



IMDA-PSA 5G TRIAL TECH CALL FOR PORTS

CALL DOCUMENT AND APPLICATION GUIDE

Public Document

8 March 2019

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1 INTRODUCTION

- 1.1 The Info-communications Media Development Authority of Singapore (“IMDA”) and PSA Corporation Limited (“PSA”) are issuing a Tech Call to invite interested industry players (“Participants”) to submit proposals (“Proposals”) for the proposed IMDA-PSA 5G Trial, spanning from 8 March 2019 to 15 May 2019.
- 1.2 The Tech Call is a joint-collaboration effort between IMDA and PSA, and aims to assess and validate the performance and capabilities of 5G in a live environment, and in a broader context, grow the 5G ecosystem in Singapore.
- 1.3 PSA has offered a trial site for the conduct of the 5G trial for some of their identified use cases for this Tech Call. Participants are welcome to propose additional use cases that they think may be relevant to PSA.
- 1.4 The proposed 5G trial should include the trial deployment of a 5G network, the provision of the 5G equipment, the necessary support, and the use of the 5G technology to address the stated requirements of the use cases identified for this Tech Call.

2 IMPORTANT NOTICES

- 2.1 Interested participants are to note that this is a grant call for 5G trials. IMDA is providing funding support through a grant for the field deployment of a 5G trial network to test and assess the capabilities of 5G for ports in conjunction with PSA. This is not a call for tender.
- 2.2 For the avoidance of doubt, this Public Document for the IMDA-PSA 5G Trial Tech Call shall be read with and shall be subject to the Important Notices as set out in Annex A.

3 BACKGROUND

- 3.1 5G is globally acknowledged to be the next big leap in wireless communications, geared for the digitalizing economies of the world. It is targeted to support 3 broad application areas, namely enhanced mobile broadband (eMBB), ultra-reliable and low-latency communications (URLLC), and massive machine type communications (mMTC). It is expected to bring about massive improvements to current mobile networks, for instance peak data rates up to 20 Gbps and over-the-air latency of 1ms or less.
- 3.2 Network slicing, another key capability of 5G, enables a single physical infrastructure to be split into multiple logical or virtual networks. This gives operators the ability to customize the capabilities and functionality to its customers, allowing them to

guarantee quality of services for diverse use cases with different performance requirements. For example, there can be several URLLC slices for different mission critical use cases, while another slice is provisioned for eMBB use cases. This approach is cost efficient, and offers a shorter time-to-market and an increased speed of innovation for businesses.

- 3.3 With such advanced capabilities and features, 5G is widely touted to enable the development of new business models and advanced applications which many may be unknown today, fostering business innovation and spurring economic growth. While enhanced mobile broadband is expected for consumer use cases (such as 4K/8K video, augmented and virtual reality), enterprise use cases are expected to be the largest incremental revenue opportunity for operators deploying 5G¹, in verticals such as smart factories, smart ports, autonomous systems, etc.
- 3.4 As a global leader operating one of the world's busiest port among others, PSA has constantly been at the forefront of digital transformation through constant innovation and technology adoption. With the announcement of the Tuas mega port, PSA is looking to further build on its success by leveraging on the potential of emerging technologies such as 5G to maximize operational efficiency and sustainability.
- 3.5 With port operations moving towards increasing levels of automation and higher density of connected devices, high performance wireless connectivity is often the preferred option because Container Handling Equipment ("CHE") needs to be highly mobile. However, the harsh container port environment and stringent requirements for certain use cases have been a constant challenge for the deployment of many wireless technologies such as Wi-Fi. As such, PSA is keen to trial and validate the next generation of mobile technology as a viable wireless connectivity option.

4 OBJECTIVES

- 4.1 PSA's primary objective of this trial is to perform a technical assessment of 5G. PSA will evaluate 5G's viability as a wireless connectivity option to meet the stringent automation requirements of PSA's massive fleet of CHEs to be operated in Tuas Port.
- 4.2 The secondary objective is to explore the potential capabilities of 5G which could bring about new innovative solutions. In these aspect, PSA is looking at collaborating and co-innovating with 5G industry partners to solve some of its current pain points and to develop new solutions that would enhance PSA's operational efficiency.

¹ Source: 5G in China June 2017 published by China Academy of Information and Communications Technology (a part of the Ministry of Industry and Information Technology) and GSMA

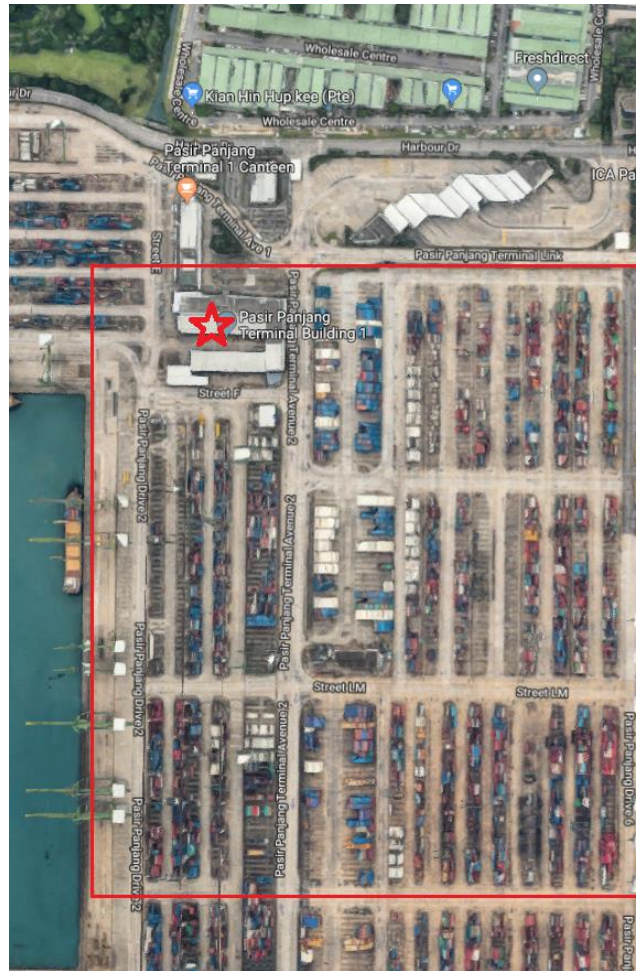
- 4.3 The outcome of the trial shall provide PSA with an in-depth understanding of 5G technology, namely its performance potentials and network integration design, before commercial adoption by PSA.
- 4.4 For IMDA, the objectives are to work with key industry partners to develop and grow early promising 5G use cases, understand the technical capabilities and performance of the emerging 5G technology in a live environment, and the requirements for future infrastructure and deployments. The learnings from the 5G field trial would be beneficial to multiple parties across the ecosystem, such as the Government, the service providers and operators, and industry users.
- 4.5 Together with IMDA's other efforts, IMDA aims to nurture and catalyze the development of the local 5G ecosystem with strong usage and applicability in various areas, enabled by a competitive operating environment with new 5G-related services and innovative business models.

5 SCOPE OF PROJECT

- 5.1 Proposals should address the identified use cases and its requirements specified in this Tech Call.
- 5.2 The proposed 5G trial in each Proposal shall include, but not limited to, the following:
 - a) The deployment of a 5G trial network at the trial location;
 - b) The necessary 5G end-devices and the commitment quantity;
 - c) The necessary support required for integration with third-party equipment and systems; and
 - d) The use of the 5G technology and its capabilities and features to address the use cases.
- 5.3 PSA has offered to work with the parties of the awarded Proposal(s) on the following for the 5G trial:
 - a) Facilitation and support on the deployment of the 5G trial network at the identified trial location;
 - b) A committed number of end-devices for 5G integration; and
 - c) Facilitation and support with internal teams and vendors for integration.

TRIAL LOCATION

- 5.4 The trial will be conducted at PSA Pasir Panjang Terminal. Use cases identified for this trial shall be performed within the area shown in red below.



TESTING ENVIRONMENT

- 5.5 All trials shall be conducted in a test environment (i.e. sandbox or isolated test network) unless otherwise specified.

6 TRIAL USE CASES

- 6.1 Details of the use cases will be shared during the briefing session, which only shortlisted invitees will be able to attend. Details of the briefing session are as set out in Clause 10.

7 PROJECT DELIVERABLES & OUTCOMES

- 7.1 Co-funded projects must involve the use of the 5G technology to achieve the following desired deliverables and outcomes:

- a) The successful deployment of the 5G trial network;
- b) The demonstrative use of the 5G technology to address the identified use cases and challenges;
- c) Documentation and report of the deployed 5G network's performance, capabilities, features and benefits to PSA and other industries.

8 PROJECT FUNDING

8.1 IMDA recognizes the risks and investment cost incurred by Participants to participate in the 5G field trial. Hence, IMDA will co-fund up to 50% of the qualifying costs. Categories eligible for co-funding include:

- a) Manpower;
- b) Training;
- c) Equipment (Hardware);
- d) Equipment (Software);
- e) Materials and ICT Services;
- f) Intellectual Property; and
- g) Professional Services.

8.2 The funding for selected project(s) will be determined upon assessment of the impact and scope of the project. All terms and conditions of any such approved funding shall be agreed between selected Participants and IMDA.

9 ELIGIBILITY FOR FUNDING SUPPORT

9.1 Singapore-registered companies with at least 30% local shareholding² are eligible to receive the grant for project funding support.

10 SCHEDULE

10.1 Interested participants are to refer to the following table for the timeline of key activities:

S/N	ITEM	DATE
1.	Industry briefing + site visit	22 Mar 19

² Local shareholding refers to shareholding that belongs to individuals who are Singapore Citizens or Permanent Residents.

2.	Closing date for submissions of proposals	15 May 19
3.	Shortlisting of proposals for evaluations	May-Jun 19
4.	Award of trial	Jul 19
5.	Commencement of trial	Aug 19

TECH CALL BRIEFING

- 10.2 Parties who are interested to attend the Tech Call briefing are required to register no later than **15 March 2019** via email to Tech@mda.gov.sg, using the following format:

EMAIL SUBJECT HEADING

“IMDA-PSA 5G Trial Tech Call – Registration_<Company name>”

EMAIL BODY

List of interested personnel:

S/N	Name	Designation	Department, Group	Email
1.				
2.				
3.				

List of other 5G trials, projects and deployments involved:

S/N	Location	Parties Involved	Description of Project	Project Duration
1.				
2.				
3.				

- 10.3 Only shortlisted participants will be able to attend the briefing session. Interested participants are highly encouraged to register early and attend the briefing session if shortlisted.
- 10.4 The Tech Call briefing will be conducted by IMDA and PSA and will cover the details of the Tech Call and further specifics of the identified use cases, including the events leading to the final award of grants, and expectation of the Proposals.
- 10.5 Details of the Tech Call briefing will be made known to registered parties via email.

11 SELECTION PROCESS

11.1 All proposals will be reviewed and evaluated by an Evaluation Committee (EC) which primarily comprise of IMDA and PSA representatives.

EVALUATION PROCESS

11.2 The submitted Proposals shall be evaluated based on the following evaluation criteria, among other things:

- a) Completeness of the Proposals;
- b) Ability to meet the key scope and specifications as stipulated in this document;
- c) Proposed 5G trial network deployment e.g. architecture, MEC, RAN deployment, frequencies and bandwidth, massive MIMO etc.;
- d) Proposed 5G trial network technical and functional features and capabilities e.g. URLLC, network slicing, user and control plane latency, network positioning etc.;
- e) Proposed 5G trial network roadmap e.g. URLLC, network positioning etc.;
- f) Proposed 5G end-devices and support.

SELECTION OF PROPOSAL(S) FOR CONSIDERATION FOR AWARD OF GRANT

11.3 Only complete Proposals will be evaluated by the EC for consideration for the award of a grant. Short-listed applicants may be required to make a presentation of their Proposal(s) (at their own cost and expense) and answer questions on the project in response to the EC.

11.4 The EC reserves the right to reject any or all Proposals submitted pursuant to this Public Document for the IMDA-PSA 5G Trial Tech Call. Where a Proposal is selected by the EC for consideration for the award of a grant, the relevant Participant will be notified by IMDA. The terms of the project, project milestones, and co-funding terms will be separately negotiated and definitive agreements entered into between the relevant parties.

11.5 For the avoidance of doubt, the selection of any Proposal by the EC may not necessarily lead to the award of a grant.

DISCLAIMER

11.6 IMDA and PSA shall have the absolute discretion to accept or reject any Proposal submitted without being liable to give any reason thereof. IMDA and PSA reserves the right to retain the Proposals submitted by all parties without liability for the costs of such documents.

12 SUBMISSIONS

- 12.1 Each application may include one (1) or more proposals.
- 12.2 If the participants are a consortium of partners, only the lead participant will be required to submit the application and proposals on behalf of the consortium.
- 12.3 All applications must be submitted to Tech@imda.gov.sg by 2359 hours on 15 May 2019. It shall be the responsibility of the Participants to ensure that their proposals are submitted by the closing date and time. An email confirmation will be issued when the application is successfully received. Incomplete and/or late proposals will not be accepted/assessed.
- 12.4 Application submission is final and no modification will be allowed upon successful submission past closing date. IMDA and/or PSA retain sole and absolute discretion to accept each application wholly or in part.
- 12.5 If there is any change or amendment of information to the Tech Call document before the closing date, notification will be given through the publication of a Notice of Addendum to the Tech Call document on IMDA's website. Participants shall check the IMDA's website regularly to ensure that the instructions on the Notice of Addendum, if any, has not been omitted before submitting their proposals in response to this call.

FORMAT OF SUBMISSIONS

- 12.6 Submissions should be made using the Proposal template that can be downloaded from the website <https://www.imda.gov.sg/industry-development/call-for-proposals/imda-psa-5g-trial-tech-call-for-ports>.
- 12.7 Participants must follow the submission of required documents as outlined below in a zip file:

S/N	DOCUMENT	DESCRIPTION
1.	Proposal File naming format: <i>"1. Proposal_<Company name>"</i>	Please use the proposal template provided on the website.
2.	Costing File naming format: <i>"2. Costing_<Company name>"</i>	Please use the proposal template provided on the website.
3.	Others File naming format:	Other supporting documents.

	"3. <Document name>"	
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- 12.8 The proposals and all supporting documentation to be supplied by the Participants shall be written in the English language.
- 12.9 In the event that the EC seeks clarifications on any aspect of the Participant's Proposal, the Participant shall provide full and comprehensive responses within seven (7) days of the EC's request.

ENQUIRIES

- 12.10 Enquiries regarding this Tech Call should be emailed to Tech@imda.gov.sg. Please indicate "**IMDA-PSA 5G Trial Tech Call Enquiry - <company name>**" in your heading.
- 12.11 No further enquiries regarding this Tech Call will be entertained after **15 May 2019**.

ANNEX A – IMPORTANT NOTICES

Companies or consortia submitting proposals in response to the IMDA-PSA 5G Trial Tech Call (collectively, “**Participants**” and individually “**Participant**”) are deemed to have read and understood the following provisions:

1 Interpretation

- 1.1 The following words and expressions shall have the meanings hereby assigned to them except where the context otherwise requires:

“**Tech Call**” shall mean the invitation issued by IMDA and PSA on 8 March 2019 to companies to collaborate with IMDA and PSA to deploy a 5G Trial in connection with the IMDA-PSA 5G Trial Tech Call for Ports.

“**IP**” shall mean intellectual property, including but not limited to patents, copyright, industrial design and integrated circuit topography.

“**IMDA**” shall mean the Info-communications Media Development Authority, a statutory board created pursuant to the Info-communications Media Development Authority Act (No. 22 of 2016) of the laws of the Republic of Singapore with its principal office at 10 Pasir Panjang Road, #03-01 Mapletree Business City, Singapore 117438.

“**Proposal**” shall mean any and all documents and information submitted by the Participant in response to the Tech Call.

“**PSA**” shall mean PSA Corporation Limited of 460 Alexandra Road #38-00 PSA Building Singapore 119963.

- 1.2 Words importing the singular shall also include the plural and vice versa where the context requires.

2 Disclaimers

- 2.1 This Tech Call is merely an invitation to treat and is not intended to create or impose any binding legal obligations whatsoever on IMDA and/or PSA, whether express or implied and whether contractual or otherwise. Without prejudice to the generality of the foregoing, each Participant acknowledges and agrees that IMDA and/or PSA shall be under no duty or obligation to act fairly or equally towards any Participant in relation to IMDA’s and/or PSA’s evaluation of its Proposal or with regard to any process adopted by IMDA and/or PSA under this Tech Call.

- 2.2 Nothing in this Tech Call shall constitute a contract between IMDA and/or PSA and any Participant. Any Participant selected pursuant to this Tech Call for participation in the project shall be required to enter into
- a) a grant agreement with IMDA ("**Grant Agreement**") in respect of the provision of grants by IMDA, the terms and conditions of which shall be agreed between IMDA and the Participant at a later date. For the Participants' reference, the Grant Agreement to be entered into between the selected Participant and IMDA shall contain IMDA's standard terms and conditions for Grants and/or any other terms which IMDA deems fit, including but not limited to the terms and conditions set out at Schedule 1 annexed hereto. For the avoidance of doubt, for the purposes of the Grant Agreement, IMDA shall be entitled to modify, vary and/or supplement any of the terms and conditions set out in Schedule 1;
 - b) a legally binding agreement with PSA setting out the terms and conditions governing the activities contemplated in relation to the project under this Tech Call, and any other activity as may be envisaged under or pursuant to this Tech Call ("**Project**") including, among others, the scope (including the technical specifications), deliverables, terms and milestones of the Project, and the rights and obligations of the relevant parties.
- 2.3 All submissions of Proposals, clarifications, discussions and presentations relating to this Tech Call are made entirely at the risk of the Participant.
- 2.4 IMDA and/or PSA does not make any representation or warranty, whether express or implied, or accept any liability for the completeness, relevancy, accuracy and/or adequacy of the information provided by IMDA and/or PSA in relation to this Tech Call.
- 2.5 IMDA and/or PSA does not make any representation of fact or promise to the future in respect of any project contemplated by IMDA and/or PSA relating to this Tech Call.
- 2.6 IMDA and/or PSA accepts no liability or obligation in relation to any Proposal submitted pursuant to this Tech Call and/or any subsequent clarifications, discussions or presentations thereon, whether requested by IMDA and/or PSA or otherwise. The Participant shall bear all costs and expenses associated with the preparation and submission of its Proposal, and any subsequent clarifications, discussions or presentations thereon. IMDA and/or PSA will, under no circumstances, be responsible for reimbursing any costs incurred by the Participant during the process, regardless of the conduct or outcome of the evaluation and selection process.
- 2.7 IMDA and/or PSA shall have the absolute discretion to accept or reject any Proposal, whether in whole or in part, without giving any reason whatsoever. The receipt by IMDA and/or PSA of any Proposal pursuant to this Tech Call shall under no circumstances impose any form of obligation or amount to an acceptance of or an

agreement to abide by any terms or conditions stated therein or elsewhere on the part of IMDA and/or PSA.

- 2.8 IMDA and/or PSA shall have the absolute discretion, at any time, to terminate this Tech Call or to change the nature, scope, procedures or timelines for the Tech Call, including the proposal selection process and criteria. Under no circumstance shall IMDA and/or PSA incur any liability in respect of such termination or changes.
- 2.9 IMDA and/or PSA shall not owe any liability to any party for any loss or damage whatsoever (including loss of profit, savings, business contracts, or revenues, and all other forms of actual, direct, special, incidental, or consequential loss or damage) arising from or related to any response to this Tech Call, including but not limited to the submission of Proposals.

3 Ownership of Documents and Intellectual Property

- 3.1 All proposals and other documents or materials submitted by any Participant pursuant to this Tech Call shall become the property of IMDA and PSA. Notwithstanding the foregoing and without prejudice to any subsequent agreement with IMDA to the contrary, any IP contained in any Proposal and/or such other document submitted to IMDA shall not be transferred to IMDA or PSA.
- 3.2 For the avoidance of doubt, all IP in any documents issued by IMDA or PSA pursuant to this Tech Call shall remain vested in IMDA and PSA respectively.

4 Confidentiality of Information

- 4.1 IMDA and/or PSA may require any party receiving confidential information from IMDA and/or PSA in relation to or arising from this Tech Call to sign a written non-disclosure agreement setting out such party's confidentiality obligations in relation to such confidential information.
- 4.2 IMDA and/or PSA accepts no liability or obligation in relation to any confidential information disclosed to IMDA and/or PSA by a Participant pursuant to this Tech Call unless otherwise agreed by IMDA and/or PSA in a written non-disclosure agreement setting out IMDA's and/or PSA's confidentiality obligations in relation to such confidential information.

5 Right to Seek Recovery

- 5.1 Nothing herein shall prejudice or limit IMDA's and/or PSA's right to seek recovery from the Participant for any loss, damage, costs, expenses, or liability incurred by IMDA or

PSA and/or its officers, directors and employees, directly or indirectly arising out of or relating to the submission of the Proposal by the Participant and IMDA's and/or PSA's retention and use thereof, including but not limited to any claim that the Proposal infringes any third party's IP rights.

SCHEDULE 1 to ANNEX A – IMPORTANT NOTICES

1. The monies ('Grant Monies') payable by IMDA to the Participant selected pursuant to this Tech Call ('Selected Participant') under the grant awarded by IMDA to the Selected Participant ('Grant') shall be paid only for reimbursement of the costs incurred by the Selected Participant in relation to the project under this Tech Call ('Project') during the period approved by IMDA within which the Project shall be completed, up to the maximum amount(s) of the respective qualifying costs approved by IMDA under the Grant.
2. Unless otherwise agreed by IMDA, the Selected Participant shall be eligible for the Grant if the Selected Participant satisfies certain conditions, including but not limited to:-
 - a. The Selected Participant must be incorporated in Singapore; and
 - b. The Selected Participant must carry out all aspects of the Project in Singapore.
3. The Selected Participant may claim for reimbursements as stated in the Grant Agreement for target(s) that the Selected Participant are required to achieve under the Grant ('Deliverables') which it has achieved (as verified by relevant supporting documents). Reimbursements by IMDA under the Grant may nevertheless be withheld for any reason whatsoever at the discretion of IMDA. Without prejudice to the generality of the foregoing, reimbursements may be withheld by IMDA:
 - a. If there are any pending clarifications required of the Selected Participant by IMDA in connection with the claims forms, progress reports on the Project and/or documents submitted by the Company; and/or
 - b. If there are any pending investigations by IMDA in connection with the Grant and/or the Selected Participant.
4. IMDA shall have the right to recover Grant Monies disbursed or reimbursed to the Selected Participant for any Deliverables which are achieved by the Selected Participant should the Selected Participant fail to complete any of the remaining Deliverables for the Project and/or should IMDA terminate the Grant upon the occurrence of certain events including but not limited to a breach of any terms of the Grant by the Selected Participant.
5. All costs incurred pursuant to audits in relation to the Grant and/or the Project shall be borne by the Selected Participant and shall not be reimbursed by IMDA.
6. The Grant may be terminated at the discretion of IMDA without cause upon prior written notice to the Selected Participant.
7. The Selected Participant shall indemnify and keep IMDA fully indemnified against all liabilities, costs and expenses (including all legal fees) in respect of any claims, demands, suits or actions brought against IMDA by third parties arising out of the Selected Participant's performance of the Project and the terms of the Agreement.

8. IMDA reserves the right to vary or supplement the terms and conditions of the Grant Agreement upon prior written notice to the Selected Participant.