/beamforming gain	25dBi	25dBi	25dBi	25dBi	25dBi	25dBi	25dBi
Polarization mode	$+45^{O}$ and -45^{O}	$+45^{O}$ and -45^{O}	$+45^{O}$ and -45^{O}	$+45^{O}$ and -45^{O}	$+45^{O}$ and -45^{O}	$+45^{O}$ and -45^{O}	$+45^{O}$ and -45^{O}
Horizonal scanning range of broadcast beams	-60^{O} to $+60^{O}$	-60^{O} to $+60^{O}$	-60^{O} to $+60^{O}$	-60^{O} to $+60^{O}$	-60^{O} to $+60^{O}$	-60^{O} to $+60^{O}$	-60^{O} to $+60^{O}$
Vertical scanning range of broadcast beams	-15^{O} to $+15^{O}$	-15^{O} to $+15^{O}$	-15^{O} to $+15^{O}$	-15^{O} to $+15^{O}$	-15^{O} to $+15^{O}$	-15^{O} to $+15^{O}$	-15^{O} to $+15^{O}$
Frequency	3400 MHz to 3600 MHz	3400 MHz to 3600 MHz	3400 MHz to 3600 MHz	3400 MHz to 3600 MHz	3400 MHz to 3600 MHz	3400 MHz to 3600 MHz	3400 MHz to 3600 MHz
Mast height 12-23M	Optimal height to be confirmed	Optimal height to be confirmed	Optimal height to be confirmed	Optimal height to be confirmed	Optimal height to be confirmed	Optimal height to be confirmed	Optimal height to be confirmed
Antenna tilt	Optimal tilt to be confirmed	Optimal tilt to be confirmed	Optimal tilt to be confirmed	Optimal tilt to be confirmed	Optimal tilt to be confirmed	Optimal tilt to be confirmed	Optimal tilt to be confirmed

Table 1: Details of SAC proposed seven sites. Assumes use of AAU5613 NR. Note, the lat/long data is for the example sites in figure 3

1.3 Equipment

The 5G equipment will all be supplied by Huawei. Specifically :-

- Steel works (brackets): These are part of the Huawei antennas
- Antenna(s)
- Equipment Cabinets
- Cables (to/from cabinets to antennas and then to terrestrial (Fibre?) network)

1.4 Scope

The successful supplier is to provide / supply everything else. The following list is intended to detail the scope of the deliverables required from the supplier although this is not intended to be definitive :-

- Site Surveys
- Site Acquisition (if required)
- Design
- Structural analysis to support standard (5G) and non standard (5G and 4G) antennas
- Site build and preparation
- Construction (including power provision, concrete bases etc)
- Connection /test to the fibre circuits back to the SAC site at Westcott.
- Etc

The successful supplier should show demonstrable experience of :-

- Pylons, lattice towers, rigging if required, concrete bases, fencing, green field, roof tops, etc
- Project management
- Working at height
- Regulations
- Previous telecoms projects of a similar size.
- Licensing (Ofcom, Comreg….) if/as required
- Telecommunications Rigging
- Electrical Installation and Commission
- Transmission solutions via microwave, Ethernet, Fibre etc
- Commissioning and Integration of Telecoms Sites
- Etc

The successful supplier should have all the necessary accreditations (for example) :-

- ISO 9001
- Health and Safety
- Working at height
- NICEIC registered or equivalent
- Relevant Distribution Network Operator
- Etc

PRICING AND SCHEDULE

All prices for the services should be detailed in the RFQ (Issue F) table in Section D.

This shall include prices for the complete task for all seven sites, including but not limited to all equipment, personnel, planning applications, consumables, ground works, cabling, erecting of fences if required, and any other prices that are not included in the above.

Schedule

Bidders are to provide a schedule of work to be conducted with associated timescales.