



**REQUEST FOR COMMENTS ISSUED BY THE
INFO-COMMUNICATIONS DEVELOPMENT AUTHORITY OF SINGAPORE
PROPOSED ESTABLISHMENT OF A DATA CENTRE PARK IN SINGAPORE**

ISSUED ON 14 Apr 2010

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PROPOSED ESTABLISHMENT OF A DATA CENTRE PARK IN SINGAPORE

PART I: INTRODUCTION

1. The Info-communications Development Authority of Singapore (“IDA”) is proposing the development of a data centre park (“DCP”), which is a specialised industrial park for data centres (DC) with infrastructure, facilities and design guidelines supportive of the setup of premium DCs¹.
2. To this end, this Request for Comments (“RFC”) solicits market feedback to shape the IDA’s strategic initiative to establish a DCP to strengthen Singapore’s position as an economic and infocomm hub.
3. Interested parties shall respond to this RFC in writing to the Infocomm Development Authority of Singapore (“IDA”) by the stipulated date, providing specific information on ways in which their organisations, either individually or in conjunction with other organisations, will be interested to participate in the design, financing, construction and operation of the DCP.
4. IDA intends to use the responses to the RFC to draw up detailed specifications, operating and business terms for the DCP. As a result of the RFC, IDA may:
 - a) Engage in further discussions and negotiations with the organisation; or
 - b) Proceed to a tender or Request for Proposals (RFP) stage in which participation will be by invitation. Respondents to the RFC will be invited by IDA to participate in the RFP.

STRATEGIC OBJECTIVES OF THE DCP

5. The development of a DCP in Singapore will strengthen Singapore’s position as an economic hub by attracting MNCs and enterprises to set up their premium DC operations here. It will also help to entrench Singapore as an infocomm and media hub by having more premium DCs such as banks and telco carriers located here. Such DC infrastructure will attract world-class Internet and media companies to host their content and services in Singapore, thus attracting more Internet traffic and international network providers. Ultimately, this will enhance Singapore’s global connectivity and competitiveness.

¹ Premium DCs are defined as DCs with dual feeds for its utilities such as power and chilled water, multiple telecoms connectivity options and redundant designs in its infrastructure components. In industry terms, it is commonly classified as Tier 3 and above DCs according to the technical standards set out by the Uptime Institute (an association for the DC industry and often used as an industry reference).

PART II: PROPOSED SETUP OF A DATA CENTRE PARK

6. IDA commissioned a technical feasibility study from June 09 to Jan 10 to identify common infrastructure that could be shared within a DCP, explore different DCP configurations, and assess the potential benefits of a DCP vis-à-vis the standalone data centre model that is being adopted today (i.e. DCs built in different locations with their own infrastructure). The study puts forward that the DCP approach will bring about greater power and cooling efficiency, higher space efficiency, lower telecommunications cost and faster speed to market. The study recommended that the optimal DCP design should incorporate on-site power generation adopting tri-generation² technology, to yield maximum benefits.
7. This RFC aims to seek industry's views, inputs and/or comments on the following:
 - a) Ownership and operating structure for the DCP;
 - b) Business Model of DCP; and
 - c) Technical Specifications for the DCP.

The information gathered will be used to develop the implementation plan for the DCP.

PART III: OVERALL CONCEPT OF A DATA CENTRE PARK

8. The proposed DCP, which is targeted to be completed by 2012-2013, may occupy an area of between 10-12 Ha and will consist of six DC buildings providing up to 120,000 sqm³ of DC rackable space. Other than one DC building which houses telecoms carriers and hosts a Singapore Internet Exchange (SGIX) node, investors will have a selection of various land plots to enable investors to rapidly build their own DC facility within the DCP, leveraging various supporting infrastructure to get to market quickly and reduce overall capital expenditure and operating costs. The following are the key features of the DCP:
 - a) Redundancy and resiliency in infrastructure – As DCs are mission-critical facilities, infrastructure in the DCP will be fully redundant and resilient. There will be dual power feeds, redundant sources of cooling and carrier diversity to ensure that DC operations will not be compromised if any part of the infrastructure should fail.
 - b) Ready-built infrastructure – Supporting infrastructure will be available and easily scalable for plug-and-play DC deployment. A purpose-built and dedicated on-site tri-generation plant will be built to meet the high power requirements of next-generation DCs and ensure the reliable

² Tri-generation refers to the generation of electricity; heating and cooling from a single energy source e.g. natural gas. The by-product of heat from power generation is further harnessed through the absorption chillers to produce chilled water for cooling.

³ A tri-generation plant has the highest power efficiency when rackable space is 120,000 sqm.

supply of power with minimal transmission losses. Telecommunication infrastructure such as high capacity fibre networks and Internet exchanges, and connections will also be established for the connectivity needs of DCs.

- c) Ready DC plots and customised industrial park guidelines – Plots of land will be demarcated within the DCP and made available for DC investments. Urban design guidelines like perimeter fencing, minimum number of parking lots, and aesthetic requirements will be customised and catered towards the needs of next-generation DCs. As much as possible, pre-approvals from the relevant authorities will be obtained.

Question 1: IDA invites comments on the proposed development of 6 Tier 3 and above DC buildings (each being 20,000 sqm in size) within the park with a total rackable space of 120,000 sqm and whether it is sufficient to meet the demand of commercial data centre space for the next five years beyond 2012-2013.

Question 2: IDA invites comments on the type and profile of the various DC players and their partners who are likely to be located within the park.

9. Based on a study commissioned by IDA, the top line benefits of the DCP, compared with a standalone DC, is estimated, in an ideal scenario which incorporates the use of a tri-generation plant in the DCP, to be:
- Up to 14% increase in rackable space;
 - Up to 25% reduction in energy usage;
 - Between 6-9 months reduction in planning and implementation of a DC (including seeking the necessary regulatory approvals);
 - Up to 90% reduction in local telecoms costs⁴ for DC players in the DCP.

Question 3: IDA seeks views on your priorities of the top line benefits, and if these estimated benefits are realistic and achievable in Singapore, based on your knowledge and experience. Would these benefits be sufficient to attract your DC project to be in the DCP? What other considerations should IDA consider?

10. In order to achieve lower energy costs for end users in the DCP, IDA is considering several models for the provision of power. One option is for the tri-generation operator to provide power via direct supply from the tri-generation plant without being connected to Singapore's power grid (i.e. no back-up power from Singapore's power grid) and without participation in the electricity market (Islanded Power Park Model⁵). Another option is for the tri-generation plant to sell power into the electricity market in competition with the other Gencos, and for end users in the DCP to purchase power from electricity retailers in the electricity market (Multi-

⁴ Based on inter-connectivity between data centres within the DCP.

⁵ The Islanded Power Park Model is being considered by the Energy Market Authority, which is the regulator of the electricity industry in Singapore.

Utilities Complex Model) but enjoy lower costs of cooling by using the cooling outputs of the tri-generation plant.

Question 4: IDA invites views and comments on the two options proposed, and the key considerations for each option to achieve lower energy costs for the DC players. IDA also welcomes views on alternative models for the provision of power to the DCP.

Scope for DCP Ownership and Operating Structure

11. The DCP will involve several industry players. One proposed DCP structure is illustrated in Figure 1 below. In this respect, IDA would like to demarcate the role/scope that will facilitate the development of the DCP and avoid potential conflict of interest.

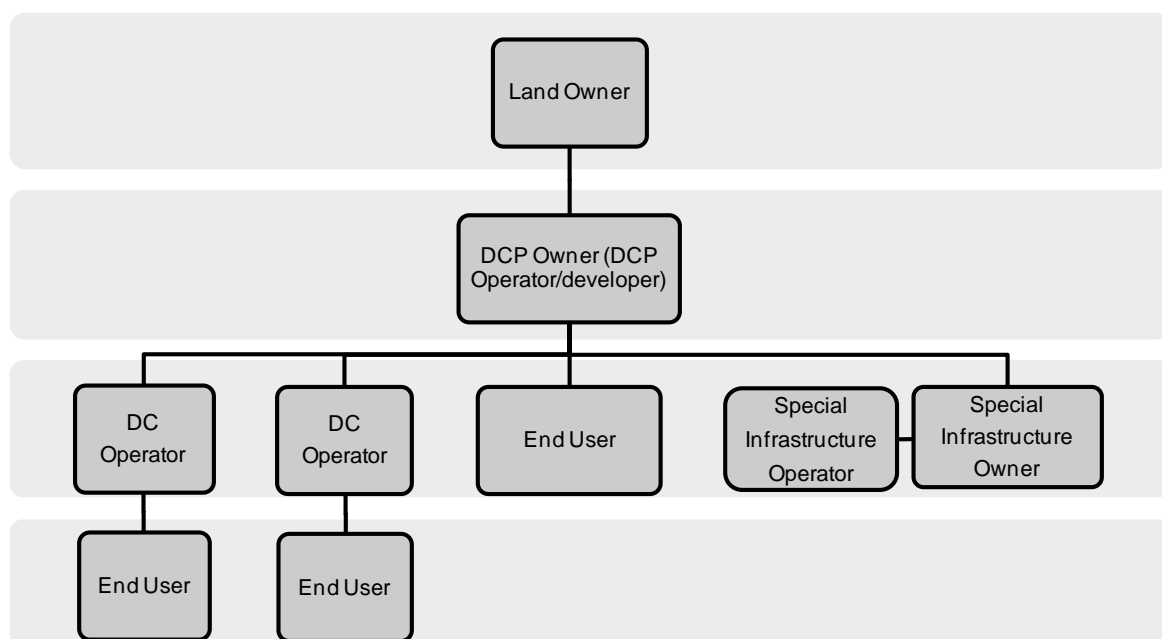


Figure 1: Proposed DCP Structure

12. A more detailed explanation of these entities and their respective roles in the DCP are as follows:
 - i. Land Owner
The Land Owner is the owner of the land where the DCP will reside.
 - ii. DCP Owner
The DCP Owner is the owner of the DCP and the basic park level features (e.g. road network, landscaping etc.).
 - iii. DCP Operator
The DCP Operator is an organisation or company that operates the infrastructure of the DCP.

- iv. DCP Developer
The DCP Developer is an organisation or company that develops the DCP.
- v. DC Operator
The DC Operator is an organisation or company that operates the individual building within the DCP.
- vi. End User
The End User is an organisation or company which is a customer and hosts their servers within the data centres in the DCP.
- vii. Special Infrastructure Owner
The Special Infrastructure (SI) Owner is the owner of the infrastructure that will be shared by various/all buildings within the DCP (e.g., tri-generation plant, campus fibre network and service tunnels to support the infrastructure).
- viii. Special Infrastructure Operator
The Special Infrastructure (SI) Operator is an organization or company that operates the infrastructure that will be shared by various/all buildings within the DCP.

Question 5: IDA invites proposals with options and recommendations on the ownership and operating model of each entity of the proposed DCP structure (Land Owner, Park Owner, Park Developer, Special Infrastructure Owner, and Special Infrastructure Operator). In particular, what would be the specific roles and responsibilities from such an operating structure? Are there other considerations that IDA would need to take into account in order to overcome any potential conflict of interest?

Business Model of DCP

13. A viable business model is an important determinant in ensuring the long-term sustainability and business continuity of the DCP. This business model should demonstrate the approach to ensure commercial viability for the DCP.

Question 6: IDA invites proposals for an appropriate business model for the DCP. The business model should include major cost items, major revenue sources with a view of achieving commercial viability over a period of 30 years.

Question 7: IDA invites views and comments on the demand growth pattern for Data Centre space requirement in Singapore.

Question 8: IDA also seeks views on the governance and regulatory framework that you would like to see in the DCP that will ensure commercial viability.

Technical Specifications – Power and Cooling

14. It is proposed that the DCP will be designed to support an average IT load density of 1600W/sqm⁶.

Question 9: IDA invites views and comments on the power density trend for DCs over the next 5-10 years and whether 1600W/sqm is appropriate to support the next generation of DCs operation.

15. The proposed design of the tri-generation plant provides for all the power and cooling requirements needed within the park. Based on the technical study conducted by IDA, it was concluded that the tri-generation plant can potentially help the DCs in the DCP to achieve a Power Usage Efficiency (PUE) of 1.35, assuming that the same DC in a standalone model has a PUE of 1.8. (Note: DC players can further improve their PUE by adopting other energy management technologies within their boundaries of their own DCs). It is also estimated that the total power generation of 260MW is and occupied. The gas turbines, which will be configured based on an N+2 design, will be designed to work based on a dual fuel system of natural gas and diesel. In this respect, diesel may be considered as an alternative fuel to natural gas.

Question 10: IDA seeks comments on the potential PUE of 1.35 and if this benefit is compelling enough for players to site their DCs in the DCP.

Question 11: IDA seeks comments on the key design considerations that need to be taken into account to support the resiliency of the tri-generation plant. Would you still require implementing your own backup power source and/or connection to Singapore's power grid for your DCs?

Question 12: IDA also seeks comments on using diesel as an alternative backup fuel for natural gas and the storage of such capacity.

Technical Specifications – Fibre Connectivity

16. The Singapore Internet Exchange (SGIX) was established in Sep 09 as a neutral Internet exchange that offers an efficient central point for Internet traffic exchange. A neutral Internet exchange will bring benefits to all industry players requiring efficient access to content, services and the internet community. An efficient traffic exchange eco-system will also enhance Singapore's attractiveness to overseas investments from players such as content and service providers, data centre players, and ISPs through catalysing the growth of data centres and content hosting here. IDA is proposing to locate one of the Internet Exchange (IX) nodes in the DCP.

⁶ Based on Uptime Institute White Paper on Product Heat Density Trends and from engineering institutions such as ASHRAE.

Question 13: IDA invites views and comments to locate one of the IX nodes in the DCP.

17. IDA is proposing an on-park Fibre or Ethernet services providing connectivity between DCs of the same or different users located at different DCs within the DCP. The DCs could leverage on other Telco service providers to extend the connectivity beyond the DCP. It is envisaged that the Fibre or Ethernet Services will be owned by a third-party operator or the DCP Operator.

Question 14: IDA invites views and comments on the type of telecommunication facilities you would require within the DCP.

Question 15: IDA also invites views and comments on whether the Fibre or Ethernet services should be offered by a third-party operator or the DCP Operator.

PART IV: INVITATION TO COMMENT

18. IDA invites the industry to comment on the matter stated above paragraphs and any other related issues not covered in this consultation document but which are considered to be relevant to the development of the DCP.
19. IDA requests that comments be presented in the following format:
- a) Description of the respondent and its interest;
 - b) Executive summary of the respondent's position;
 - c) Views regarding questions stipulated in this document; and
 - d) General comments.
20. In all comments, respondents should identify the questions (by section number/paragraph, where provided) to which comments are being made. Where appropriate, respondents may propose additional or alternative suggestions, provided that such suggestions should always be accompanied by an explanation of the reason for the proposal. All respondents are requested to keep comments clear and concise.
21. IDA reserves the right to make public all or parts of any written submissions made in response to this consultation, and to disclose the identity of the respondent. Any part of the submission which the respondent considers is commercially sensitive must be clearly marked and placed as a separate annex to the comments raised. IDA will take this into consideration when disclosing the information submitted.
22. All views and comments should be submitted in hard copies (four (4) sets) and soft copies via four (4) sets of CD, each includes one copy (1) in MS Office and one (1) in PDF format and shall reach IDA by **12 noon, 5 May 2010**. Respondents are required to include their personal/company

particulars as well as their correspondence address in their submission.
Views and comments should be addressed to:

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