Legislative Council Panel on Transport
Subcommittee on Matters Relating to Railways

Capacity and Loading of trains in the MTR Network

Purpose

This paper aims to brief the Subcommittee on the capacity of trains in the MTR network in 2015. In order to provide passengers with a more comfortable riding environment, the MTR Corporation Limited ("MTRCL") is committed to enhance the capacity of its trains. Details of the initiatives are provided below.

Heavy Rail network

Current situation

2. In February 2014, the MTRCL reported to the Subcommittee on the capacity and loading of the MTR network (details are at Legislative Council paper CB(1)980/13-14(03)). When compared with 2014, the patronage of the MTR trains was generally stable in 2015, with loading of individual lines either recorded a moderate growth or a slight decrease during morning peak hours on the busiest sections. Details are at **Annex 1**.

3. All train compartments of the existing MTR railway lines are designed based on the industry standard design adopted at the time of the construction of railway lines, and the maximum carrying capacity of train compartments is calculated based on an accommodation of up to 6 persons (standing) per square metre ("ppsm") on average. However, it has been observed that over the years, passenger riding habits have changed. Nowadays, passengers are less willing to board a train that looks crowded even when there is still room available. They prefer waiting for the next train. This in effect reduces the carrying capacity of the train and the rail line as a whole. In actual operation, trains running during the busiest hours on the busiest corridors achieve a passenger density of only around 4 ppsm. Based on a 4 ppsm passenger density and current train frequency, the loading during morning peak hours for critical links of the MTR lines in 2015 ranges from 32% to 104%. Among those, the loading during morning peak hours on critical links of the West Rail Line and Tsuen Wan Line in 2015 has exceeded 100%, at 104% and 102% respectively.

4. The MTRCL has increased the train frequency during peak hours where possible. However, since the loading of the signalling systems of the West Rail Line and Tsuen Wan Line have reached their maximum capacity, it is not possible to further increase train frequency for the two lines during morning peak hours on the busiest sections. In March 2015, the MTRCL awarded contract to upgrade its signalling systems, including that of the Tsuen Wan Line. Details are contained in paragraph 14 to paragraph 19 below. Furthermore, upon the commissioning of the Shatin to Central Link ("SCL"), the North South Corridor, formed by the East Rail extension from Hung Hom to Admiralty, will increase the cross harbour capacity and thus alleviate the loading of the busiest section of the Tsuen Wan Line between Tsim Sha Tsui and Admiralty stations.

5. To ease the crowdedness of the West Rail Line during peak hours, the existing seven-car trains serving the West Rail Line are being replaced progressively with eight-car trains starting from 2016, thereby increasing the carrying capacity by about 14%.

Enhancing capacity

6. The MTRCL notes the crowdedness on platforms and inside train compartments along the critical links during peak hours. In this connection, the MTRCL has been striving to boost the carrying capacity and efficiency of the railway network as a whole through various measures such as increasing train frequency, launching publicity and education programmes for passengers, enhancing platform management at stations and upgrading train door facility.

7. Since 2012, the MTRCL has significantly increased the carrying capacity of the railway network through strengthening train services so as to ease the loading on trains and reduce passenger waiting time. In 2015, about 600 train trips per week were added by the MTRCL. Since 2012, an aggregate of about 2 600 train trips per week have been added. Travelling by railway has become more convenient with the further increase in train frequency of the whole railway network. In recent years, where possible, the MTRCL has arranged short-haul trips to run between busy stations to increase capacity, if a gap between trains under the scheduled train services has opened up to allow safe running of additional trains. However, such train trips are not always possible and can only reduce passenger waiting time at some stations.

8. To increase the train capacity of the Tseung Kwan O Line, a new "2+1" train service arrangement has been introduced during the morning and evening peak periods since December 2014. Under the arrangement, every group of three trains departs from North Point Station at intervals of 2.5 minutes, 2 minutes and 2 minutes (the frequency was a flat 2.5 minutes on average before the arrangement was put in place). The first two trains head to Po Lam Station while the third train terminates at LOHAS Park Station. Under such arrangement, more than 200 train trips in total have been increased weekly, boosting overall passenger carrying capacity during peak periods by about 11.5%. To provide more convenience to passengers on the Tseung Kwan O Line, the MTRCL has further added 78 trips per week running after evening peak hours on weekdays and before morning peak hours on Saturdays. This, together with the "2+1" additional train trips during peak periods, has increased the train frequency on the Tseung Kwan O Line by about 280 trips per week.

Passenger flow management measures

9. It is observed that under normal circumstances, passengers will not uniformly occupy the space in train compartments. Train compartments that are closest to escalator landings generally attract more passengers, while those located at the far ends of a platform carry relatively fewer passengers. In view of this, the MTRCL has implemented the measures below to even out passenger distribution on platforms and in trains to make passenger flow smoother and optimise the efficiency of train operations:

(a) to better utilise the space on trains and facilitate the smooth alighting and boarding of passengers, the MTRCL has launched a courtesy campaign to encourage passengers to move into the centre of the train compartment and let others alight first before boarding. Such message will be broadcasted through announcements on platforms and displayed regularly on passenger information panels to enhance passengers' awareness;

(b) the MTRCL continues to step up platform management measures across the whole network to achieve smoother alighting and boarding of passengers, so as to optimise the efficiency of train operations during peak periods. Around

1 300 additional station staff were recruited in the past few years, including 300 additional station staff deployed to the busier stations in 2015 to assist and give directions to passengers and enhance passenger flow, so as to help rationalise passenger flow and allow on-time train departures;

(c) last year, the MTRCL installed new door bottom guides on trains to reduce the chance of train doors being blocked by foreign objects and thus avoid the extra time spent by trains on platforms because of re-opening and re-closing of doors, in order to reduce the number of times of repeated opening and closing of train doors. In addition, the "Door Chimes Standardisation Programme" has been rolled out along various railway lines to facilitate smooth train operations and to raise passenger awareness of door safety by providing clearer audio signals. Platform assistants are also deployed to encourage passengers to move towards the centre of train compartments after boarding, instead of staying near train doors;

(d) the MTRCL will continue to update and enhance passenger flow management measures at platforms to improve the alighting and boarding arrangement of passengers. The MTRCL will review the measures from time to time, optimise the application, and introduce new measures[1] as and when necessary, taking into account the actual situation (including the commencement of service of new railway lines). Before the implementation of new measures, the MTRCL will put them on trial to ensure its smooth operation and effectiveness. The MTRCL will also maintain communication with passengers to allow them to understand thoroughly the

[1] An example of implementing new measures is the introduction of new queuing arrangement at Platform 2 of Kowloon Tong Station (Kwun Tong Line towards Yau Ma Tei) in April 2014 after putting it on trial. The new queueing arrangement facilitates orderly alighting and boarding of passengers, significantly improves the passenger flow at the platform. Besides, new measures that may be considered in the future include closing of some entry gates at the upstream stations of a particularly busy railway line during peak periods, so as to reduce the speed of passenger flow towards platforms and to ensure the availability of space on trains for carrying passengers at downstream stations. Separately, if at all possible, enhancement of short-haul trains as mentioned in paragraph 7 will also be implemented.

operation mode of the new measures. The MTRCL will continue to step up its efforts on this front; and

(e) As part of its ongoing efforts to ensure a safe, efficient and high-quality railway service, the MTRCL invests over several billion dollars annually to keep its railway assets and station facilities in its best conditions and enhance their functions to provide better services.

10. Besides, to alleviate the heavy loading of trains during peak periods, the MTRCL has extended the "Early Bird Discount Promotion" to 31 May 2016. The main objective of the promotion programme is to encourage passengers to take MTR before the peak period so as to relieve the heavy train loading situation during the morning peak on the busiest sections of the network. The MTRCL is reviewing the implementation of various fare concession schemes, including the "Early Bird Discount Promotion", to determine their future arrangements. Details will soon be announced.

New railway lines

11. Several new local railway lines under construction will commission service in the coming few years, including the Kwun Tong Line Extension and the South Island Line (East) which are expected to commission service this year, and the SCL which is expected to commission service by phases in 2019 and 2021.

12. Upon the commissioning of the SCL, the MTR system will be able to provide additional carrying capacity and divert existing passenger flow. In particular, it will increase the carrying capacity of the railway section from Tai Wai to Kowloon Tong and that of the cross harbour section of the existing lines. Among these, the East West Corridor will ease the bottleneck of the East Rail Line by diverting the passenger flow between Tai Wai and Kowloon Tong.

13. Expansion works of the Admiralty station is now underway to tie in with the development of the railway network. The Admiralty station will become an interchange station serving four railway lines including the Island Line, Tsuen Wan Line, South Island Line (East) and

SCL. The expansion involves the addition of three underground levels below Harcourt Garden located east of the existing station, including one level for interchange and two levels for train platforms for the future use of the South Island Line (East) and SCL. To cater for the South Island Line (East), additional lifts, escalators and staircases will be constructed in the station to provide connection to various levels of the station so that passengers can transit to other railway lines without going through any exit gates. The expansion works of the Admiralty station include expanding the narrower portions east of the existing platform of the station by relocating the existing plant room for releasing more platform space. Moreover, the MTRCL will strengthen platform management measures for the Tsuen Wan Line at the Admiralty station by deploying more station assistants, increasing real-time broadcast of passenger information and implementing queuing measures to assist passengers.

Replacement of signalling systems

14. The signalling system is the hub of railway operation. It comprises different components, including central computer, computers at different levels, train-borne computers, back-up computers, as well as equipment which are installed at trackside and inside equipment rooms along railway lines. The signalling system controls train operation and adopts a "fail-safe" design, which will bring trains to an automatic halt once irregularities are detected, ensuring that trains are kept at a safe distance apart. The Tsing Yi Operations Control Centre (OCC) captures the operation status of the signalling system via the data transmitted through the monitoring and communications system.

15. Similar to other electrical or electronic devices, the devices in the signalling system may malfunction, which will lead to problems in data transmission and consequently trains have to reduce speed or even stop. The causes of malfunctions vary, which may include unstable signal transmission, breakdown of cables or equipment along the railway lines. Once there are malfunctions, according to experiences, completion of repairs normally takes about dozens of minutes to two hours, depending on the causes and seriousness of the malfunction. Emergency repairs mainly include replacement of damaged components and restart of computers. During emergency repairs, because of safety reasons, trains may have to reduce speed or stop and passengers may need to be detrained.

16. As the signalling systems of some railway lines are already operating at their maximum capacity during peak hours, only an upgrade of the systems can achieve an overall increase in carrying capacity and further enhancement of the overall reliability and service efficiency. In this connection, the MTRCL awarded a contract to upgrade signalling systems in March 2015. The new signalling systems of seven MTR lines including the Tsuen Wan Line, Island Line, Kwun Tong Line, Tseung Kwan O Line, Disneyland Resort Line, Tung Chung Line and Airport Express will be commissioned in phases starting from 2018. The advance works on the Tsuen Wan Line have commenced and the upgrade will be completed in 2018. Upon the completion of the upgrade of all signalling systems in 2026, the overall carrying capacity of these railway lines will be increased by about 10%.

17. Besides, the SCL will be commissioned in phases. With the commissioning of the section between Tai Wai and Hung Hom in 2019, it will form the East West Corridor together with the existing West Rail Line and Ma On Shan Line. With the commissioning of the cross harbour section (between Hung Hom and Admiralty) in 2021, it will form the North South Corridor together with the East Rail Line. As part of the future North South Corridor, the East Rail Line has to upgrade its signalling system to cater for the increase in train frequency. The upgrading works will be implemented progressively in phases. The advance works, such as installation of equipment compatible with the new signalling system at trains and trackside, are underway. Based on the current progress of works, the MTRCL estimates that testing for the new signalling systems can be conducted in phases on various sections of the East Rail Line starting from the third quarter of 2016.

18. As the signalling system involves tens of thousands of electronics components, internationally, no railway signalling systems are completely fault-free. Major signalling system upgrades may cause the system to become unstable, and the railway service may be more vulnerable to disruption. Overseas experiences indicate that, to avoid such risks, some railways would have their services suspended completely when their signalling systems are undergoing major upgrades until the completion of works. Such extreme practice is not applicable to Hong Kong because public transport services (including railway) in other places are not as well developed as in Hong Kong and the number of passengers affected by service disruption is relatively smaller. The popularity and unique position of the Hong Kong public transport system requires the MTRCL to maintain but not lower its service level during upgrades of its signalling systems. Thus, it is crucial and rather

challenging to complete a smooth upgrade of the signalling system while minimising the risk of subjecting the railway service to the impact of the works. The MTRCL will conduct a comprehensive risk assessment of the upgrade of the signalling systems. It will also take into account all possible risks at various stages of the works and formulate corresponding measures on the basis of the existing contingency mechanism on railway service disruption (main features of the existing contingency plan are at **Annex 2**). The most important task is to ensure that railway safety is not compromised. The MTRCL will appoint independent experts to offer advice in this respect. It is also required to submit a risk assessment report to the Electrical and Mechanical Services Department ("EMSD") to ensure that international safety standards are met. Also, the MTRCL's contingency plan on railway service disruption will be subject to the agreement of the Transport Department.

19. Prior to commissioning, the new signalling system has to be subject to a long period of tests conducted in a progressive manner to ensure its smooth operation. Staff of the EMSD will observe on site the tests on the new signalling systems conducted by the MTRCL. The EMSD's approval has to be obtained before the new system is allowed to be put into service. Taking the upgrade works of the East Rail Line as an example: the new signalling system will be tested in phases by the MTRCL on various sections of the railway line during non-traffic hours at night. During the testing, the new signalling system will be activated while the existing one will be suspended. The MTRCL will stop testing in the morning before traffic hours and spares sufficient time to revert to the existing signalling system for train service.

Light Rail network

Capacity of Light Rail

20. The design capacity of a Light Rail Vehicle (LRV) is around 240 persons[2]. In practice, a number of factors may affect the actual number of passengers that can be carried by a LRV, including the riding

[2] The design capacity of a LRV is based on the total weight it can safely carry, with reference to the information provided by the manufacturers. Each LRV can safely carry a total weight of around 13 700 kg. Based on this standard, the design capacity of a LRV is 240 persons. It is assumed that each passenger weighs, on average, around 57 kg, which is the assumed average weight of all passengers, children or adults.

habits of passengers. Owing to these factors, in practice the maximum number of passengers that are carried by a single-set LRV, as observed during peak hours, is about 200. How it could be translated into passenger density in terms of ppsm would depend on the number of seats in a LRV. There are currently four generations of LRVs in operation, and vehicles of each generation vary slightly in their design capacity and number of seats. On average, the design capacity of about 240 persons per LRV could in theory be translated into a passenger density of about 8 ppsm, while the maximum capacity of about 200 persons per LRV could be translated into a passenger density of 6-7 ppsm[3]. The MTRCL uses the maximum carrying capacity as the service standard in arranging LRV service.

Loading of Light Rail

21. As there are a number of routes passing through a single Light Rail stop, it is not possible to ascertain which route is chosen by passengers after they purchase the Light Rail tickets or pay by Octopus. The method of assessing loading of heavy rail is thus not workable to calculate the exact loading of individual Light Rail routes by referring to the entry/exit records of passengers. The MTRCL currently assesses the loading of LRVs by on-site observation and surveys. Based on the Corporation's assessment, the overall loading of the Light Rail network in the busiest one hour during the morning peak in 2015 is about 80%. The loading of individual routes is at **Annex 3**.

Additional LRVs

22. The MTRCL has finished refurbishing a total of 69 Phase I LRVs, thereby increasing the average carrying capacity of the Light Rail system by about 8%. Meanwhile, overhaul of three LRVs is underway for progressive resumption of service in 2016 and 2017 to increase the

[3] The current design capacity of train compartments of the heavy rail is calculated based on accommodating up to 6 ppsm on average. The various components of the existing heavy rail, including the design of railway station structures (such as the concourses and number of exits/entrances), platform size, passageways, and throughput of escalators are designed to sustain the aforementioned designed capacity while maintaining safety. As the Light Rail is operating at grade, its infrastructure and station facilities are not as complex as the heavy rail. The carrying capacity of LRVs largely depends on the loading which can be safely carried by the vehicles, instead of, like the heavy rail, being limited by other infrastructure (e.g. station concourse and escalators). Therefore, within the same space, LRVs can carry more passengers than heavy rail trains.

carrying capacity. This will reduce the chances of some passengers failing to board the first arriving LRV during peak hours. The MTRCL will flexibly deploy single-set and coupled-set LRVs to serve different routes in order to meet passengers' needs. Nevertheless, it is worth noting the Light Rail has an open design and it shares certain space of the road with other road users. Therefore, when considering whether it is possible to introduce more coupled-set LRVs to individual Light Rail routes, the constraint imposed by the open design of Light Rail on the number of operating LRVs should be taken into account, alongside the patronage. The Government and MTRCL are reviewing these matters, with details set out in the ensuing paragraph.

23. The MTRCL noted that the Government has commenced the Public Transport Strategy Study ("PTSS"), with a view to conducting a systematic review on the roles and positioning of public transport services other than heavy rail. As mentioned in the paper submitted by the Transport and Housing Bureau to the Legislative Council Panel on Transport in November 2014 (please refer to Legislative Council paper CB(1)238/14-15(06) for details), the Government will review the long-term development of Light Rail. Topics covered include (i) the feasibility of increasing carrying capacity with the original design of the system; (ii) the feasibility of upgrading the existing system to increase the carrying capacity; (iii) the long-term demand of North West New Territories for public transport services; and (iv) the roles of various public transport services including Light Rail in meeting such demand. In accordance with the requests of the Government, the MTRCL is conducting a technical study on topics (i) and (ii) above and will make recommendations on various improvement measures, including the feasibility of procurement of new LRVs. The PTSS is expected to be completed by mid-2017 and the findings will be announced. Meanwhile, the MTRCL has reserved funding for the procurement of 10 LRVs and 10 feeder buses. Suitable contractual arrangements have been made with future suppliers to ensure that the delivery of LRVs and feeder buses to Hong Kong could dovetail with the growth of patronage.

24. Other initiatives taken to enhance capacity and manage loading of Light Rail are at **Annex 4**.

Way Forward

25. The MTRCL is committed to providing safe, reliable and smooth railway services. The MTRCL will continue the efforts to

enhance train frequencies where possible and through implementation of various measures to smoothen passenger flow and train operations at the busiest stations during peak hours, with a view to providing the most efficient railway service, while ensuring safety.

MTR Corporation Limited
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Annex 1

2015 Statistics (per hour per direction during morning peak for critical links)

		East Rail Line	West Rail Line	Ma On Shan Line	Tseung Kwan O Line	Island Line	Kwun Tong Line	Tsuen Wan Line	Disneyland Resort Line	Tracks sharing at some sections	
										Tung Chung Line	Airport Express
1.	Design Capacity (6 ppsm) (a)	101,000	64,000	32,000	85,000	85,000	85,000	85,000	10,800	66,000 (Note 1)	10,000 (Note 1)
2.	Maximum carrying capacity when train frequency is maximised (6 ppsm) (b)	90,000	49,200 (Note 2)	30,500	67,500	80,000	71,400	75,000	9,600	45,000	4,800
3.	Existing carrying capacity (6 ppsm) (c)	86,200	49,200	26,800	67,500	80,000	71,400	75,000	9,600	37,500	4,800
4.	Difference between (a) and (b) (Note 3)	11,000	14,800	1,500	17,500	5,000	13,600	10,000	1,200	21,000	5,200
5.	Difference between (b) and (c) (Note 4)	3,800	0	3,700	0	0	0	0	0	7,500	0
6.	Current passenger throughput (d)	57,200	36,400	15,300	46,400	54,900	47,000	54,500	2,200	22,700	1,900
	Changes as compared with 2014	-1,500	-200	+100	+1,200	+1,200	-1,100	+2,200	+400	-100	-600
7.	Current loading (1) (6 ppsm) [(d)/(c)] { } critical link	66% {Tai Wai to Kowloon Tong}	74% {Kam Sheung Road to Tsuen Wan West}	57% {Che Kung Temple to Tai Wai}	69% {Yau Tong to Quarry Bay}	69% {Tin Hau to Causeway Bay}	66% {Shek Kip Mei to Prince Edward}	73% {Tsim Sha Tsui to Admiralty}	23% {Sunny Bay to Disneyland}	61% {Olympic to Kowloon}	40% { Airport to Tsing Yi }
8.	Current loading (2) (4 ppsm) [(d)/(c)÷71.2% (Note 5)] (For the critical links mentioned in item (7))	93%	104% (Note 8)	80%	97%	96%	92%	102%	32%	85%	47%
	Changes as compared with 2014 (percentage point)	***-7%***	-	-	***-5%***	***+2%***	***-3%***	***+4%***	***+6%***	-	***-14%***
9.	Current loading (3) (6 ppsm) [(d)/(a)] (For the critical links mentioned in item (7))	57%	57%	48%	55%	65%	55%	64%	20%	34%	19%
10.	Can additional train trips be provided (with the existing signalling system)? (Note 6)	Yes	No	Yes	No	No	No	No	No	Yes(Note 7)	No (Note 7)
11.	Any plans to upgrade the signalling system? If yes, when will the upgrading exercises be completed?	Yes (to be completed by 2021 when the North South Corridor of Shatin to Central Link (“SCL”) opens)	Not applicable	Yes (to be completed by 2019 when the East West Corridor of SCL opens)	Yes (to be completed by 2021)	Yes (to be completed by 2019)	Yes (to be completed by 2020)	Yes (to be completed by 2018)	Yes (to be completed by 2026)	Yes (to be completed by 2026)	Yes (to be completed by 2026)

Note 1 As Airport Express and Tung Chung Line share tracks at some sections, the overall design capacity of the railway lines are affected by the train service pattern, throughput of terminal stations and turn-back facilities. To meet the increase in railway transport demand, the maximum carrying capacity of Tung Chung Line can be enhanced by construction of an overrun tunnel in future, and upgrading of signalling system by 2026. Upon completion of these two modification works, the maximum carrying capacity of Tung Chung Line and Airport Express will be further increased to 66,000 and 10,000 respectively under 6 ppsm. Before the completion of the construction of the overrun tunnel, the maximum capacity of Tung Chung Line will be maintained at 45,000 while that of Airport Express will be maintained at 4,800.

Note 2 Since 2014, temporary speed restriction has been imposed near Hung Hom Station to facilitate the staged track modification for realignment of the West Rail Line in preparation for the East West Corridor of SCL. Hence, the maximum carrying capacity of West Rail Line, under the condition of maximized train frequency, has been temporarily reduced from 51,500 to 49,200 (6 ppsm).

Note 3 Reasons accounting for the difference include: (a) platform screen doors and automatic platform gates increase the dwell time of trains at each platform by about 10 seconds; (b) shared tracks on East Rail Line between local train services and cross-boundary services; and (c) train turnaround times for East Rail Line and West Rail Line have lengthened after extension of West Rail Line to Hung Hom Station in 2009.

Note 4 This is because the service frequency has not yet been increased to the maximum level the signalling system permits.

Note 5 For a typical heavy rail train operating in the urban area, there are 340 seats and 2,160 standees under a passenger density level of 6 ppsm, adding up to a total carrying capacity of about 2,500 per train. Under a passenger density level of 4 ppsm, the 340 number of seats will remain unchanged while the number of standees will be reduced to 1,440, adding up to a total carrying capacity of about 1,780 per train. Hence, the carrying capacity under a passenger density level of 4 ppsm is 71.2% of that of 6 ppsm (the respective percentage for Airport Express is 85%).

Note 6 The purpose of providing additional train trips is to maximise the carrying capacity when train frequency is maximised and permitted by the existing signalling system, i.e. providing the carrying capacity under item (5) in the table above, in order to achieve the maximum carrying capacity item (2) refers.

Note 7 As Tung Chung Line and Airport Express share tracks at some sections, and that the remaining capacity to maximise the carrying capacity to the maximum carrying capacity when train frequency is maximised and permitted by the existing signalling system of these railway lines would be allocated to Tung Chung Line, hence it is not feasible to provide additional train trips for Airport Express under the existing signalling system.

Note 8 To tie in with the East West Corridor project of the SCL, starting from 2016, the number of train compartments of West Rail Line train will be progressively increased from 7 to 8, contributing to an increase in the carrying capacity of each West Rail Line train of about 14%.

Annex 2

The MTRCL's contingency plans for railway service disruptions

Purpose

The MTRCL has drawn up contingency plans for various service disruption situations specific to the needs of individual stations. They are made available to the staff assigned to contingency duties. For information that is of use to passengers, it is made available to them in stations and in the Internet. This note gives an account of the 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, the MTRCL will issue a "Red Alert" message to inform Government departments including the Transport Department ("TD"), other public transport operators and media organisations of the incident. Upon notification by the MTRCL, other public transport operators will provide appropriate supportive services as best as they can under the co-ordination of the TD. On its part, the MTRCL will suitably adjust its railway service to minimise 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 being alerted, 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, the 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 demanded for at short notice and keep close contact with the MTRCL.

5. The 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 those 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), the MTRCL shall report to the Electrical and Mechanical Services Department ("EMSD") any incident that occurs at any part of the entire railway premises and which has a direct bearing on the safe operation of the railway.

Dissemination of information during incident

7. Regarding dissemination of information to passengers, the 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 situation at stations and in trains;

(b) providing information of alternative public transport service 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 screens installed at visible locations near station entry gates of all MTR 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";

(f) displaying alternative public transport information on maps in the concourse of affected stations; and

(g) 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 serious service disruption, the 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. The 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 take affected passengers to the nearest MTR station still under normal operation to continue 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 the MTRCL and the Public Omnibus Operators Association (POOA)[4], when free MTR shuttle bus service is needed, the POOA will arrange about 7 buses to provide service within 30 to 45 minutes after receiving the 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 impact to train service and road traffic condition. Depending on the actual situation, the 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 in the station. The Guide is also uploaded to MTRCL's website (http://www.mtr.com.hk/en/customer/services/needs_index.html).

13. Since the carrying capacity of shuttle buses is far below that of the railway, they 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 replacement for the entire railway service. Therefore, lines queuing for such bus service are expected and most passengers may

[4] POOA is the confederation of non-franchised public bus operators in Hong Kong. At present, more than 200 non-franchised operators are members of the POOA, and together having a fleet of about 4 000 buses which accounts for about 60% of the total non-franchised buses operating in Hong Kong.

have to change to other unaffected MTR lines or take alternative public transport services to travel to their destinations.

Manpower Deployment

14. In response to a service disruption incident, the MTRCL 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 needed.

15. The MTRCL has also established a 90-member dedicated Customer Service Rapid Response Unit ("CSRRU") to provide additional support focusing on customer service on top of the manpower stationed at individual stations. The 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 Operations Control Centre ("OCC") of the MTRCL will mobilise team members of CSRRU to affected stations to provide extra support on:

- setting up facility 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 co-ordination with relevant Government departments such as the Police for better crowd management;
- handling enquiry and advising passengers 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. The 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.

Annex 3

Loading of individual Light Rail routes in the busiest one hour during morning peak hours in 2015

Route Number	Loading (based on on-site observation and surveys)
505	94%
507	93%
610	88%
614	90%
614P	70%
615	90%
615P	80%
705	69%
706	75%
751	74%
751P	77%
761P	83%
Average	**82%**

Annex 4

Other initiatives taken to enhance carrying capacity and manage loading of Light Rail

Increased and flexible deployment of LRVs

The MTRCL has been closely monitoring the loading and service level of individual Light Rail routes, and will flexibly deploy LRVs in meeting passengers' need where necessary. Currently, there are on average 130 LRVs[5] being deployed to serve various routes during the morning peak hours every day. The actual number of LRVs will be slightly adjusted based on actual passenger demand and operational needs. In view of the passenger demand during the morning peak hours, the MTRCL has introduced short-haul special trips to bring passengers from certain sections of some Light Rail routes where demand are higher (including 505, 507, 614, 614P, 615P, 751, 705 and 706) to the West Rail Line stations, so as to improve passenger flow during peak hours.

2. Since end September 2014, the MTRCL has extended the service of eight Light Rail routes at midnight by deploying more LRVs and rearranging the maintenance time of Light Rail facilities, so that passengers of the last West Rail Line departure can switch to Light Rail and travel to all 68 stops of the network. Besides, since March 2015, the MTRCL has added 446 trips in total for the Light Rail network per week, and deployed more coupled-set LRVs to serve nine Light Rail routes, so as to enhance carrying capacity.

Strengthened platform management

3. The MTRCL has, since 2014, deployed 70 additional platform assistants to assist passengers in boarding and alighting at various busy Light Rail stops. Special boarding and alighting arrangements are also applied to certain Light Rail stops. Adjustments have also been made to the fare collection devices of Light Rail stops. All these measures are conducive to the smooth boarding and alighting, as well as entering and leaving the stops, which in turn relieve the relatively crowded situations

[5] A single-set LRV is adopted as a unit in this calculation. Coupled-set LRVs will be counted as two vehicles. 127 of these 130 LRVs are regularly deployed to serve various routes, while another three LRVs are deployed flexibly based on actual passenger demand of individual Light Rail routes.

of certain Light Rail stops during peak hours. These also facilitate the on-time departure of LRVs and allow the MTRCL to provide Light Rail service in accordance with the schedule, which reduces the negative impact on overall carrying capacity of the system.

4. Besides, in view of the views of some members of the public that certain Light Rail stops are relatively crowded during peak hours, the MTRCL is assessing the patronage of individual Light Rail stops during peak hours, as requested by the EMSD. This is to ensure that there will be no safety risk created by the crowdedness situation at platforms of Light Rail stops. For stops with higher patronage, the MTRCL will assess whether the existing platform management measures are effective and sufficient, and the necessity and feasibility of adopting other measures. Also, the EMSD required the MTRCL to review the effectiveness of the latter's regular monitoring mechanism for the patronage of various Light Rail stops, so as to maintain the safe operation of Light Rail.