

**Legislative Council Panel on Transport**  
**Subcommittee on Matters Relating to Railways**  
**29 October 2018**

**Service disruption of four MTR lines on 16 October 2018**

The Government and the MTR Corporation Ltd (MTRCL) are concerned about the incident of signalling system failure on MTR Island (ISL), Kwun Tong (KTL), Tsuen Wan (TWL) and Tseung Kwan O Lines (TKL) on 16 October 2018. The Government has requested MTRCL to conduct in-depth investigation and review the contingency and information dissemination arrangements on the day. Regulatory departments have also requested MTRCL to submit a detailed report in two months and will take into account this experience in reviewing the existing contingency plan with MTRCL. This paper briefs the Subcommittee on the sequence of events of the incident and findings of the initial investigation.

**Sequence of events**

2. On the early morning of October 16, MTRCL conducted testing of the new signalling system along the Tsuen Wan Line, during which both the new and existing systems functioned normally. Before 5 a.m., MTRCL switched the signalling system back to the existing one, and deployed trains as usual to prepare for train service. At 5:28 a.m., the Operations Control Centre (OCC) received reports from train captains of testing trains (non-passenger trains) along ISL, KTL and TWL that three testing trains could not receive train service commands when they were returning to the depot.

3. Maintenance staff of MTRCL was dispatched immediately carried out emergency repair works. Having failed to recover the system, they then attempted to re-boot the signalling system of the respective lines one by one. MTRCL assessed that the situation might affect train service on the three lines when service commenced, hence it informed the Emergency Transport Coordination Centre (ETCC) of the Transport Department (TD) at 5:52 a.m. (that is before the first train commenced service), and issued “Amber Alert” and “Red Alert” consecutively, requesting other public transport operators to enhance service. Out of safety concern, the OCC requested trains on the three lines to switch to manual mode at reduced speed from the start of service at around 6 a.m. Train service was maintained a headway of about 8 minutes, and subsequently the headway was changed to about 12 to 15 minutes at around 7:30 a.m., in order to match with the lengthened boarding and alighting time for passengers at station platforms. During the incident,

the over-speed protection of the trains continued to function to ensure railway safety.

4. During the emergency repair works at around 10 a.m., the TKL also suffered from signalling fault and trains were switched to manual mode at reduced speed. Upon re-booting the computers at the stations along the four railway lines and with the completion of emergency repair works, the signalling system of Island, TWL, KTL, and TKL resumed normal operation one by one between 9:20 a.m. and 11:45 a.m., and train service gradually resumed to normal frequencies.

5. The sequence of events is at **Annex 1**.

## **Contingency arrangements during incident**

### Notification and information dissemination

6. Train operations were found to be unstable at 5:28 a.m. on the day, which was during non-traffic hours. At 5:52 a.m. (i.e. 3 minutes before the earliest train in service), when MTRCL expected that the incident would cause delay in train service for more than 8 minutes after the start of train service, it notified ETCC. MTRCL issued an “Amber Alert” at 6 a.m., expecting that train service would be seriously disrupted with a reduction of carrying capacity by 20% or more during peak hours. Subsequently, MTRCL, expecting a delay in train service of 20 minutes or more, issued a “Red Alert”, signifying a serious service disruption, and notified the Electrical and Mechanical Services Department (EMSD), TD and the media at 6:20 a.m. so that TD could coordinate with other public transport operators to enhance services to divert passengers.

7. Upon receiving MTRCL’s notification, taking into account the severity of the incident, ETCC of TD upgraded its operation level to Level 2<sup>1</sup>, led by directorate staff of TD, and deployed additional staff to coordinate with other public transport operators and to provide emergency support. ETCC urged MTRCL to disseminate information to passengers and closely monitor and manage passenger flow in stations. It also contacted and requested franchised bus, tram and ferry operators to enhance services and

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<sup>1</sup> Under normal circumstances, the ETCC, operating 24 hours a day, handles daily minor traffic accidents at Level 1. In the event of small-scale pre-planned activities, serious road or tunnel incidents, serious or widespread disruption of public transport services, the operation of the ETCC will operate at Level 2 and additional staff will be deployed.

deployed additional staff to assist passengers in queues. During the period, TD disseminated information to the public through the media, website and mobile applications, and also deployed staff to key affected stations to monitor the situation on-site. EMSD also deployed staff to MTRCL's OCC and Kowloon Bay Central Equipment Room to observe train operations and monitor the repair works.

8. Besides, MTRCL informed passengers about the service disruption and information about other transportation modes via its mobile apps "Traffic News", broadcast at stations and in train compartments, signage installed at stations and at ground levels, and Passenger Information Display System located next to the entry gates. During the incident, ticket gates of affected stations were switched to a specific mode of which passenger fare was not deducted.

9. Subsequently, MTRCL continued to update its train service information via its mobile applications and the media. After the train service was resumed, MTRCL also immediately informed the public through these channels. On that day, MTRCL arranged media sessions at 8:45 a.m., 12:30 p.m. and 4:30 p.m. to report on the latest situation, train service arrangement and follow up actions.

### Manpower

10. During the incident, MTRCL deployed an additional 400 staff (including train service staff, station assistants, passenger support teams and Customer Service Rapid Response Unit) to assist passengers at affected stations of relevant lines, including crowd management at stations, advising passengers on using other transportations, etc.. MTRCL also deployed about 55 maintenance staff to relevant signalling equipment rooms along the lines to inspect and recover the systems.

### Other transport services

11. During the period, ETCC continued to closely liaise with franchised bus, tram and ferry operators, requesting them to enhance services and deploy additional staff to assist passengers in queuing. With TD's coordination, 11 routes of franchised bus, 24 additional trams and the Star Ferry enhanced its service during the incident to assist in picking up affected passengers. ETCC also maintained close liaison with MTRCL on the day, and disseminated information concerning the latest development of the incident and transportation arrangements to the public through media and mobile applications. TD also advised the public through radio to plan their trips

well in advance, and consider other routing and transportations, in order to minimise the impact of the incident. The existing contingency plan is attached at **Annex 2**.

12. In general, when train service is partially suspended (for example, when there was no service at individual stations), MTRCL's OCC would arrange free shuttle buses in accordance with its contingency plan to pick up passengers along the affected routes. On 16 October, the signalling fault impacted four lines during the morning peak even though train service was maintained. MTRCL did consider the feasibility of deploying shuttle buses a number of times. However, MTRCL could only deploy about ten vehicles in short notice, which might not be effective in the circumstance given the scale of the incident. Hence, MTRCL decided to focus its resources on maintaining limited train service and repairing the system instead.

### **Initial observations**

13. The Government and MTRCL are sparing no efforts to look into the cause of the incident in order to avoid its recurrence. The root cause of the incident will be further investigated and analysed by an executive review panel. Nevertheless, MTRCL has immediately checked the signalling system of the four concerned railway lines after the incident. Below are the initial observations and results of analysis.

14. At present, the signalling system of TWL, ISL, KTL and TKL are provided by two suppliers<sup>2</sup>. The two systems of the four lines are inter-connected through sector computers<sup>3</sup>. The data transmission must be synchronised at all times to ensure that the two systems communicate with each other for delivering train control commands. As the software counter resetting arrangement of the two systems is different<sup>4</sup>, it resulted in uncoordinated situation between the two inter-connected systems when they were undergoing synchronisation as usual on 16 October (i.e. the incident

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<sup>2</sup> The signalling system of Tsuen Wan Line, Island Line and large part of Kwun Tong Line (Whampoa to Kwun Tong stations), involving 25 sector computers are supplied by Alstom, and has been in service since 1996 and 2016 (including two computer sets for Island Line extension and Kwun Tong Line extension in service in 2014 and 2016 respectively). The signalling system of Kwun Tong Line (Lam Tin station to Tiu Keng Leng station) and Tseung Kwan O Line covering 8 sector computers was supplied by Siemens and have been in service consecutively since 2001 and 2002.

<sup>3</sup> The function of sector computer is to deliver train service commands to all trains in the specific region.

<sup>4</sup> According to the established setting of the software counter of Alstom, when the pre-set value reaches the ceiling, it will undergo automatic reset. The original design is that such reset process will not affect the operation of the system. As regards to the software counter of Siemens, according to its established setting, there is no such automatic reset function. When the pre-set value reaches the ceiling, it will switch off automatically.

time), hence leading to unstable operation, i.e. unable to deliver stable train control commands. Only after MTRCL had isolated the connections between relevant lines and re-booted all computers, the signalling system of the four lines resumed normal.

15. The above findings are based on initial investigation conducted which will be confirmed upon in-depth analysis by the signalling system suppliers, as well as overseas and local experts. Based on the signalling system data records on the incident day as provided by MTRCL, the subsequent signalling system testing during non-service hours, and the preliminary information provided by the two system suppliers, EMSD initially agreed that the major cause of the incident was the uncoordinated resetting arrangement of the software counters of the two systems, which through the synchronisation process and inter-connection of the service lines rendered the systems unstable.

16. Based on the signalling system data records of MTRCL, the incident indeed occurred only after MTRCL had switched the signalling system back to the existing one and had operated normally for some time. Hence, there was no evidence showing correlation between the incident and the signalling system upgrading project and its testing. Moreover, based on the initial observations, there was no evidence showing that the incident is relevant to computer virus or sabotage.

### **Follow-up work**

17. After resetting, all systems along the four lines have returned to stable operation. Before the announcement of investigation results, EMSD has discussed with MTRCL on short-term measures to avoid recurrence and to ensure normal operations, including regular monitoring of the value of the system counters and synchronisation of the sector computers. MTRCL has also temporarily segregated the inter-connection of sector computers of TWL, ISL and KTL to ensure that they will not be affected by one another in case of similar incidents. KTL and TKL continue to be inter-connected though due to system operation needs. Moreover, as there is no evidence showing correlation between the incident and the signalling system upgrading project, MTRCL will continue to conduct testing on the new signalling system. That said, MTRCL has further strengthened its monitoring and maintenance of the existing systems when testing the new signalling system, and has deployed additional personnel to stand by at stations' signalling equipment room to reboot the computers and expedite the recovery works if necessary.

18. EMSD has requested MTRCL to continue its in-depth investigation, while conducting examination on the related equipment of the signalling system and submit a detailed report in two months. MTRCL has set up an executive review panel. It shall involve overseas and local experts to assist in the investigation, conduct a comprehensive review on the system with the system suppliers, and formulate relevant measures to avoid recurrence of similar incidents. Besides the abovementioned software counters' resetting arrangement and data synchronisation of the signalling system undertaken by the two suppliers, the detailed investigation will also look into whether there are other potential software compatibility problems, whether the interconnection and communication of the railway lines are smooth, and confirm that the incident has no correlation with the signalling system upgrading project, computer virus or sabotage etc.. EMSD will continue to monitor the investigation and review the simulation test to be conducted by overseas experts of the two signalling system suppliers, and the detailed investigation report submitted by MTRCL.

19. The Government has requested MTRCL to propose improvement measures in the report, including reviewing the contingency and information dissemination arrangements on the day, the deployment of free shuttle bus service during the incident etc., in order to minimise the impact to the public in case of similar incidents. TD will take reference from this experience to review the existing contingency plan with MTRCL, and explore whether there is room for other public transport operators to enhance services during the incident. However, it should be noted that shuttle bus service is an emergency supplementary measure with limited carrying capacity, and would be subject to factors such as road conditions, which can hardly replace normal train service.

20. According to the "Service Performance Arrangements" under the MTR Fare Adjustment Mechanism, MTRCL will be penalised for causing any service disruption of 31 minutes or more due to system breakdown or other human factors. The penalty will be set aside for giving concessions to passengers in the next year. As the Government and MTRCL are still conducting in-depth investigation on the root cause of the incident, the Government will follow-up with MTRCL later.

21. MTRCL apologises for causing inconvenience to the public due to the incident. During the incident, passengers exiting the ticket gates would not be deducted the fare. If passengers have any questions about fare matters, they may approach MTR's customer service centres for assistance.

**Transport and Housing Bureau  
MTR Corporation Limited  
October 2018**

**Train Service Disruption on 16 October 2018  
Chronology of Events**

<b>Approximate time</b>	<b>Issue</b>
4:36 a.m.	The new signalling system on TWL finished testing and switched back to the existing system successfully. Computer records showed that the OCC was able to command six engineering trains to run on TWL with the existing signalling system, with three returning to the depot smoothly.
5:28 a.m.	In preparing for the start of service in the morning, OCC discovered the signalling fault on ISL, TWL and KTL. Trains were unable to receive stable train commands.
5:40 a.m.	Maintenance staff arrived at signalling equipment rooms to look into the signalling fault and conduct repair works.
5:46 a.m.	Maintenance staff informed OCC that the relevant signalling systems required rebooting.
5:52 a.m.	Anticipated a longer recovery lead-time needed, MTRCL notified TD whilst continuing the recovery process.
5:57 a.m.	Through its mobile apps “Traffic News”, MTRCL informed passengers of the extra travelling time for ISL, TWL and KTL and advised passengers to allow sufficient time. MTRCL also disseminated such information to the media.
6:00 a.m.	Amber alert was issued by MTRCL
6:20 a.m.	Red alert was issued, with train service maintained at 8-minute interval. MTRCL disseminated the information via the “Traffic News”.
7:32 a.m.	Maintenance staff attempted to re-boot the signalling system on each railway line.
8:30 a.m.	The system on ISL and TWL was rebooted, but recovery was unsuccessful. Signalling faults continued.



- 8:45 a.m. MTRCL hosted a media session to report on the latest situation.
- 9:00 a.m. Maintenance staff attempted to disconnect the systems in service lines, and reboot the systems on ISL and TWL again.
- 9:20 a.m. The recovery of ISL was completed. Train service resumed normal.
- 10:07 a.m. Signalling fault happened on Tseung Kwan O Line (TKL). For prudence sake, the train service on TKL was operated manually at reduced speed.
- 10:25 a.m. The recovery of TWL was completed. Train service resumed normal.
- 11:10 a.m. The recovery of KTL was completed. Train service resumed normal.
- 11:45 a.m. The recovery of TKL was completed. Train service resumed normal.
- 12:30 p.m. MTRCL hosted a media session again to report on the incident.
- 4:30 p.m. MTRCL hosted the third media session to report on the incident on the same day. It also announced the setting up of an investigation panel with local and overseas signalling experts. To show appreciation to passengers for their tolerance, MTRCL announced to offer 50% fare discount to passengers on a chosen day within this year. The exact date is to be announced.

## **MTRCL's contingency plans for railway service disruptions**

### **Purpose**

The MTRCL has drawn up contingency plans for various service disruption scenarios specific with regard to the needs of individual stations. MTR staff responsible for contingency duties are familiar with these plans. Information that is of use to passengers is available at stations and on the MTR website. This note gives an account of MTRCL's contingency plans for railway service disruptions.

### **Handling of railway service disruptions**

2. When a serious incident happens and is expected to lead to a prolonged suspension of railway services for 20 minutes or more, MTRCL will issue a "Red Alert" message to inform Government departments including TD, other public transport operators and media organisations of the incident. Upon notification by MTRCL, other public transport operators will provide appropriate support services as best as they can under the coordination of TD. MTRCL will suitably adjust its railway service to minimise the impact and arrange free MTR shuttle buses to carry passengers from the affected stations to convenient locations such as the nearest MTR station with railway service still in operation.

### **Alert system**

3. "Red Alert" is defined as a signal which denotes that serious railway service disruption will continue or is expected to continue for 20 minutes or more, and emergency transport support services from other public transport operators are required. Upon receiving the Alert, public transport operators will urgently mobilise their resources to provide appropriate supporting services as quickly as possible.

4. Prior to the issuance of a Red Alert message, MTRCL may issue an "Amber Alert" message. "Amber Alert" is defined as an early warning in respect of an incident which may lead to a serious disruption of service. After receiving this Alert, other public transport operators will alert their

emergency unit, get prepared for possible emergency actions which may be required at a short notice and keep close contact with MTRCL.

5. MTRCL is also required to notify TD within 8 minutes on any service disruption incident which has lasted for 8 minutes or is expected to last for 8 minutes or more. Train service disruption incidents refer to incidents that lead to a suspension or delay of service at a railway station or a Light Rail stop, or on a section of a railway line.

6. Besides, according to the Mass Transit Railway Regulations (Cap. 556A), MTRCL shall report to EMSD any incident that occurs at any part of the entire railway premises which has a direct bearing on the safe operation of the railway.

### **Dissemination of information during incident**

7. Regarding dissemination of information to passengers, MTRCL has formulated measures to ensure effective communication with passengers during service disruption, with a view to assisting them to make appropriate alternative travel arrangements. These measures include:

- (a) broadcasting details of the service at stations and on trains;
- (b) providing information on alternative public transport services such as franchised bus routes, bus stop locations and free MTR shuttle bus boarding/alighting points on large information displays installed at stations;
- (c) displaying signs from concourse ceilings and at street level to mark routes to free MTR shuttle bus boarding/alighting points when free shuttle bus service is ready;
- (d) during service disruption, using LCD display systems installed at visible locations near entry gates at stations to provide train service information and other important notices;
- (e) posting railway service disruption message and information on free MTR shuttle bus services on the MTR website and MTR Mobile App “Traffic News”, and users of “Traffic News” will be redirected

to the Citymapper app to look for alternative transportation information to reach their destinations during severe delays or disruptions; and

- (f) distributing “Rail Service Suspension – Passenger Guide” to passengers.

### **Operation of train and free MTR shuttle bus during serious railway service disruptions**

8. In the event of a serious service disruption, MTRCL will endeavour to minimise the area being affected and provide train service to the farthest extent by:

- (a) reversing trains at designated track sections to maintain train service in unaffected sections;
- (b) diverting trains through supplementary track sections to bypass the affected section;
- (c) diverting trains across lines through designated track sections to reduce the impact of service disruption; and
- (d) diverting trains through spare track sections to reduce the impact of service disruption (for example, when the cross-harbour section of Tseung Kwan O Line is suspended, depending on which section is affected, cross-harbour train service can be maintained via the Service Connection Tunnel of Kwun Tong Line to provide linkage between Lam Tin Station and Quarry Bay Station).

9. MTRCL has formulated free shuttle bus deployment plans for railway incidents and agreements have been entered into with bus operators for the provision of such services during railway incidents to carry affected passengers to the nearest MTR station still under normal operation to continue with their journeys.

## Operation of free MTR shuttle buses

10. Free MTR shuttle bus service is a supplementary measure to assist passengers to travel to convenient locations. Given the limited carrying capacity of shuttle buses, it is not intended to be a substitute for normal train service. It brings passengers to the nearest station outside the affected section of a railway line where service is disrupted to enable them to continue with their journeys. Shuttle buses would also stop at stations in the affected section to provide services to passengers.

## Activation of free MTR shuttle bus services

11. The number of free MTR shuttle buses and the level of shuttle bus service to be deployed during a railway incident will depend on which section of the railway line is involved and the seriousness of the situation. Generally speaking, according to the agreement between MTRCL and the Public Omnibus Operators Association (POOA)<sup>5</sup>, when free MTR shuttle bus service is needed, together with stand-by buses that can be deployed by MTRCL, about 10 buses can be deployed to provide service within 30 to 45 minutes after receiving MTRCL's notification; an additional 40 buses, if required, will be deployed within 1 to 1.5 hour; and about 100 buses in total after 2 to 2.5 hours. The actual number of buses to be deployed will depend on the extent of the impact on train service and road traffic condition. Depending on the actual situation, MTRCL may operate additional shuttle buses or modify the operating details of shuttle bus services to suit the need of the affected passengers.

12. Information on the estimated arrival time, locations of and routes to boarding and alighting points of free MTR shuttle buses is included in MTRCL's "Rail Service Suspension – Passenger Guide" which is tailor-made for each station for distribution at the station. The Guide is also available on the MTR website. ([http://www.mtr.com.hk/en/customer/needs\\_index.html](http://www.mtr.com.hk/en/customer/needs_index.html))

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<sup>5</sup> POOA is the confederation of non-franchised public bus operators in Hong Kong. Currently, more than 200 non-franchised operators are members of the POOA and altogether they have a fleet of about 4 000 buses which accounts for about 60% of the total number of non-franchised buses operating in Hong Kong.

13. Since the carrying capacity of shuttle buses is far below that of the railway, these buses can only serve as a support service to assist affected passengers to continue with their journeys. It is not possible for shuttle buses to serve as full replacement for railway service. Therefore, lines queuing for such bus service are expected and most of the passengers may have to switch to other unaffected MTR lines or take alternative public transport to travel to their destinations.

### **Manpower deployment**

14. In response to a service disruption incident, MTR staff would be on duty at each MTR station to carry out crowd management duties, make public announcements, issue station notices and help passengers on fare matters according to the established procedures in times of incidents. The number of station staff will be increased as necessary.

15. MTRCL has also established a dedicated Customer Service Rapid Response Unit (“CSRRU”) with around 90 members to provide additional support focusing on customer service on top of the staff stationed at individual stations. MTRCL will, from time to time, review the number of team members of the CSRRU as necessary.

16. Upon calling out the free MTR shuttle bus services during serious service disruption, the OCC of MTRCL will mobilise the CSRRU to affected stations to provide extra support on:

- setting up facilities for the implementation of free MTR shuttle bus services;
- maintaining order at affected stations and free MTR shuttle bus boarding/alighting points;
- making timely reports to the OCC during incidents to facilitate more effective coordination with relevant Government departments such as the Police for better crowd management;
- handling enquiries and advising passengers on alternative routes and transport choices; and
- providing guidance and assistance to passengers.

17. Upon notification of deployment, CSRRU team members will proceed to the affected stations by the best available means of transport, including taxi. The first team would likely arrive within 20 minutes in most cases according to past experience. CSRRU team members are easily identifiable in their pink vests.

### **Regular review and updating**

18. MTRCL will continue to regularly review and update its contingency plans for railway service disruption in consultation with relevant Government departments, in the light of operational experience gained in each incident.