Finance Committee

Date: **5 December 2017**

Item: **Telecommunications Commercialisation Project Update**

This paper will be considered in public

1 Summary

1.1 This paper sets out the approach we are taking to deliver a range of telecommunications improvements in line with the draft Mayor's Transport Strategy. These include public cellular services on the London Underground, a new high-speed fibre optic network across London and the use of on-street assets such as lighting columns to support the delivery of the next generation of cellular coverage.

1.2 To date we have both engaged with the market and potential customers to build interest and have commenced a procurement process to select a partner who will deliver services for our customers and generate revenues in which we will share.

1.3 A paper is included on Part 2 of the agenda, which contains exempt supplemental information. The information is exempt by virtue of paragraph 3 of Schedule 12A of the Local Government Act 1972, in that it contains information relating to the financial and commercial affairs of TfL which could prejudice future commercial arrangements.

2 Recommendation

2.1 **The Committee is asked to note the approach to commercialising the telecommunications assets and the supplementary information on Part 2 of the agenda.**

3 Background

3.1 The draft Mayor's Transport Strategy includes the proposal that 'The Mayor, through TfL and the boroughs, and working with other transport operators, will improve customer service across the transport system with a focus on making the most of new technology and innovations in customer service, including provision of mobile phone access underground.'

3.2 The initial opportunity in commercial telecommunications is to provide mobile coverage in stations and tunnels across our Underground network. Most major international metro operations already provide a public cellular service. There are several different business models employed around the world, though the majority involve a commercial partner, and many are revenue generating for the metro operator. Our soft market testing has shown that there is strong market interest in the commercial opportunity in London.

3.3 As well as engaging and understanding the needs and drivers of the supply chain and market, we have trialled cellular coverage on our own network using the Waterloo & City Line. Further details on the trial are set out below.

3.4 Our second commercial opportunity is to create a fibre network. Across the world, cities are engaged in building fibre infrastructure to provide city-wide, hyper-connected environments. These networks are becoming increasingly important to cope with the rapid growth in connected devices including utility assets, street lighting, traffic signals and CCTV. Cities such as New York, Hong Kong and Stockholm have leveraged their networks to foster fibre-based services, either directly or, more often, through partnerships with local providers. They have used these new services to support economic development, education, healthcare and other community functions.

3.5 There is currently inflexibility of fibre supply in London, with established providers struggling to meet the demand. This creates the opportunity to add significant value to the capital's economy by providing telecommunications services quickly and efficiently. Bringing new telecommunications infrastructure to London over a physically separate fibre network infrastructure will result in a highly resilient and state-of-the-art network for Londoners - residents and businesses alike – and will go a long way in making London a 'Gigabit city'.

3.6 Improved connectivity in London will have far reaching implications. As well as potentially delivering a new revenue stream to support the transport service, we can improve the lives of Londoners, create digital inclusion, change the way transport is used and delivered, support wider revenue generation and provide countless new opportunities for the technology sector.

3.7 Given the constraints on our powers and state aid considerations we cannot simply create a fibre network for commercial purposes. We can however, use spare capacity, but further fibre provision, which will be needed if we are to be successful, will require assistance of the private sector, possibly via a joint venture or concession type arrangement. We have had very positive initial market engagement, including with a number of organisations that have delivered similar schemes in other cities in the UK and across the world.

3.8 The third commercial opportunity in telecommunications is to leverage our new fibre network and on-street assets to provide the Mobile Network Operators (MNOs) with sites for small cells across London. The next generation mobile networks, known as the '5G' networks, are expected to roll-out in the 2020s. This mobile technology will provide 400 times more capacity than the 'Superfast Broadband' currently offered by the home broadband industry. To provide this capacity and coverage, small cells (miniature mobile phone base stations) will play an essential role. We will be in the unique position of being able to offer high volumes of sites for small cells across London in areas where there are high densities of people. Due diligence will be carried out to assess the availability and suitability of on-street assets as sites.

4 Current Status

4.1 Significant progress has been made on demonstrating the deliverability of a public cellular network on our Underground estate. This includes a successful technology trial on the Waterloo & City Line where 4G cellular services were available in tunnels and stations for the first time during non-passenger hours. The installation also trialled the laying of fibre which will be needed for other elements of the strategy.

4.2 The formulation of a procurement strategy to deliver a public cellular network, fibre and small cells has started with the issuing of a Prior Information Notice (PIN) and market testing questionnaire. We received 22 responses to the market questionnaire that was issued alongside the PIN. These responses included companies keen to invest in all three elements of the strategy, mobile network operators, and other companies that have an interest in the solution such as service, delivery and equipment manufacturers. A summary of the findings is set out below.

4.3 The successful trial was a result of a good collaborative approach. The future success of this project will require that our new partner continues to get support from operational and technology areas. The support will be further detailed during the bid process but will include engineering disciplines and across telecommunications.

Public Cellular Trial

4.4 During summer 2017 we worked with all four MNOs to deliver a trial of the proposed public cellular technology. Three and EE participated through design reviews. With Vodafone and O2 we went further and trialled delivering mobile coverage in the tunnels and station areas of part of the Underground network during non-passenger hours.

4.5 The Waterloo & City Line was chosen for the trial because the reduced hours of passenger operation allowed longer periods of testing in engineering hours. Also the 2.1 km stretch of tunnel between the two stations was considered to be particularly demanding in terms of radio coverage.

4.6 The Waterloo & City Line trial confirmed that 4G LTE services can be deployed within London Underground without impacting operational systems or public WiFi, although further testing will be required before full service in passenger hours. It also provided performance data that has been used to refine the design, project timescales and costs.

4.7 Undertaking the trial with O2 and Vodafone permitted testing in the licensed bands at 800MHz, 1800MHz & 2100MHz bands in tunnels, and 1800MHz, 2100MHz & 2600MHz bands in two stations at Waterloo and Bank. Four different radiating cables from two different manufacturers were tested in the tunnel environment. The results of the trial showed that there was no interference with any of the existing railway signalling and radio systems at these frequencies. The testing also confirmed that the specifications given out by the radiating cable manufacturers were accurate and that overall coverage was in line or better than we had modelled.

4.8 The station solution was based on multiple low-power radio heads. Similar units had been trialled on the disused platforms at Charing Cross in 2016 and that work was used to plan the positioning of the low-power radio heads in both Waterloo & City Line stations. Again, the results were positive with the selected approach providing the predicted service in all public areas of the station at a much lower cost than could be achieved using additional leaky feeders.

4.9 The trial culminated in the testing team establishing a data call in the ticket hall area of one station then walking through the station to the platform before taking a powered track trolley through the tunnel to the second station and walking through that station to the ticket hall all the while maintaining the same data call for the whole duration, handing over from cell to cell correctly while continuously downloading data.

4.10 Importantly, the trial allowed us to test deployment processes and refine the interface between the Project and the operational teams.

4.11 The MNOs are not set up to work in railway environments, requiring escorting by qualified personnel. The MNOs have highly standardised processes that do not work in the Underground. The trial confirmed that the best solution is for us and our partners to deliver a solution where the on-track infrastructure is provided to the MNOs and the MNOs' interface is organised outside of the core operational estate.

Partnership

4.12 We do not have the technical or commercial capability to run what would be a substantial telecommunications company to deliver the emerging strategy. To build such a capability would also take a large investment that is not assumed in the Business Plan. The support of a commercial partner and additional investment would significantly speed up the opportunity to provide public cellular technology on the underground, ultra-fast broadband connectivity and also improved cellular coverage across the city. All three propositions potentially have the capability to provide us with a significant long-term revenue stream.

4.13 Our expectation is that the commercial partner will cover the capital and operating costs of the telecoms operation and would provide a revenue share for us. A financial summary of anticipated revenues is set out in the paper on Part 2 of the agenda. Our plan is to have a commercial partner on board in summer 2018 with incremental rollout starting six months after contract signature.

4.14 We will select a partner in accordance with the applicable procurement regulations beginning with the issue of an OJEU notice (with a further paper coming to the Committee with the shortlisting recommendation after the Standard Selection Questionnaire stage and before the Invitation to Tender is issued). The winning bidder will need a combination of a good financial offer and proven capability to build and operate a large neutral host network.

4.15 In the contracting arrangements and evaluation process for the partner we will include stipulations that will minimise the disruption. All work will be required to be carried out in engineering hours, so there will be no disruption to the train service.

4.16 Careful coordination with the Emergency Services Network (ESN) project will mean that when infrastructure, e.g. cabling, is designed and installed for either ESN or public cellular, we would aim to use the equipment across both projects wherever this is practical. Where different infrastructure is required, e.g. to meet differing requirements, the installation will be coordinated with the aim of minimising tunnel and station access. However, ESN delivery is not dependant on PCN delivery.

4.17 Much of the specific work for public cellular will be in the base station hotels, where the MNO will connect into our estate. These base station hotels for ESN are consciously being positioned in locations outside of the core operational estate. This will minimise the disruption caused by the majority of works. PCN works will not disrupt ESN delivery.

Market Feedback

4.18 The first stage in unlocking this opportunity with a commercial partner was the issuing of a PIN together with a market questionnaire to understand some key elements of the market to help us to define the procurement strategy. This notice was issued on 6 October 2017 and we received 22 responses.

4.19 The market questionnaire included in the PIN Notice covered a wide range of topics relating to the commercialisation, including the assets that are of interest to the market; the structure and term of the contract; the ideal lot structure; key risks and their mitigation as well as asset ownership; on-going investment; and how we deal with assets at the end of the contract. Key findings were:

(a) Assets – there is a strong view that we should include all potential assets to provide the greatest opportunity and maximise the synergies between asset classes. The only exceptions to this general rule were Bus WiFi and ESN service provision. There are some companies, including specialists, that see the possibility of delivering a bus WiFi service without the need for TfL subsidy and investment, and this is worth exploring further but we are proposing to do so as a standalone project;

(b) Structure – though a number of suggestions were raised, the clear preference of those responding was for us to use a concession model to contract the commercialisation;

(c) Term – longer terms were recommended, given the level of investment and the need for continued capital investment as technology changes. Most respondents quoted a minimum of ten years with a recommendation of 15 years with additional periods of extension;

(d) Lots – Most respondents recommended a single lot (given ESN and Bus WiFi are already separated out) with some providing detailed analysis of the synergies and additional opportunities a single combined lot provide;

(e) Asset Ownership and Contract End Conditions – Almost all recommended that asset ownership for new assets should rest with the investor during the life of the contract. There was more difference of view on what should happen at the end of the contract. If the concession route is followed,

assets would return to TfL and the financial treatment of those assets would need to be considered so as to incentivise on-going investment;

(f) Perceived Risks and Mitigations – respondents pointed out the well understood project, commercial, service and technical risks which exist for projects of this nature. Some specific risks were identified that we will take into account in future phases of work;

(g) Customer View – Mobile network operators were positive about the opportunity though cautioned against pricing that would reduce demand;

(h) Data – respondents said that while no customer data will be directly available from this solution, MNOs offer aggregated, anonymised data services; and

(i) LU Station WiFi – most respondents believe there is the opportunity for both cellular and WiFi to coexist. The revenue opportunity from WiFi will be limited once cellular is available, but there is the potential to widen the scope of supply to include the Virtual Network Operators (such as Virgin Mobile, giffgaff and Tesco Mobile) and to provide a sign-in service for all users, including visitors from overseas.

4.20 In summary, we have gathered a valuable set of information from the market questionnaire that all points to the current approach as being a positive route to delivering our telecoms commercialisation strategy. This information will be fed into the business case and procurement strategy.

Interface with Other Telecoms Activity

4.21 We are also working closely with the ESN project to identify synergies and opportunities to share infrastructure or services between our projects. Public cellular may be helped by the ESN project but is not dependent on it. Shared governance is being put in place with a combined Programme Board covering ESN and public cellular.

4.22 We have agreed with the team responsible for delivering ESN that the shared infrastructure should be Neutral Host based on an Active Distributed Antenna System. The MNOs have endorsed this assumption. This would allow the infrastructure to be scalable to cover initial deployment of the ESN through to a full public 4G service involving multiple MNOs. There are different requirements for public cellular and ESN, and this will require close working as these projects are delivered. ESN needs to support only one MNO (EE) but requires much higher resilience, whereas public cellular needs to support all four MNOs and to manage a much larger number of connections simultaneously. Any sharing of ESN infrastructure will be subject to the terms of the grant agreement between TfL and the Home Office who are funding ESN. Those Terms include a gainshare mechanism in the event of re-use of infrastructure by TfL.

5 Next Steps

5.1 We will follow a procurement regulations compliant procurement process with a qualification stage, commencing with issuing an OJEU followed by a Standard Selection Questionnaire (SSQ), followed by a formal costed bid stage with Invitation to Tender (ITT). This process typically takes around six to nine months. Rollout of service will thereafter be incremental.

5.2 Indicative Timetable

Milestone	**Target**
ESN / PCN Trial complete	Completed
PIN Notice	Completed
PCN Business Case baselined	Dec 2017
OJEU/SSQ Issued	Feb 2018
ITT Issued	Apr 2018
Tender return and bid evaluation	June 2018
Contract award	Summer 2018
Commercial negotiations within MNOs	Summer 2018
Incremental coverage in stations / tunnels	From Jan 2019

List of appendices to this report:

Exempt supplementary exempt information is included in a paper on Part 2 of the agenda.

List of Background Papers:

PIN Notice

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