M1 Limited

21 April 2021

Ms Aileen Chia
Director-General (Telecoms and Post)
Deputy Chief Executive (Connectivity Development & Regulation)
Infocomm Media Development Authority
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Dear Ms Chia,

CONSULTATION PAPER ON IMPLEMENTATION OF IP-BASED INTERCONNECTION IN SINGAPORE

1. We refer to the above public consultation paper issued by IMDA on 1 March 2021.

2. M1 welcomes the opportunity to submit our comments to IMDA's public consultation on implementation of IP-based interconnection in Singapore. Our response to the consultation paper is enclosed in this letter.

3. Should IMDA require any clarification, please do not hesitate to contact us.

Yours sincerely,

Mr Wee Keng Hoon
Deputy Director
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Encl.

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M1'S RESPONSE TO IMDA'S PUBLIC CONSULTATION ON IMPLEMENTATION OF IP-BASED INTERCONNECTION IN SINGAPORE

This paper is prepared in response to IMDA's public consultation document dated 1 March 2021 and represents M1's views on the subject matter. Unless otherwise noted, M1 makes no representation or warranty, expressed or implied, as to the accuracy of the information and data contained in this paper nor the suitability of the said information or data for any particular purpose otherwise than as stated above. M1 or any party associated with this paper or its content assumes no liability for any loss or damage resulting from the use or misuse of any information contained herein or any errors or omissions and shall not be held responsible for the validity of the information contained in any reference noted herein nor the misuse of information nor any adverse effects from use of any stated materials presented herein or the reliance thereon.

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Introduction

1. M1 is Singapore's most vibrant and dynamic communications company, providing mobile and fixed services to over 2 million customers. With a continual focus on network quality, customer service, value and innovation, M1 links anyone and anything; anytime, anywhere.

M1's views on implementation of IP-based Interconnection

2. M1 supports the development of a proportionate and stable regulatory environment as it will catalyse a sustainable and growing info-communications industry where long term planning and decisions can be undertaken.

3. M1 welcomes the opportunity to submit our comments to IMDA's public consultation on implementation of IP-based interconnection in Singapore. M1 agrees that the IP-based interconnection should be the way forward for the industry, with the eventual phasing out of technologies and equipment based on SS7 signalling, and the progressive transition of end-users to IP-based services. As IMDA has also rightly pointed out, IP-based interconnection will bring about several benefits to the industry, including higher operational efficiency for voice traffic and improved voice call quality, cost savings and reduced complexity for operators.

4. Notwithstanding the above, the implementation of IP-based interconnection is expected to be a significant and complex exercise. We foresee that such an industry exercise will have to be facilitated by IMDA, and we welcome active engagement on the key issues and specific implementation details with IMDA and other operators to enable a smooth transition to IP-based interconnection.

5. M1's specific comments to IMDA's view and questions are set out in the subsequent table below.

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S/N	IMDA's proposal	M1's comments
1	**<u>Scope and Technical Requirements</u>**	
	IMDA proposes, at this time, to require only the establishment of IP-based signalling protocol at domestic Points-of-Interconnection ("POIs") across all operators' networks that are interconnected to provision voice services. Based on the above defined scope, IMDA is of the preliminary view that all operators should follow a standardised set of technical requirements to implement IP-based interconnection at domestic POIs. ***Question 1: IMDA invites views and comments on whether operators should follow a standardised set of technical requirements to implement IP-based interconnection at domestic POIs across all operators' networks that are interconnected to provision voice services.***	M1 agrees that operators should follow a standardised set of technical requirements to implement IP-based interconnection at domestic POIs. This will provide clarity in the implementation of IP-based interconnection and avoid any inter-operability issues. We also observe that many international carriers are using SIP and SIP-I today for carriage of international voice traffic.
	IMDA would like to further propose that operators adopt the Session Initiation Protocol ("SIP") based on IETF2 and 3GPP3 specifications at the POIs (the "Proposed SIP"). IMDA understands that the Proposed SIP, which is defined by IETF standards, also fulfils the specifications of 3GPP. As it is based on the use of the IP Multimedia Subsystem ("IMS") defined by 3GPP, the Proposed SIP is deemed appropriate for operator's networks that use an IMS. Further, the Proposed SIP is suitable for the growing proportion of VoLTE calls over mobile networks, which are based on SIP and IMS specified by 3GPP. ***Question 2: IMDA invites views and comments on whether the Proposed SIP, based on IETF and 3GPP specifications, is appropriate and suitable to be implemented at the POIs.***	On IMDA's proposal that operators adopt the Proposed SIP, M1 suggests that IMDA provide further clarity on the specific requirements of the Proposed SIP which operators should adopt. M1 would recommend adopting SIP-I. We understand that it reuses many IETF standards and inherits the traditional ITU-T recommendations. It allows interworking of the basic call and supplementary services such as CLIP and CLIR. This facilitates backward compatibility to existing TDM-based networks and a smooth transition to IP-based interconnection.

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2	**<u>Singtel's RIO for IP-based Interconnection</u>**	
	Considering the possibility of a Transition Period, and that interconnection with Singtel (being the Dominant Licensee regulated under its RIO for TDM-based interconnection) is currently offered based on SS7, IMDA is of the view that it may be necessary to firm up the specific details of the interconnection arrangement under an IP-based interconnection environment before commencing the migration. IMDA considers that providing clarity to the industry on the specific details of any IP-based interconnection arrangement with Singtel will facilitate the migration planning and preparation of industry players who are currently directly interconnected with Singtel via Singtel's RIO. This will also serve as a reference for other IP-based interconnection arrangements between Non-Dominant Licensees which are commercially negotiated. With both sets (TDM-based and IP-based) of interconnection arrangements ready/in place, IMDA believes the Transition Period will be smoother and more manageable for the industry. IMDA intends to require Singtel to propose the offerings of the RIO services related to IP-based interconnection for IMDA to consult the industry on. Primarily, IMDA will require Singtel to propose an RIO offering that will eventually replace the current RIO Schedule 1 – Physical and Virtual (Distant) Interconnection. The proposed offer should contain a similar level of technical details, requirements and specifications (including transmission, signalling, routing, interconnect testing, etc.) to enable operators to establish IP-based interconnection with Singtel's network. At this juncture, IMDA believes that IP-based interconnection should also be on reciprocal terms and conditions, as per the current interconnection regimes, and that all parties should bear their own cost of establishing interconnection.	M1 agrees with IMDA's proposed approach to finalise the offerings of the RIO services related to IP-based interconnection, before commencing the migration to IP-based interconnection, as this will help to provide a clear migration path for the industry.

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	In order to ensure the public's uninterrupted access to emergency call services, IMDA will also require Singtel to propose a similar service to be offered under IP-based interconnection, if the implementation of IP-based interconnection affects Singtel's provision of emergency call services under Schedule 4A of the RIO. ***Question 3: IMDA invites views and comments on the proposed approach to finalise the offerings of the RIO services related to IP-based interconnection, before commencing the migration to IP-based interconnection***.	
3	**<u>Impact to Number Portability</u>**	
	IMDA believes that the migration to IP-based interconnection will require changes to the technical solutions currently implemented for the FNP service. In this regard, IMDA would like to propose the following options for FNP operators' consideration: (a) The FNP operators can review whether there is a similar "Release" message with a specific cause value under SIP signalling, or a similar signalling function under SIP signalling, which all FNP operators can agree to use as an indication to the originating network that the dialled number has been ported out; or (b) To adopt an All-Call-Query ("ACQ") method, given that all FNP operators have their own database. As for Mobile Number Portability ("MNP"), IMDA understands that the technical implementation of the current MNP service is not related to SS7 signalling. Thus, IMDA believes that the implementation of IP-based	M1 understands that if the SIP-I is adopted, it could allow the existing FNP solution to continue. Nonetheless, FNP operators could still review whether the existing FNP solution will be affected as a result of the migration towards IP-based interconnection. Additionally, the existing FNP solution uses two level 6 numbers (N1 and N2). IMDA and FNP operators may wish to review this requirement to preserve Singapore numbering resources. M1 shares the same understanding that the implementation of IP-based interconnection will not have an impact on MNP service.

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	interconnection will not have an impact on MNP service. ***Question 4: IMDA invites views and comments on the feasibility of IMDA's proposals to revise the technical implementation of FNP service in an IP-based interconnection environment.***	
4	**<u>Network Security and Quality of Service</u>**	
	IMDA emphasises the importance of operators securing their IP-based networks to address cyber security risks and vulnerabilities. IMDA believes that a baseline set of network security requirements that are aligned with industry best practices should be adopted. These baseline requirements will be in addition to other security measures and protection that operators should undertake to protect their own IP-based networks, and/or avoid technical harm to the telecommunication network and/or system of another operator. Such baseline requirements can include the following: a) Monitor and analyse signalling messages to detect malicious traffic; b) Adopt signalling firewalling to filter malicious traffic; c) Harden interconnect infrastructure such as Signalling Transfer Points ("STP") and Diameter Signalling Controllers ("DSC"); and d) Perform external network security assessments and penetration tests periodically, if domestic exchange points are used. On how a network should be connected to another network under an IP-based interconnection environment, IMDA will continue to leave it to the industry to discuss the appropriate and mutually agreed arrangements in good faith, be it via direct physical transmission links (ethernet or otherwise) or via domestic exchange points, if operators choose not to take up the RIO for interconnection purposes.	M1 agrees that IP-based networks must be secured to safeguard against cybersecurity risks and vulnerabilities. However, prior to establishing the baseline set of network security requirements, these should be consulted and discussed in greater detail with the industry. On the baseline requirements cited in this consultation paper, M1 would like to seek further clarity from IMDA on the relevance or role of Diameter Signalling Controllers in the hardening of interconnect infrastructure. M1 notes that IMDA will leave it to the industry to discuss the appropriate and mutually agreed arrangements in good faith on how a network should be connected to another network under an IP-based interconnection environment. M1 submits that one of the options for a point of interconnection should also include a neutral data centre location, and each operator can agree to bear their own costs of transmission links to the designated neutral data centre location.

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	Further, IMDA would like to highlight that at any point in time (whether during the Transition Period or otherwise), IMDA will require each operator to prevent or minimise any adverse impact on the voice services it is providing to end users (including any emergency call services). ***Question 5: IMDA invites views and comments on IMDA's preliminary views on network security and QoS under an IP-based interconnection environment.***	
5	**<u>Migration Approach</u>**	
	Broadly, the following is IMDA's preliminary proposals on the migration approach: (a) If industry can agree on and co-ordinate a common cut-over time to deploy the Proposed SIP at the POIs, then a co-ordinated single migration approach may be more efficient overall; or (b) If there is differing readiness of the operators to deploy the Proposed SIP at the POIs, then a phased approach with a Transition Period may have to be adopted for industry to migrate in phases. Further, to avoid/minimise migration issues, IMDA considers that it may be prudent for industry to conduct a co-ordinated industry-wide trial migration on testing platforms first before actual migration, while IMDA will remain involved in facilitating the exercise. IMDA is of the view that the assessment of whether a co-ordinated single approach or a phased approach is more appropriate can only be carried out at a later stage when there is more clarity on the various aspects of the implementation of IP-based interconnection, specifically the technical details.	M1 is of the view that a phased migration will likely be the preferred approach, given that it will be a major exercise across the industry. We note that IMDA has also decided that the industry should move to a BAK interconnection charging regime and will provide a 3-year glide path for the transition. To incentivise operators to move to IP-based interconnection and provide certainty for the industry to complete their migration, we suggest that IMDA sets out a clear timeline to achieve BAK interconnection charging regime and IP-based interconnection.

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S/N	IMDA's proposal	M1's comments
	Question 6: IMDA invites views and comments on IMDA's preliminary views on the broad migration approach.	

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