Review Report

Initial report into the overhead line incidents affecting Metrolink services on Monday 19th and Tuesday 20th February 2018

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1 Executive Summary

The overhead line related incidents that occurred on the Metrolink network on Monday 19th February caused widespread disruption during the busy evening peak. Multiple overhead line related incidents are rare and can be difficult and time consuming to repair. However, the customer experience on Monday was poor, particularly with regard to the lack of information provided by employees on the ground and through social media channels.

The incidents caused disruption until the end of service for large parts of the network and into Tuesday morning on the Bury Line. The management of the incident by KAM and TfGM demonstrated improvements in disruption management and engineering response (critical lessons from incidents in 2017). However, there were gaps in what is required to bring customer communications and escalation of information to key stakeholders up to the required standard.

The complex nature of the faults made it difficult to cascade rapid messages to customers. The location of the incidents (between Deansgate-Castlefield and Cornbrook) meant that a large proportion of Metrolink customers travelling at that time were affected and coordinating alternative services took a long time.

Several steps have been taken since the incident to ensure the overhead line and tram pantographs assets are safe and secure. Action plans are in place to improve customer communications and upward escalation to stakeholders.

This initial report provides a timeline of the incident and outlines some of the key issues and lessons arising.

2 Incident Overview

2.1 Timeline – how were our customers impacted?

The network disruptions were caused by overhead line related failures at three different locations on Monday 19th February:

- 1st incident: Bury Terminus, impacting on the Bury line from 14:33 to 11:17 on Tuesday.
- 2nd incident: Deansgate-Castlefield, from 16:05 to 17.07.
- 3rd incident: The section of overhead line between Deansgate-Castlefield and Cornbrook, from 17:22 until the end of service.

Below is a summary of the impact, the customer care and customer information in place for each of the locations.

Services on the Bury Line were suspended at **14:33**, terminating at Queens Road. Customer communications were immediately updated and within 20 minutes, Metrolink tickets were being accepted on several bus routes serving stops towards Bury. By **15:30**, in addition to commercial services a bespoke bus replacement service was mobilised.

At **16:05,** a second overhead line related incident was reported, just south of Deansgate-Castlefield stop, whereby a tram lost power and had to be shunted into the stop. Services resumed through Deansgate-Castlefield at **17:07** but at **17:22** a driver on board another tram noticed damage to the overhead line closer to Cornbrook. Services from East Didsbury, Altrincham and Eccles (via MediaCityUK) then terminated at Cornbrook while services from Manchester Airport terminated at Firswood. Other services had minor impacts. By **17:00,** commercial bus ticket acceptance arrangements were in place right across the Metrolink network. In addition, Northern Rail services accepted Metrolink tickets to destinations near Metrolink termini. This was communicated to customers via social media and announcements.

Customer service staff were redeployed to affected stops immediately after the second incident, but given the nature of the combined situation and the network wide impact, particularly after the third incident, staff on the ground were stretched thin. Additional contract staff were called in and deployed in larger numbers from approximately **18:00** until the end of service.

The above tram service pattern and bus services remained in place until the end of the day on Monday. Services resumed as normal on Tuesday morning apart from on the Bury line. Services on the Bury line did not resume fully until **11:17am on Tuesday**. From early morning, a bespoke bus service and commercial services served stops between Bury and Queens Road with onward tram connections available from there. From **08:30 on Tuesday**, trams operated as far as Whitefield stop.

Throughout the incidents described above, customers were kept informed through several channels: passenger information displays (PIDs) on stops, public address (PA) announcements on stops and by drivers on board trams, customer service staff on stops, the TfGM website, media statements and on social media; all of which were updated regularly. However, between 16:00 and 18:00, given the complexity of the service pattern and the dynamic nature of the incidents, Metrolink's messaging (from both TfGM and KAM) was not clear enough, was not consistent and was not timely enough to allow customers to make decisions about their journeys in the affected areas. Approximately 50,000 customers were travelling on the network at the time of the incident as it impacted on the busy evening peak. The challenging nature of communicating a dynamic service pattern resulted in the majority of the complaints and negative social media activity.

During the second and third incidents, several trams were stranded between Cornbrook and Deansgate-Castlefield. In one case, customers were safely disembarked by staff and escorted to Cornbrook, in accordance with safe working practices. However, in other cases, customers became impatient and pulled the emergency door release handles to disembark themselves in an uncontrolled way and made their way to Cornbrook.

2.2 Nature of the overhead line equipment (OLE) failures

Three asset failures occurred within a short period of time, all of which were related. Unfortunately, the incidents between Deansgate-Castlefield and Cornbrook, given the volume of services through that corridor (+70 trams per hour), had a very serious impact on a large number of customers.

The initial incident was caused by a failure in the interface between the tram's pantograph (on the roof of the vehicle) and the overhead line on a section of line immediately south of the Bury stop.

The investigation has so far determined that:

- Damage to the overhead line at Bury was caused by a tram pantograph which was most likely defective due to impact damage from another part of the overhead line or a foreign object in the vicinity.

- The damaged overhead line at Bury was then caught by a subsequent tram, this time detaching the overhead line from its support structures in the area of the Bury stop and platform over a length of approximately 150 metres.

- In addition to the incident that occurred at Bury, another tram that had passed through the incident site prior to the lines being torn down sustained damage before continuing inbound to the city and onto Altrincham. This tram eventually failed on the return journey at Deansgate-Castlefield, requiring it to be shunted into the central platform (see 2nd incident above).

- Before failing at Deansgate-Castlefield, the above tram imparted damage to the overhead line support structures nearer to Cornbrook and a part of the tram pantograph was lodged in the overhead line, posing a risk to further tram movements in the area (see 3rd incident above).

2.3 Response and recovery

The initial incident at Bury was handled efficiently, with staff in the control room, customer service and engineering teams adhering to enhanced procedures that were developed following disruptive incidents in 2017. Communications to customers was good, with clear messaging and bus replacement options offered quickly. It was also clear very soon into the incident that the repairs would take until the following day so arrangements could be made to the benefit of customers in advance of the Tuesday morning peak period.

Crisis teams were immediately mobilised, with conference calls set up from 14:40, occurring hourly for 24 hours. Situation reports were sent to KAM teams and TfGM after each conference call.

Contractors for the works at Bury were mobilised within 35 minutes of the incident. A visual inspection of all tram pantographs was carried out and seven trams were found to have sustained damage to pantographs from the overhead line issue at either Cornbrook or Bury. Some of the damaged pantographs were repaired overnight in time for the start of service on Tuesday. After the event, a more detailed inspection was undertaken, which identified a further four pantographs with minor damage.

Repairs were made to the damage at Deansgate-Castlefield overnight by KAM in order to restore full services to the majority of the network for Tuesday morning. Repairs were made by KAM's contractor overnight and through the next morning at Bury, with full services resuming at midday. KAM also made repairs and commissioned the points at Whitefield overnight, enabling services to extend to Whitefield by 08:30 on Tuesday morning.

3 Further Discussion

The initial investigation into the response to the incidents focused on three areas, with the intention of improving future responses: customer and stakeholder communication; operational decision making and asset resilience.

3.1 Technical investigation and immediate actions

Metrolink operates a modern fleet of 120 Bombardier trams, the first of which were delivered in 2009, and the most recent arriving in September 2016. The fleet reliability of 30,000 miles between service faults places it in the top performing light rail vehicles in Europe, having risen from approximately 5,000. The infrastructure across the network is a mixture of legacy railway, adapted for Metrolink in 1992, that has been subject to extensive renewal over the past 25 years, and new expansions that have been built over the past 10 years.

Every section of overhead line and all trams undergo a planned maintenance inspection regime, which are carried out by competent technicians. The regime and most recent results are:

- Cab ride inspections - a review of the maintenance records confirms that this section was inspected on 07/02/2018, with no corrective work identified in the affected area.
- Foot patrol inspections carried out every 12 weeks. A review of the maintenance records confirms that the Bury line was inspected in its entirety between 29th and 31st January 2018.
- Tram pantograph inspections occur every 20,000 km. A review of maintenance records showed that the 2 trams in question were inspected on 16 December 2017 & 14 January 2018 (V3047), with no corrective work identified.

A review of vehicle maintenance on the affected vehicles and a review of the entire fleet's pantograph maintenance history showed no unusual pattern of faults reported. In all cases, maintenance had been carried out by qualified persons in accordance with the requirements, at the correct intervals.

Investigations are ongoing to determine the precise root cause. So far, KAM has:

- Carried out a complete visual inspection of all overhead equipment from the tram cabs.
- Conducted a forensic scan of the incident site and trams to collect information, including parts and materials.
- Examined CCTV footage.
- Strengthened foot patrol inspections at key locations on the network.
- Examined every tram pantograph in detail.

KAM has installed video equipment on a tram roof to provide additional inspection data, as well as a deployment of a dedicated vehicle to scan the network for overhead faults. In addition, KAM has implemented a twice weekly pantograph inspection for assurance purposes, while the investigation continues.

It is possible that the root cause investigation may be inconclusive. For example, even though a forensic search was undertaken it is possible that small parts could have travelled some distance. If conclusive evidence cannot be found, the actions described above will provide sufficient engineering and safety assurance. Additionally, KAM is increasing the frequency and intensity of inspection of both the overhead line and tram pantographs. Jointly, TfGM and KAM has commissioned an independent review, seeking advice on best practice in other locations.

3.2 Operational response

Assisted by a timely mobilisation of the crisis response procedures, the joint focus of KAM and TfGM was to keep as much of the network moving, so as long as operational decisions did not increase safety risk. Key decisions taken were correct:

- Termination of the Bury service in Queens Road, as no other turning points were operational post Queens Road.
- Team tasked with bringing Whitefield cross-over into operation, focusing on bringing customers as close to their final destination as possible.
- Termination of the southern part of the network as close as possible to the asset failures.
- Engineering focus on resolving the asset failure between Deansgate-Castlefield and Cornbrook, as it had the highest impact on our customers, with limited alternative options.
- Deployment of CSRs in full was appropriate, in light of the resourcing available at the time and the locations of the various disruptions. However, we recognise that they were not provided with the most immediate network updates due to the challenging nature of the dynamic situation.

However, with the benefit of hindsight, one key decision brought the highest level of negative feedback: to stop trams and not to immediately start turning services at Cornbrook and disembark stranded customers following the second incident. This was due to the assumption that the fault was simpler than it turned out to be. This left customers without information or with incorrect information for over an hour and in cases stranded on trams for too long.

Other operational decisions could have been better too. For example the decision not to have commercial bus ticket acceptance from Bury from 6am on Tuesday (a bespoke bus service was provided) was inconsistent with the information provided to the public. This was rectified by 06.35.

Additionally the crossover at Whitefield could have been brought into use an hour earlier on Tuesday morning, which would have maximised tram services for the morning peak.

3.3 Customer response

The response to the first incident at Bury, in terms of customer information was accurate and timely. However, the response to the second incident at Deansgate-Castlefield was disjointed. A clear assessment of the situation was not made quickly, ultimately leaving customers stranded and without information. The initial assumption was that it was simply a failed tram, and moving it into the central platform at Deansgate-Castlefield would be quick, with services resuming as normal. Therefore, the assumption used to decide on customer information was based on the best-case scenario, rather than a more lengthy delay, leaving customers without correct information.

Due to the damage, moving the tram clear of the running lines took longer than anticipated (just over an hour), and throughout that time customers were informed that their journey would resume soon. This was, in hindsight, an error of judgment as when services did resume they were stopped once again when further damage was found on the overhead line closer to Cornbrook. It was only at that point that operators were able to put in place a stable service pattern, with trams from East Didsbury, Altrincham, Eccles and MediaCityUK terminating at Cornbrook.

The turning point was the third overhead incident between Cornbrook and Deansgate-Castlefield at 17:22. We had communicated prior to this that services had resumed (which was correct) from 17:07, but again the stoppage was slow to be communicated to front-line staff. In that sense, customers were being told that the line was open, when it wasn't. At the same time, a number of PIDs were showing services in the city centre as going through towards Cornbrook when they weren't, which added to customer frustration.

Communication to key stakeholders mirrored the challenges met in communicating accurate and timely information to customers. This gap in communication created additional challenges as some customers were voicing their understandable frustrations directly to senior stakeholders on social media.

Although a blanket commercial bus ticket acceptance request was made, it took too long for the detailed messages to get out over social media and to get the same consistent messages to employees on the ground and to drivers who would have been able to pass correct information to customers.

In terms of staff deployment, we had significant numbers of staff deployed throughout the incident. These included back office employees, Customer Service Representatives, TravelSafe Officers and contracted staff. The teams were allocated in groups of two as a minimum, and provided with mobile phones or a radio.

The communications from the Network Management Centre to drivers involves making 'Voice All Calls', which means that a broadcast message is made to all drivers advising them of the incident, so they can pass this information on to customers on the tram. Whilst this did happen, and we have received positive comments from some customers about drivers communicating on trams, it is recognised that the 'Voice All Calls' were not made at sufficient frequency to provide re-assurance and information to customers. Procedures require drivers to make an announcement to customers within two minutes of being stopped out, and then frequently throughout any disruption. Whilst there is strong evidence to suggest this was happening, the quality and relevance of the information was limited.

The most significant result of the failure to communicate adequately was that customers on two trams decided to disembark in an uncontrolled way by activating the emergency door handles and climbing down on to the ballast. There are procedures for doing this in a controlled manner under staff supervision to ensure the safety of customers. There were no reports of any injuries.

4 Lessons Learned

Both organisations have taken immediate action. The aim is to reduce the risk of asset failure and in case of further network outages, to provide an improved customer communication and key stakeholders' information. Below are the key short term improvements committed. Most of the improvements relating to customer information and asset reliability were already under way as part of KAM's transition programme since they took over the operation and maintenance of Metrolink in 2017. However, both TfGM and KAM are working together to accelerate the improvements these changes will generate.

4.1 Operational assurance

A key focus for improvement is on-network reliability, and the quality of decision making during disruption.

To understand and improve Metrolink's asset reliability, both organisations will complete the following:

- A full Asset Condition Review earlier than committed by KAM. The review will inform either maintenance interventions by KAM or targeted investment in assets by TfGM.
- Improve overhead line and tram pantograph reliability by:
  - Reviewing the frequency and quality of asset inspections and maintenance
  - Implement a recurring benchmarking of asset reliability against other networks

An independent review of the incidents and network reliability will be jointly commissioned, through the engagement of an industry expert. The expert will review the improvements already delivered in 2017, assess the quality of the operational and engineering responses to asset failures and benchmark Metrolink's reliability against other networks.

4.2 Customer information

The most disappointing part of the collective response was the timeliness and inconsistency in our customer information. To address this critical gap, KAM and TfGM have made changes, such as:

- Appointment of a senior KAM customer lead, coordinating all customer channels and ensuring the consistency of customer information and the quality of customer advice (length of delay, alternative modes of transport).
- Consolidation of all channels of communication relevant to Metrolink under KAM, including channels operated by TfGM (for example the tfgm.com website).

4.3 Internal reporting, notification and escalation to stakeholders

The second key focus for improvement is internal reporting, notification and escalation processes. While KAM demonstrated significant improvements to previous incidents, this did not flow into a timely and accurate information to key stakeholders.

The key recommendation here is the immediate escalation of critical incidents to a senior TfGM officer, for the purpose of onward reporting to stakeholders as follows:

- An initial notification within 15 minutes of any major Metrolink network disruptions
- A regular update on the disruptions (every 30 minutes) until network is back to normal operations
- A regular situational report, aimed at the post disruption activities

4.4 Next steps

While steps have already been taken as detailed above, two reviews are ongoing and will inform further actions for TfGM and KAM. These are the technical root cause investigation into the overhead line incidents and the independent review commissioned jointly by the parties. Both reports should conclude by the end of March.