

**Legislative Council Panel on Transport  
Subcommittee on Matters Relating to Railways**

**East Rail Line Service Disruptions  
on 27 and 28 April, and 1 and 2 May 2014**

**Purpose**

The East Rail Line (“EAL”) service disruptions occurred on 27 and 28 April, and 1 and 2 May this year were related to the operational instability of a router and a concentrator of the data network transmission of the monitoring and communications system, harddisks of the train control system of the signalling system, and a trackside encoder of EAL respectively. These service disruptions had an impact on railway service, with the longest service disruption at 36 minutes. This paper sets out details of the events and the follow-up actions taken.

**Train operation**

2. MTR EAL train service is operated and controlled by three major systems. They are (i) **signalling system**; (ii) **central monitoring and communications system**; and (iii) **console of the monitoring and communications system**.

3. **Signalling system** is installed along railway tracks and inside equipment rooms along railway lines. It is responsible for controlling train operation. To ensure safety of train operation, the signalling system has been designed to ensure that trains are kept at a safe distance apart. Its fail-safe design will bring trains to an automatic halt whenever irregularities are detected.

4. The Operations Control Centre (“OCC”) at Tsing Yi captures train operation status via the data network transmission of the **central monitoring and communications system**. The **monitoring and communications system** of various railway lines is installed inside equipment rooms located at different stations along railway lines. For EAL, data of the monitoring and communications system is transmitted via routers and concentrators.

5. The **console of the monitoring and communications system** is located at the Tsing Yi OCC. The console facilitates the OCC

controllers to monitor train operation, communicate with train captains or stations etc., and adjust train service as and when necessary.

### **Service disruption on 27 April 2014**

6. At 8:09 am on 27 April, a fault occurred on the data network transmission, which is part of the central monitoring and communications system of EAL. The OCC thus could not receive information needed to perform its central monitoring and communications functions. As a prudent measure, the OCC immediately suspended EAL train service between Hung Hom and Lo Wu/Lok Ma Chau stations. Engineers were promptly dispatched by the MTR Corporation Limited (“MTRCL”) to rectify the situation. They immediately rebooted the computers of the signalling system, but the central monitoring and communications functions failed to resume.

7. As the recovery work was expected to take some time, MTRCL notified the Transport Department (“TD”) within 8 minutes (i.e. 8:16 am) as required. An “Amber Alert” was also issued at 8:19 am. Subsequently, the “Major Incident” service disruption “Red Alert” was issued at 8:27 am.

8. MTRCL immediately activated its emergency contingency plan. Free shuttle buses were arranged to run along all stations of EAL to carry passengers to and from all stations between Hung Hom and Lo Wu/Lok Ma Chau. Besides, MTRCL notified passengers of the EAL service disruption through centralised public announcements at MTR stations and in train compartments as well as through electronic displays, MTR Mobile Apps and MTR website.

9. At 8:45 am, engineers succeeded in re-establishing data transmission by manually activating the standby router in the central monitoring and communications system. Full EAL train service then resumed.

### *Investigation results*

10. Findings from the technical investigation show unstable operation of one of the routers in the central monitoring and communications system of EAL, which hindered smooth data transmission. As the standby router is designed to be activated automatically only at the complete malfunctioning of the active router,

automatic switchover was not successful as the active router was only performing in an unstable manner on the day of the incident. The active router was replaced that night after train service.

### **Service disruption on 28 April 2014**

11. At 7:41 am on 28 April, another data network transmission fault occurred. As a prudent measure, the OCC immediately instructed all EAL trains between Hung Hom and Lo Wu/Lok Ma Chau stations to stop at platforms.

12. Engineers succeeded in re-establishing the data transmission by restarting the train control system computer at Fo Tan. EAL train service then resumed. During the incident, train service was affected for 12 minutes.

#### *Investigation results*

13. Findings from the technical investigation show that one of the concentrators of the central monitoring and communications system located in the equipment room at East Tsim Sha Tsui Station malfunctioned. It caused a temporary suspension of the computer programmes in the train control system (part of the signalling system) during the incident. After the concentrator was replaced, data transmission resumed normal. There is no evidence showing that the concentrator fault on 28 April was related to the router fault happened the day before.

### **Service disruptions on 1 and 2 May 2014**

14. At 7:55 pm on 1 May, the computer of the EAL train control system experienced temporary fault. As soon as the standby train control system was activated automatically, EAL train service then resumed normal. During the incident, train service was affected for 10 minutes. The subsequent investigation identified that the incident was caused by two faulty computer harddisks of the train control system. The components were immediately replaced.

15. At 8:47 pm on 2 May, due to a fault on the signalling system of EAL, the journey time from University Station to Tai Po Market Station was 5 minutes longer than usual. Engineering staff, upon investigation,

identified that the incident was caused by a faulty trackside encoder (a component of the signalling system). After the replacement of the encoder, full EAL service resumed at 11:57 pm. During the incident, EAL train service was maintained.

### **Follow-up actions**

16. MTRCL has requested the supplier of the central monitoring and communications system to send experts to Hong Kong to investigate the incidents on 27 and 28 April 2014. Findings of the investigation confirm that the two incidents were caused by the malfunctioning router and concentrator respectively, which affected normal data transmission. MTRCL, upon consulting the supplier, has installed a data analyser to monitor the stability of the data network transmission. Should there be any instability of the data network transmission, the problem can be detected and rectified as early as possible.

17. MTRCL has also engaged an independent expert to carry out a review on the EAL train operations and control systems in relation to the four service disruptions and make recommendations for improvement.

18. The review confirms the results of the investigation conducted by MTRCL and the supplier of the central monitoring and communications system. The independent expert points out that the existing EAL train operations and control systems are capable of performing their functions, and provide reliable train service. The expert also endorses the backup train control system MTRCL has put in place to allow the OCC to bypass the data network transmission and gain direct control of the signalling system when needed, thereby increasing the efficiency of train service resumption.

19. To further expedite recovery works and resumption of train service, the expert recommends MTRCL to establish effective communication means, so as to enhance the communication between the OCC and the recovery engineering team. MTRCL has adopted the recommendations from the expert and is considering how the communication between the OCC and the engineering team can be enhanced.

20. The Electrical and Mechanical Services Department (“EMSD”) has endorsed the findings of the review and suggestions for improvement upon examining the materials. EMSD and TD will jointly monitor the

progress of MTRCL's formulation and implementation of measures to enhance internal communication.

21. MTRCL points out that under the Shatin to Central Link project, EAL signalling system and data network transmission will be replaced. Works have already commenced and it is expected that the new signalling system and data network transmission will be in operation upon the completion of the project.

## **Conclusion**

22. MTRCL takes every incident seriously. It has carried out investigations to determine the causes of the incidents and put in place follow-up actions to prevent similar recurrence in future. The four service disruptions did not affect the safe operation of trains. MTRCL will continue to adopt a proactive attitude to improve its service, so as to minimise the occurrence of service disruptions and the inconvenience caused to passengers.

**MTR Corporation Limited**  
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