

## Business Case – B (£100,000 or more Investment)

This document provides the basis of proposal for investment within Sandwell and West Birmingham Hospitals NHS Trust for investment of **£100,000 or more**.

The document provides details of the proposed investment within the Trust for the approval in line with the Trust's Standing Financial Instructions.

**All sections are mandatory**

Section 1: Basic Information	
<b>Name of Project/Scheme:</b>	MMUH Mobile Coverage
<b>Group / Corporate:</b>	Corporate
<b>Department / Ward:</b>	Informatics
<b>Project Manager:</b>	Mark Taylor, Head of IT - MMUH
<b>Project Sponsor:</b>	Martin Sadler, Executive Director of IT and Digital / Rachel Barlow, Chief Development Officer
<b>Capital or Revenue:</b>	Capital and Revenue

Section 2: Project Brief / Background
<p><i>[Describe why the asset / project / scheme is needed and outline the key issues / difficulties that the area of the business faces]</i></p> <p>Mobile phones are becoming an essential tool for staff with wards using mobile phones to manage flow, escalate issues, and maintain business continuity. Therefore, adequate and reliable mobile phone coverage across the MMUH site is essential to support operational and clinical activities. In addition, patient experience can be impacted if there is insufficient mobile phone coverage.</p> <p>The construction design and materials used for Midland Metropolitan University Hospital (MMUH) prevents the ability to provide adequate mobile coverage across the site. This is identified on the trust risk register as risk 4453. In addition, Mobile or cellular coverage across MMUH is not a deliverable under the Balfour Beatty contract. As a result, an alternative approach is required.</p> <p>Following a workshop with the National Hospital Programme it became evident that future hospitals are to be advised to include an indoor mobile coverage solution as part of the Digital foundations required for a modern hospital.</p> <p>The Home Office leads a cross-government programme to deliver the new Emergency Services Network (ESN) critical communications system. This will replace the current Airwave service used by the emergency services in Great Britain (England, Wales and Scotland) and transform how they operate. This service is to be built upon the EE mobile network.</p> <p>The proposal is to implement a Distributed Antenna Solution (DAS) within the building. As a result, staff, visitors and patients can make and receive calls in all locations across MMUH.</p>

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	Yes	No
Are there current funds available to support this asset / scheme?  <ul style="list-style-type: none"> <li>- Revenue costs have been obtained from a procurement exercise and the capital costs are obtained from a similar specification at the City site.</li> <li>- The trust finance team will confirm accounting treatment as the project progresses.</li> <li>- Capital funding will be provided from either the 22/23 or 23/24 Trust capital plan. The Trust will, however, look to secure funding via the ICB and strategic bids.</li> <li>- Revenue implications of the case will be built into trust plans.</li> </ul>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
	<b>Yes</b>	<b>No</b>
Does this case support an increase in activity / income?	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	<b>Yes</b>	<b>No</b>
Is this asset / scheme supported by the commissioners?	<input checked="" type="checkbox"/>	<input type="checkbox"/>
	<b>Yes</b>	<b>No</b>
Does this business case support a development identified within the CIP Programme?	<input type="checkbox"/>	<input checked="" type="checkbox"/>
N/A		

Section 3: Alignment to 2020 Vision <i>[indicate with an 'X' which Plan this paper supports]</i>				
Safety Plan	Public Health Plan		People Plan & Education Plan	
Quality Plan	Research and Development		Estates Plan	<b>X</b>
Financial Plan	Digital Plan	<b>X</b>	Other <i>[specify in the paper]</i>	

Section 4: Principal Reason for Investment	
<i>[Please select one box only which is the most relevant to the investment]</i>	
A "Spend to Save" initiative	<input type="checkbox"/>
Achievement of business plan targets	<input type="checkbox"/>
Achievement of waiting list targets	<input type="checkbox"/>
Improved service quality for patients	<input checked="" type="checkbox"/>
Improved working conditions for staff	<input checked="" type="checkbox"/>
Significant risk from department risk register <sup>1</sup>	<input checked="" type="checkbox"/>
Other (please describe) <sup>2</sup> :	<input type="checkbox"/>
<sup>1</sup> Include detail of risk along with detail of how the proposed project will provide mitigations against the risk/reduce the potential impact of the risk.  Risk 4453 - There is a risk that mobile phones will not be able to connect to a mobile phone network, due to ineffective mobile coverage in MMUH which may result in the inability for users to make or receive mobile phone calls.	
<sup>2</sup> Provide detail of the principal reason for investment.	

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N/A
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Section 5: Project Scope	
<i>[State the scope of the project, its deliverables and/or desired outcomes, any exclusions e.g. areas that the project will not address, any constraints on the project and known interfaces e.g. to other projects, clinical services, IT services etc.]</i>	
<b>Scope</b>	<ul style="list-style-type: none"> <li>• Provide mobile coverage across the MMUH site only.</li> <li>• The creation of a mobile server room at MMUH.</li> </ul>
<b>Desired Outcomes</b>	<ul style="list-style-type: none"> <li>• The ability for staff, visitors and patients to make and receive mobile calls.</li> <li>• The solution will act as an alternative method of connectivity for the smartphone bleep application if the Wi-Fi network was to be unavailable.</li> </ul>
<b>Exclusions</b>	<ul style="list-style-type: none"> <li>• Other SWBH sites.</li> <li>• Use of 5G. However, the solution is upgradeable if required.</li> </ul>
<b>Constraints</b>	<ul style="list-style-type: none"> <li>• Budgetary constraints, no currently identified budget to support the proposal.</li> <li>• Time constraints if implemented during the trust commissioning phase of MMUH.</li> </ul>
<b>Interfaces</b>	<ul style="list-style-type: none"> <li>• Balfour Beatty – to build mobile coverage main equipment room.</li> <li>• Estates – to interface with Balfour Beatty.</li> <li>• Informatics – To project manage and install the solution.</li> </ul>

Section 6: Benefits
<i>[Describe the benefits that the Trust will receive by investing in this scheme and if applicable how the benefits will be measured. These should be SMART in nature: Specific, Measurable, Achievable, Relevant and Timely]</i>
<p>The provision of a mobile coverage solution will not deliver quantitative benefits to the Trust. Instead, it is anticipated that benefits may accrue to other programmes of work; therefore, the mobile coverage solution should be seen as an investment to facilitate the strategic drivers of the Trust.</p> <p>Qualitative benefits are expected and are described as:</p> <ul style="list-style-type: none"> <li>• Patients and visitors can access comprehensive mobile coverage, enhancing the patient experience.</li> <li>• Business continuity solution in the event of a failure of the site’s telephony system.</li> <li>• Provide more comprehensive access to mobile cellular services (Mobile provider dependent).</li> <li>• Many staff members will not have fixed desks at MMUH; contacting them will be via their trust mobile.</li> <li>• Capacity Team uses mobile phones for communication with the wards.</li> </ul>

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- Support clinical and non-clinical staff to resolve flow issues/barriers essential to daily planning.
  - Community teams in-reach teams all have and use mobile phones to action immediate blockers (i.e. chase STAR referrals) whilst also taking calls from the community whilst onsite.
  - Support the site-wide bleep smartphone application in the event of a network issue.
- It is recognised that further opportunities exist to realise benefits from redesigning services based on a comprehensive mobile coverage solution. However, they are outside of the scope of this business case.

Section 7: Risks
<i>[Describe the risks that could occur by not making this investment i.e. loss of service provision]</i>
Risks caused by not making this investment include: <ul style="list-style-type: none"> <li>• Ineffective mobile phone coverage at the Midland Metropolitan University Hospital site. Trust risk 4453.</li> <li>• The inability to use mobile phones would impact business continuity processes, patient flow removing a vital tool in the capacity management of the hospital.</li> <li>• Impact on patient experience of not being able to make or receive calls.</li> </ul>

Section 8: Options Analysis	
<i>[List all options that have been considered including a “Do Nothing” option. Provide as much information as possible. Max 4 options to be evaluated. Options analysis should include details of any resultant changes to activity numbers, any changes to physical capacity requirements/estate changes (including office space) and any non-recurrent resource requirements such as project management support from other departments. Where none are expected, this should also be stated.]</i>	
<b>Market Engagement</b> A market engagement event was held in February 2021 with suppliers from the indoor mobile coverage market. A supplier list was obtained from a national framework contract. In addition to the suppliers, NHS Digital and West Midlands 5G were contacted to provide advice on solutions.  Various solutions were discussed and included in the options appraisal below, however, a number were deemed not suitable and have been excluded from the benefits options appraisal in section 9. The full details for each option evaluated are available in Appendix A.	
<b>Option 1</b>	<b>Do Nothing</b> Use the local mobile masts to provide telephone and data services to MMUH. EE, the incumbent mobile provider, has confirmed that signal strength will be insufficient to provide coverage throughout the hospital. Suppliers confirmed this at the market engagement event, NHS Digital technical lead and West Midlands 5G technical lead.
<b>Option 2</b>	<b>Install a Distributed antenna system (DAS)</b>

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	<p>A proven, high-quality solution is suitable for high footfall/density venues for medium to large corporate offices, hotels, hospitals, mixed-use campuses, retail parks, stadiums, or sports venues.</p> <p>An extension of the mobile network operator network brings all the benefits of quality, reliability, high capacity and security. Neutral host/multi-operator: DAS can support multiple carriers, with each carrier installing its equipment.</p> <p>Fully supported by all the mobile network operators, DAS can provide 2G, 3G, 4G currently and 5G on one system in the future. Has the capabilities required for essential emergency calls and real-time monitoring and management.</p> <p>Each mobile network operator requires a separate network link. However, it can help with resilience as emergency calls can still be made on the other networks should one backhaul network link fail.</p>
<p><b>Option 3</b></p>	<p><b>Reconfigure the mobile phone masts located near the hospital.</b></p> <p>The incumbent supplier advised that due to the size of the building and locations of the masts, the same issues would exist, as stated in option 1. Furthermore, EE advised that it was not possible to move the masts and to reconfigure the mast would disrupt the mobile signal across the area and impact multiple providers.</p> <p>The option was excluded from the benefits appraisal due to the cost of change and the complexities of migrating to a new mobile phone provider. In addition, the signal strength issues within the building will be apparent for all providers.</p>
<p><b>Option 4</b></p>	<p><b>Install Signal booster.</b></p> <p>Also known as repeaters, the technology uses the available mobile signal and amplifies the signal inside the building.</p> <p>Repeaters depend on the availability and quality of the outdoor signal, which could fluctuate, resulting in significant and uncontrollable quality issues. Furthermore, signal availability cannot be optimised for the specific requirements of MMUH as the repeaters amplify the signal from only one mobile phone network at a time.</p> <p>The market engagement event advised that it is not possible to obtain a service guarantee as the mobile network operators can change the local signal configuration without notice.</p> <p>The option was excluded from the benefits appraisal as it is deemed not fit for the purpose.</p>
<p><b>Option 5</b></p>	<p><b>Wi-Fi calling.</b></p> <p>Wi-Fi calling is seen as a complimentary service to mobile coverage, often supplementing an integrated mobile phone coverage solution on a large scale such as MMUH.</p> <p>The Wi-Fi network is a 'data' based network. In addition, calls can drop when 'handing</p>

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	<p>off' to the mobile network depending on the contract and device. Furthermore, calls via Wi-Fi are not deemed as secure compared to calls made using a mobile signal.</p> <p>It should also be noted that supplying mobile coverage via this method would impact business continuity if the network was unavailable.</p> <p>The option was excluded from the benefits appraisal as it is deemed not fit for the purpose.</p>
<p><b>Option 6</b></p>	<p><b>Femtocell/Small Cell</b> The solution is used for smaller buildings available from limited mobile network operators, currently Vodafone and O2.</p> <p>The solution is not multi-operator. Therefore, duplicate equipment is required for each mobile network operator, resulting in clusters of up to 4 radio points on the ceiling. Calls can drop as the user moves around within the building and drop as users enter or leave the building, resulting in a poor end-user experience.</p> <p>Typically uses 3G only, which is now deemed old technology and likely to be rendered obsolete as the market moves towards 4G and 5G. Costly investment due to its short life span. No upgrade path with femtocell technology.</p> <p>The option was excluded from the benefits appraisal as it is deemed not fit for the purpose.</p>
<p><b>Option 7</b></p>	<p><b>Virtual Radio Access Network (RAN).</b> Virtualisation involves decoupling software from hardware, enabling network operators to automatically develop and deploy innovative services, making the network more agile while reducing the need for expensive proprietary hardware.</p> <p>A virtual RAN is more complex to implement than other implementations partly because the centralisation of RAN functions demands high bandwidth and low latency between the customer site data centre where the equipment is hosted.</p> <p>Discussions were held with the incumbent supplier on implementing a Virtual RAN. However, they declared that the technology, in their opinion, as a supplier of indoor mobile coverage technologies, was not ready for deployment into a hospital setting.</p> <p>The option was excluded from the benefits appraisal as it is deemed not fit for the purpose.</p>

**Section 9a: Option Benefit Appraisal**

*[Rank the options identified according to the benefits. Using the risk ratings score below:*

*1 – High Negative Impact*

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- 2 – Slight Negative Impact
- 3 – No Impact or Improvement
- 4 – Slight Improvement
- 5 – High Improvement

The following options were taken forward for the benefits appraisal.

- Option 1 – Do Nothing
- Option 2 - Install a Distributed antenna system

	Option 1	Option 2		
Improve quality of patient care	2	4		
Improve patient experience	1	4		
Improve visitor experience	1	4		
Improve staff experience	1	4		
Improve throughput of elective activity	3	3		
Improve throughput to meet emergency admissions	2	4		
Improve efficiency	2	4		
Evidenced clinical effectiveness	3	3		
Income generation	3	3		
Value for money	3	3		
<b>Total score</b>	<b>21</b>	<b>36</b>		

**Section 9b: Preferred Option**

*[State the preferred option, giving rationale for its selection.]*

**Preferred Option:**

The preferred option is Option 2 - Install a distributed antenna system, also known as a DAS.

The rationale is that the technology is proven, is a high-quality solution suitable for high footfall/density venues for medium to large corporate offices and hotels, mixed-use campuses and retail parks. Furthermore, will enhance patient experience and provide resilience as emergency calls can still be made on the other networks should one carrier backhaul link fail.

The solution has been implemented in Hospitals, including the Grange Hospital, Cwmbran, Wales, which members of the project team visited in February 2022.

Fully supported by all the mobile network operators, DAS can provide 2G, 3G, 4G and 5G on one system. Has the capabilities required for essential emergency calls and real-time monitoring.

It should be noted that the specification did not include the use of 5G due to having extensive Wi-Fi coverage on site which includes a guest Wi-Fi network. Whereas 2G and 3G is intended to be deprecated over the next 2-3 years to support 4G, 4G coverage is expected to be available until 2033.

Capital	Option 1	Option 2		
Building		(480)		

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Mechanical & Engineering				
Fittings				
Design & planning costs		(20)		
Equipment (medical, IT etc.)				
IT resource		(30)		
Training				
Other (please specify)				
<b>Total Capital</b>	<b>0</b>	<b>(530)</b>	<b>0</b>	
Pay				
Non-Pay (including estates & IT)		(190)		
Training				
Capital charges (depreciation, amortisation)				
Other (please specify)				
<b>Total Revenue</b>	<b>0</b>	<b>(190)</b>	<b>0</b>	
NHS clinical income outpatients				
NHS clinical income inpatients / day cases				
Other NHS clinical income				
Non NHS clinical income				
<b>Total Income</b>	<b>0</b>	<b>0</b>	<b>0</b>	
Pay				
Non-Pay				
Capital charges other				
<b>Total Cost Savings</b>	<b>0</b>	<b>0</b>	<b>0</b>	
<b>Net Cost / Saving</b>		<b>(720)</b>		

**Section 10b: Net Present Value (NPV) – if applicable**

*[NPV is an indicator of how much value an investment will add to the Trust. Generally if an NPV is positive the investment will be profitable, if the NPV is negative the investment will end up making a net loss]*

<b>Net Present Value – Discount Factor 3.5%</b>	<b>Option 1</b>	<b>Option 2</b>		
Outflow – Year 1	<b>0</b>	<b>(720)</b>		
Discounted Inflows Year 2 to Year 7	<b>0</b>	<b>(1008)</b>		
<b>Net Present Value</b>	<b>0</b>	<b>(1728)</b>		

**Section 10c: Payback Period – if applicable**

*[The Payback Period is the length of time required to recover the cost of an investment]*

No payback period - as no savings/income generated

	<b>Option 1</b>	<b>Option 2</b>		



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No. of Years:	n/a	n/a		
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**Section 10d: Financial Statement Effect – Preferred Option**

*[Please show the effect on the Statement of Comprehensive Income and the Statement of Financial Position once the scheme has been completed and is live]*

Statement of Comprehensive Income							
£'000s	YR 1	YR 2	YR 3	YR 4	YR 5	YR 6	YR 7
Income							
Expenditure	(190)	(190)	(190)	(190)	(190)	(190)	(190)
<b>EBITDA</b>	<b>(190)</b>	<b>(190)</b>	<b>(190)</b>	<b>(190)</b>	<b>(190)</b>	<b>(190)</b>	<b>(190)</b>
Depreciation	(76)	(76)	(76)	(76)	(76)	(76)	(76)
PDC dividend payable	(19)	(16)	(13)	(11)	(8)	(5)	(3)
<b>Net surplus / (deficit)</b>	<b>(284)</b>	<b>(282)</b>	<b>(279)</b>	<b>(276)</b>	<b>(274)</b>	<b>(271)</b>	<b>(268)</b>

Statement of Financial Position							
£'000s	YR 1	YR 2	YR 3	YR 4	YR 5	YR 6	YR 7
Property, Plant & Equipment	530	455	379	303	227	152	76

**Section 11: Milestones for Delivery (This will be used for monitoring & reporting progress of delivery)**

*[This section outlines the key milestones for successful delivery of the programme]*

Key Milestone Description		Start Date	End Date
<b>1</b>	Undertake Procurement exercise following approval of an outline business case. - <b>Completed</b>	TBC	01/06/22
<b>2</b>	Inform suppliers outcome of procurement – <b>Completed.</b>	01/06/22	
<b>3</b>	Trust board approval	07/09/22	
<b>4</b>	Raise order with supplier and award contract	08/09/22	13/09/22
<b>5</b>	Kick-off meeting with the supplier to agree implementation plan	13/09/22	30/09/22
<b>6</b>	System live	Three months prior to MMUH opening	

**Section 12: Risks**

Risks Summarise the key known risks to the successful delivery of this project and how you plan to mitigate these project risks

Risk	Mitigation
<p><b>Funding</b> The funding for the ongoing support and management solution is not identified in the budgets. Therefore, the financial risk is twofold; the capital funding is required for the initial installation and building of the mobile coverage server room with no allocated revenue funding.</p>	<p>Approval of business case.</p> <p>Regular updates with finance teams once full costings are known for the required estate work.</p>

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<p><b>MMUH Programme – Cabling</b> Balfour Beatty would be included in implementing the solution as additional cabling is required for the radio nodes.</p> <p>The hospital programme is not reliant on mobile coverage. Instead, this is additional infrastructure.</p>	<p>As a pre-emptive measure following a desktop survey by one of the digital solution providers, Balfour Beatty was instructed to install extra network points to connect the mobile access points.</p>
<p><b>Estates</b> The installation of a Distributed Antenna System (DAS) would require additional network cabinets.</p> <p>The current node rooms do not have the capacity; as a pre-emptive measure, a room has been re-designated as an IT room where the cabinets could be installed.</p> <p>In addition, the space will require power and cooling, and an indicative cost is included in the financial section.</p>	<p>A location has been identified for the mobile coverage server room that only requires power and cooling installed.</p> <p>Closely working with Balfour Beatty and the New Hospital Programme will determine the ability to make this room ready prior to handover.</p>
<p><b>Estates</b> The designated space for the server room may not be sufficient if the Trust wishes to have all network operators available rather than a private network for EE only, who is the Trust's current mobile provider.</p> <p>In addition, a secondary room may require additional cooling.</p>	<p>A secondary room near the identified room is available and could be used.</p> <p>Close working with the supplier and Balfour Beatty to establish if this room can be used.</p> <p>Costings include estimated costs for cooling and power in both rooms.</p>
<p><b>Infrastructure</b> An expected requirement is additional fibre cabling to be installed between node rooms</p>	<p>Blown fibre is being installed at MMUH and is not expected to be a complicated issue to resolve. However, it will require an instruction issued to Balfour Beatty to install.</p>
<p><b>Ability to install – Trust risk 4991</b> Due to the revised programme, installing equipment before handover may not be possible.</p> <p>As a result, this may delay the hospital's opening if Mobile Coverage is declared a must-have for go-live.</p>	<p>Work with NHP and BB to negotiate construction access to the mobile network operator's equipment and the solution to each edge node room.</p> <p>The solution can then be installed and tested. However not full commissioned until handover. The radio antennas would then be installed post-handover.</p>

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**Section 13: Identification of Successful Outcomes**

*[Clearly describe the demonstrable and quantifiable successful outcome criteria that the investment will be measured against, to prove the investment has been a success. These should be linked to the benefits identified in section 5, to Trust objective and/or improvements in performance against current key performance indicators. For instance, where investment is expected to reduce waiting times, provide detail of expected improvement.*

*A report will need to be produced, once implementation of the scheme has been completed, and presented to the Executive Directors in relation to these outcomes. This should include detail of delivery of the project to timetable, budget and whether deliverables were achieved.]*

The overriding identifier of success is the ability to make and receive calls in all identified locations within the hospital. A signal survey will be undertaken and included in the post-go-live report during the trust commissioning phase and once the system is fully commissioned.

**Report Production Time:** MMUH opening + 6 month

**Section 14: Contract Management / Procurement Strategy**

*[Please note that UK Law requires us to comply with The Public Contract Regulations 2015 in which above value procurements are subjected to advertisement in Europe. Above threshold spend conditions will apply:*

- Goods and Services - £122,976 (NHS Trusts are listed as a Central contracting authority under the Regs)
- Works/Equipment - £4,733,252
- Social/Health/Education - £663,540

*Your route to market analysis should identify the correct application & mitigation of a breach of law]*

Our route to market was via the SBS: Digital Workplace Solutions. The SBS: Digital Workplace Solution confirmed that a “Distributed Antenna System” – DAS, is covered under the framework’s ability, and “The Grange, Wales” have also direct awarded under this framework.

Following a submission of an online business case to CLE a procurement exercise was approved. The procurement exercise was led by the Informatics department commercial team with input and consultation with the central procurement department. Furthermore, a Principal category manager was assigned from SBS and was present during all stages of the procurement.

The procurement notice issued on to the SBS Digital workplace solutions framework was as follows:

<b><u>Contract Subject Matter</u></b>	Informatics Mobile Signal for Midland Metropolitan University Hospital
<b><u>Projected Contract Value</u></b>	£2,000,000.00
<b><u>Projected Contract Length</u></b>	7 Year inline with SBS Digital Workplace Solutions offering

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<b>Procurement Process Type</b>	Mini-Competition via SBS: Digital Workplace Solutions		
<b>Light Touch Regime Deviations</b>	N/A		
<b>Framework / DPS Name and Reference (where applicable)</b>	SBS: Digital Workplace Solutions		
<b>Lot Information (where applicable)</b>	As Above		
<b>Advertising Platform (where applicable)</b>	Elcom - Evolve		
<b>Sign Off</b>			
<b>Signature:</b>	tbc		
<b>Name:</b>			
<b>Designation:</b>	Director of Procurement		
<b>Date:</b>		<b>Telephone No:</b>	

Section 15: Other Information			
15a – Other Department(s) / Division(s)	Yes	No	N/A
Will any other department / division be affected by this scheme?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
If “Yes” has the scheme been discussed with them and the implications agreed?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Identify the department(s) / division(s) affected and names of individuals involved in the agreement			
Financials generated by John Doyle, Financial Account			

15b - Equipment	Yes	No	N/A
Will any medical equipment procured as part of this business case achieve standardisation within the division / Trust?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Has this been confirmed by the Clinical Equipment Group (CEG)?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Name & Designation of the CEG representative:			
Due to the purchase of this asset, will other equipment be removed from service?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>

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If “Yes” please specify the equipment, asset number(s) and value(s) to be replaced

15c – Information Technology	Yes	No	N/A
Are there any IT implications with regard to the implementation of this scheme e.g. system changes, data storage requirements?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
If “Yes” has this been discussed with the IT department?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Name & Designation of IT representative:  Martin Sadler, Executive Director for IT and Digital.			

15d – Estates & Facilities	Yes	No	N/A
Are there any estates implications with regard to the implementation of this scheme e.g. estate building changes?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
If “Yes” has this been discussed with the estates department?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Name & Designation of estates representative: Kevin Reynolds, Senior Estates Manager			

Section 16: Sign Off			
Name & details of Project Manager			
I confirm that all necessary advice and input has been obtained from Estates, Finance, IT and Operational departments in the completion of this business case.			
<b>Signature:</b>			
<b>Name:</b>	Mark Taylor		
<b>Designation:</b>	MMUH IT Lead		
<b>Date:</b>	13.06.22	<b>Telephone / Ext No:</b>	

Name & details of Project Sponsor

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<b>Signature:</b>			
<b>Name:</b>			
<b>Designation:</b>			
<b>Date:</b>		<b>Telephone / Ext No:</b>	

<b>Name &amp; details of Finance Manager or Capital Accountant</b>
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I confirm that all the financial information has been checked and verified at the time of this business case being prepared.

<b>Signature:</b>			
<b>Name:</b>			
<b>Designation:</b>			
<b>Date:</b>		<b>Telephone / Ext No:</b>	

<b>Name &amp; details of Commissioning/Income Reviewer</b>
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I confirm that all commissioning and income implications have been reviewed and reflected appropriately in the financial information within the business case.

<b>Signature:</b>			
<b>Name:</b>			
<b>Designation:</b>			
<b>Date:</b>		<b>Telephone / Ext No:</b>	

<b>Name &amp; details of Group or Corporate HR Manager (required for changes to workforce)</b>
------------------------------------------------------------------------------------------------

I confirm that all workforce information has been checked and verified.

<b>Signature:</b>			
<b>Name:</b>			
<b>Designation:</b>			
<b>Date:</b>		<b>Telephone / Ext No:</b>	

<b>Executive Directors Decision</b>
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<b>Investment Proposal Outcome:</b>	
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If the outcome of the proposal is either declined please outline the reasons why below:			
<b>Directors Signature:</b>		<b>Date:</b>	
<b>Directors Name:</b>			
<b>Directors Designation:</b>			

**Section 17: Additional Supporting Information**

*[This section is for any additional information you may feel is relevant to support the business case. This could be in the form of supporting calculations or specific data form 3<sup>rd</sup> parties]*

Market research was undertaken and is available in Appendix A, reviewing the various solutions available and approximate costs if applicable.

**Mast locations and current EE mobile phone coverage**

The location of the masts in the vicinity of MMUH and the associated EE coverage is shown in figures 1,2 & 3 below:

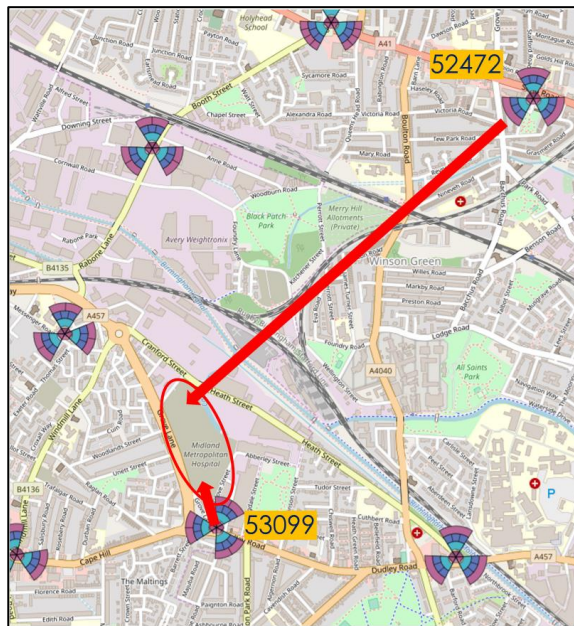


Figure 1: Mobile phone masts

The masts identified as 53099 and 52472 are those installed by EE.



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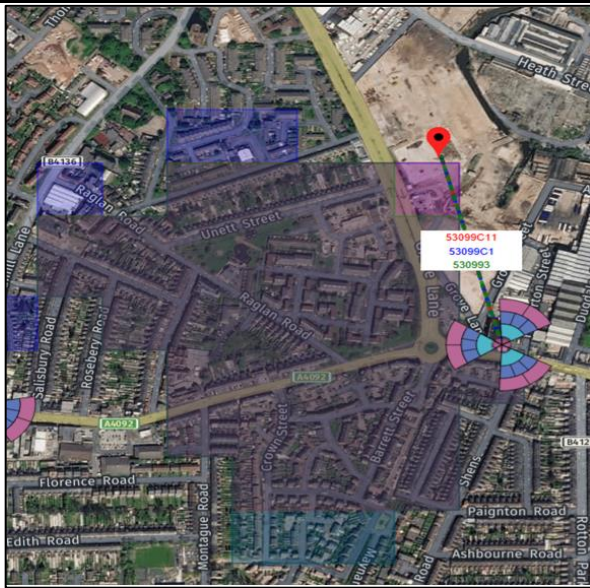


Figure 2: Coverage at the front of the hospital.

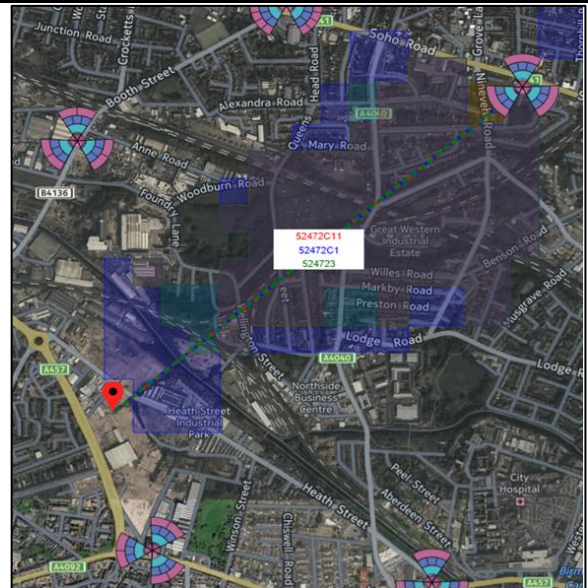


Figure 3: Coverage at the rear of the hospital.

### Signal Strength

A key component of using a mobile phone is the signal strength the user sees, usually depicted by the number of bars shown. Depending on factors such as proximity to a tower, any obstructions such as buildings or trees, this signal strength will vary—the stronger the signal, the more likely the phone will receive calls and run apps.

Cell phone signal strength is measured in decibels (dBm), and signal strengths can range from approximately -30 dBm to -110 dBm. The closer that number is to 0, the stronger the cell signal. In general, anything better than -85 decibels is considered a usable signal. If the signal in a building is not hitting this benchmark, then issues will arise.

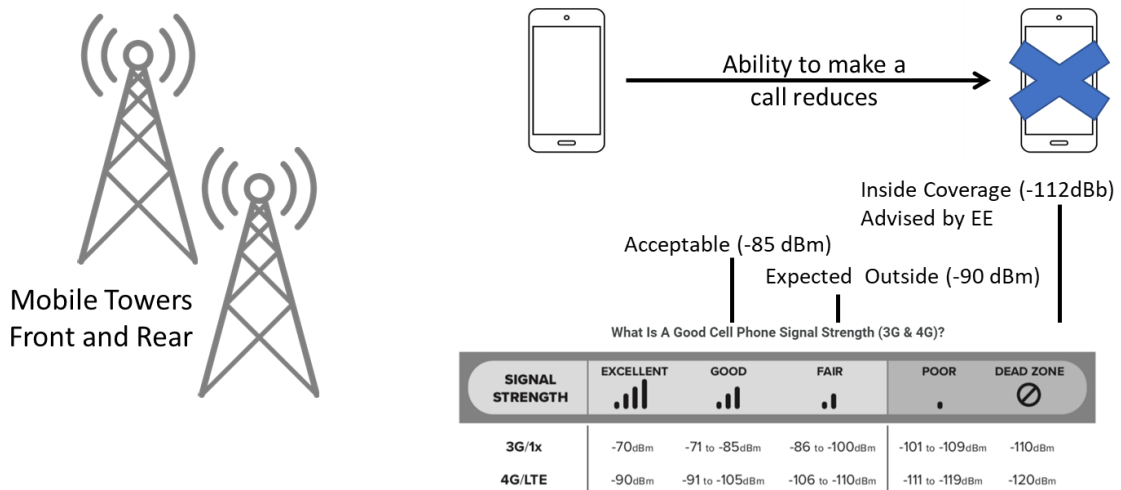


Figure 4: Mobile coverage indicator



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EE has advised that the signal strength expected outside the building will be -90 dBm at the rear and -92 dBm at the front. When moving inside the building and away from windows, the signal could drop as low as -112 dBm, nearly 40 dBm away from what is seen as acceptable signal strength.

Limited locations will have coverage, for example, the winter gardens or close to the extremities of the hospital, allowing a user to maintain and receive calls. That said, the number of phone users in the hospital may prevent a reliable connection from being made.

To summarise, the estimated signal strength from the mobile masts when inside MMUH is expected not to meet the industry benchmark. Furthermore, as the number of phones increases, this will cause further capacity issues resulting in problems making or receiving calls and running apps that require a data connection.

### Section 18: Quality Impact Assessment and Equality Impact Assessment

*Complete the Trust QIA and EIA forms and submit as separate documents with your Business Case.*  
<https://connect2.swbh.nhs.uk/project-management/change-management-templates/>

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### Appendix A – Market Engagement Event

#### Market Engagement

Both NHS Digital and West Midlands 5G were contacted to provide advice on solutions. As a result, NHS Digital provided an NHS telecommunications lead who advised on the solutions available to the trust. Furthermore, a supplier engagement event was held with leaders from the market.

#### Install Signal booster.

Also known as repeaters, it takes the incoming mobile signal and amplifies the phone signal inside the building.

Repeaters depend on the availability and quality of the outdoor signal, which could fluctuate, resulting in significant and uncontrollable quality issues. Furthermore, it cannot be optimised for the specific requirements of MMUH as the repeaters amplify the signal from only one mobile phone network at a time.

The solution can interfere with the mobile operator service, and mobile network operators could apply to OFCOM, the regulator for telecommunications, to have the repeaters switched off without warning. It is impossible to obtain a service guarantee as the mobile network operators can change the local signal configuration without notice.

Costs are not available as the solution is not deemed fit for the purpose.

#### Wi-Fi calling.

The option uses the functionality of mobile phones to make and receive calls using the Wi-Fi network. Wi-Fi calling is a complimentary service to mobile coverage. Therefore, it often supplements an integrated solution on a large scale such as MMUH.

The Wi-Fi network is a 'data' based network. As a result, call quality can be impacted. Calls can drop when 'handing off' to the mobile network depending on the contract and device supporting Wi-Fi calling. Furthermore, calls via Wi-Fi are not deemed secure compared to calls made using a mobile signal.

The additional load on the Wi-Fi network could impact the Wi-Fi devices that already connect, including clinical stations used to update the patient's record. It should also be noted that supplying mobile coverage via this method would impact business continuity if the network was unavailable.

#### Femtocell/Small Cell

The solution is used for smaller buildings available from limited mobile network operators, currently Vodafone and O2.

The solution is not multi-operator. Therefore duplicate equipment is required for each mobile network operator, resulting in clusters of up to 4 radio points on the ceiling. Calls can drop as the user moves around within the building and drop as users enter or leave the building, resulting in a poor end-user experience.

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Typically uses 3G only, which is now deemed old technology and likely to be rendered obsolete as the market moves towards 4G and 5G. Costly investment due to its short life span. No upgrade path with femtocell technology.

EE has indicated they are not looking to join this technology, so currently, the solution is not available with the trusts current provider.

Costs for a 7-year contract would be £2.25M for all four main networks.

### **Distributed antenna system.**

A proven, high-quality solution is suitable for high footfall/density venues for medium to large corporate offices and hotels, mixed-use campuses, retail parks, stadiums, or sports venues.

An extension of the mobile network operator network brings all the benefits of quality, reliability, high capacity and security. Neutral host/multi-operator: DAS can support multiple carriers, with each carrier installing its equipment.

Fully supported by all the mobile network operators, DAS can provide 2G, 3G, 4G and 5G on one system in the future. Has the capabilities required for essential emergency calls and real-time monitoring and management.

Some installations require a large equipment footprint (up to 30 square metres) in the Main Equipment Room (MER). However, in offices, they can be configured with much lower space requirements (2/3 racks).

Each mobile network operator requires a separate backhaul link. However, it can help with resilience as emergency calls can still be made on the other networks should one backhaul link fail.

Costs for a ten-year contract would be £2m - £2.5m subject to survey

### **Virtual Radio Access Network (RAN).**

Virtualisation involves decoupling software from hardware, enabling network operators to automatically develop and deploy innovative services, making the network more agile while reducing the need for expensive proprietary hardware.

A virtual RAN is more complex to implement than other implementations partly because the centralisation of RAN functions demands high bandwidth and low latency between the customer site data centre where the equipment is hosted.

Discussions were held with the incumbent supplier on implementing a Virtual RAN. However, they declared that the technology, in their opinion, was not ready for deployment into a hospital setting. Costs are not available as the solution is not deemed fit for the purpose.