

For discussion  
on 12 May 2003

**Legislative Council Panel on Commerce and Industry**  
**Development of integrated-circuits design**

**Purpose**

This paper -

- (a) informs Members of the action taken by the Administration in supporting the development of integrated-circuits (IC) design in Hong Kong; and
- (b) outlines the Administration's proposal to support the establishment of an IC development support centre by the Hong Kong Science and Technology Parks Corporation (HKSTPC) under the Innovation and Technology Fund.

**Background**

2. Promoting innovation and technology has been a major cornerstone of the HKSAR Government's policy to spearhead Hong Kong's development into a knowledge-based, technology-intensive economy. In this context, we have been supporting and facilitating Hong Kong enterprises to engage in research and development, become more innovative and add value to their services.

3. Our main task in promoting technology development, as announced in the 2003 Policy Agenda, is to promote areas where Hong Kong has competitive advantages, including but not limited to IC design. IC design presents good potential for Hong Kong because :

- (a) we have a strong user base in view of the well-established electronics industry both in Hong Kong and the Pearl River Delta region;
- (b) we are well supported with manufacturing facilities, including foundries, in the neighbouring region;

- (c) we have a not insignificant design capability and presence, from training to IC design small and medium-sized enterprises; and
- (d) Hong Kong has a robust intellectual property protection regime, which is critical for the growth of knowledge-based industry like IC design.

### **IC design and Electronics Industry**

4. Hong Kong's electronics industry is the largest merchandise export earner, accounting for 39.1% of its total exports in 2002. Hong Kong's total exports of electronics reached HK\$610 billion in 2002, representing an increase of 13.4% over 2001.

5. IC design occupies a critical and high value-added segment in the whole chain of the electronics industry, from IC design, testing, wafer fabrication, assembly and packaging to equipment manufacturing and sales. IC design supports the electronics industry, and as part of the semiconductor sector, is also an industry on its own. IC technology is essentially the miniaturization of electronic components and their connections onto a small slice (chip) of semiconductor material (such as silicon). IC design means the design of such miniature electronic circuitries. The applications of IC design are very wide-ranging including but not limited to computers, phones, calculators, watches, personal digital assistants (PDA), toys, remote controllers, alarm systems, television, etc.. According to some industry estimates, the Asia Pacific market size of the semiconductor industry was US\$57.3 billion in 2002 (with 40% share by the Mainland / Hong Kong) and will likely expand to US\$85.4 billion (with 43% share by the Mainland / Hong Kong) in 2004.

6. The intellectual content of the IC is embedded in its design. IC design is a knowledge-based industry. The IC designed provide high value-add to the end products. Nevertheless, as the IC design industry is also capital-intensive and requires substantial investments, it presents a critical entry barrier to many of the relatively small and medium-sized local IC design companies. Currently, most of the Hong Kong electronics manufacturers outsource their critical IC components to overseas suppliers. To upgrade Hong Kong's product design and innovation, it will be essential to build the capability of Hong Kong's electronics industry to capture and master the core technology, the design of IC. The Federation of Hong Kong Industries and the Hong Kong Electronic Industries Association have also conducted studies highlighting the significant development potentials for Hong Kong's electronics industry, if Hong Kong has stronger presence of local IC design industry.

7. The world leaders in IC design include the USA, Japan and Taiwan. The Mainland is also posing as a key player. The Mainland plans to establish ten national IC parks and companies located in these parks may enjoy favourable tax holiday, rebates and other support such as low rent. Taiwan's support for its IC design and semiconductor industry could be traced back to 1970s / 80s when its Industrial Technology Research Institute was granted with funding to develop its own IC design and manufacturing capability and the formation of a foundry, which helped mushroom hundreds of fabless IC design houses. Japan was the first in Asia to engage in high-end IC design or semiconductor industry. Five major Japanese electronics giants have recently announced that they would join a government-backed project to develop a super tiny, high-capacity semiconductor only 0.1 micron thin, which will entail smaller circuit size and yet higher processing speed. For the U.S., the private sector provides the much-needed research and development efforts in advancing its chip technologies. Classic examples are giants like IBM and Intel.

### **HKSAR Government support for development of IC design**

8. The HKSAR Government runs various programmes for manpower training and provides infrastructural support to cater to the industry's needs. Degree courses in electrical and electronics engineering, as well as science degrees in physics are available in the local universities. One of the universities will soon offer a two-year, part-time master of science degree course specialising in IC design. At the technical level, the Vocational Training Council provides IC design training.

9. Under the Innovation and Technology Fund (ITF), as at the end of the first quarter of 2003 we have supported 64 projects with funding of over HK\$207 million in the area of electrical and electronics engineering for projects ranging from design of an IC with specific function to the establishment of an infrastructure supporting IC design activities. For instance, an IC design house, with the support of ITF funding, has successfully developed a system-on-chip solution for a major remote control manufacturer. The Science Park is also developing electronics as one of its four focused technology-based clusters. We would continue to build upon our strong foundation and the strength of the local electronics industry to further spawn high value-added IC design activities locally with a view to achieving multiplier economic impact.

## **Proposal**

10. The HKSTPC has recently proposed to establish an IC development support centre in the Science Park. The Science Park is developing along four technology-based clusters, including electronics. As at end February 2003, the HKSTPC has approved admission of 25 companies as tenants and another eight companies as incubatees into the Science Park. 16 of them are in the electronics sector and some of these specialize in IC design. A nascent cluster of IC design companies is emerging. Coupled with the IC design support facilities which HKSTPC has been developing (with computer-aided design tools, software and supporting staff), the proposed centre aims at providing a one-stop service to IC design companies from design stage to production release. The services to be provided include -

- (a) probe and test development services. The centre will house advanced test systems for testing and debugging hardware and software design;
- (b) reliability and product analysis services. The centre will provide IC reliability and product analysis services; and
- (c) multi-project wafer shuttle services. This service refers to the photo-masking process, which is generally very expensive for small number of designs from single user. The centre will provide “bundled” photo-masking services so that wafer shuttle will allow a maximum of 16 different designs in one mask set. The consequence is that end users will then only need to commit 1/16 of the total mask set cost to use the service.

11. Potential clients of the proposed centre are tenants of Science Park, HKSTPC’s incubatees, IC design companies based in Hong Kong and other strategic partners of HKSTPC. The HKSTPC estimates that because of the shared use of facilities in IC design, wafer shuttle, test development, reliability and product analysis, etc., and time-based charging, end users may expect to reduce their new product development cost and cycle time by as much as 60%.

12. The centre, when fully established, is expected to lower the entry barrier for the design and development of IC in terms of cost and technical know-how. It would help spawn new investments in the fabless IC design business in Hong Kong. The centre would also facilitate more electronic end-product producers to invest in designing their own IC to increase the value of their products and to encapsulate their intellectual property in IC. It also helps attract fabless IC design houses to set up in Hong Kong.

13. Details of HKSTPC's project are at Annex.
14. The ITF Electronics Projects Vetting Committee has considered the proposal and advised that -
- (a) the HKSTPC has identified certain support and services necessary (such as those mentioned in paragraph 10 above) in the value chain of IC design which it could help provide for further developing Hong Kong's existing strengths to create greater economic impact in IC design; and
  - (b) the project team had good track record and core competencies in IC design, a firm grip on the needs of the industry and wide networks with the industry to facilitate success of the project. The proposed project also has support from the industry.
15. The ITF Electronics Projects Vetting Committee has concluded that the proposed IC development support centre would be beneficial to Hong Kong's electronics industry by providing a platform whereby technology development of the industry may be facilitated. It would help the industry become more competitive and therefore bring wider economic benefits to Hong Kong as a whole. The Vetting Committee supports the establishment of the proposed center and has recommended that a grant under the ITF be made towards the funding requirement for the initial year of the centre's establishment.
16. It is estimated that the proposed IC development support centre will require \$72.6 million in the first year to acquire the platform infrastructure and manpower for the setting up and running of the centre. Of the \$72.6 million required:
- (a) HKSTPC has secured sponsorship of \$11.3 million from industry;
  - (b) the centre is expected to generate a modest income of about \$3.4 million through fee-charging shared use of equipment during the one-year period; and
  - (c) the net amount requested from ITF is therefore \$57.9 million.

Separately, HKSTPC will provide the necessary technical support and services, including some training services and continual maintenance of the hardware of the centre after the initial year of establishment, as well as the staff cost required for running the centre in subsequent years. The HKSTPC will bear the recurrent running cost of the centre and contribute about \$57.9 million in the

first three years. It expects that the centre would run on self-financing basis starting from the fourth year, largely relying on fees charged through shared use of equipment and services to be provided to offset the running cost.

### **Way Forward**

17. Since the amount of funds requested from the ITF exceeds \$15 million, we will need the Finance Committee's approval as this is above the funding ceiling for Category D projects in the public works programme (currently \$15 million). Subject to Members' comments, we will seek the approval of the Finance Committee in June 2003.

**Commerce, Industry and Technology Bureau  
May 2003**

## **HKSTPC's proposal on IC development support centre**

### **HKSTPC's Proposal**

#### **1. Project Title**

Establishment of Hong Kong Integrated Circuits (IC) Development Support Centre

#### **2. Abstract**

This project aims to establish an integrated-circuits (IC) development support centre, which will be located at the Hong Kong Science Park. It will provide one-stop service to companies engaged in IC development - one of the most important technological foundations of a high value-added electronics industry. The centre will support the IC product development cycle by Hong Kong-based IC companies on an end-to-end basis with quality infrastructure and shared support services, which will in turn support the electronics end-product manufacturers in Hong Kong and attract international IC design firms to Hong Kong.

#### **3. Objectives**

The local electronics industry is facing a barrier in entering the high value-added market because the local capability of developing IC components still has room for further upgrading.

Today most of the Hong Kong electronic manufacturers outsource their critical IC components to overseas suppliers. In many cases, the intellectual property of these critical IC components is controlled by those who supply these IC components.

The main objectives of this project are to establish an IC development support centre to be shared among Hong Kong-based IC companies, and to enable the growth of an IC design and development industry in Hong Kong. With the quality infrastructure, IC development cycle time and cost will be greatly reduced and be able to supply these critical IC components to electronics manufacturers in Hong Kong and Pearl River Delta. In addition, the start-up capital requirements of an IC design company will be reduced substantially.

#### **4. Deliverables**

The IC Development Support Centre will include –

- *Probe and Test Development services*, which will be equipped with advanced automated test equipment, wafer preparation tools, RF equipment for shared use;

- *Reliability Testing services*, which will be equipped with IC life and environment test equipment for shared use;
- *IC Product Analysis services*, which will be equipped with advanced measurement and analysis equipment to support mixed signal/RF/analog IC development with upgrade capability to support 0.13µm/submicron IC evaluation and circuit editing; and
- *Multi-Project Wafer Shuttle Service*, which will allow up to 16 different vendors to pool their designs in one mask set and hence reduce wafer foundry costs.

## 5. Budget (1 September 2003 to 31 August 2004)

		<b>Total</b>
<b>5.1</b>	<b>Expenditure</b>	
	<u>Manpower</u> (including 1 Centre Manager, 6 Test Engineers, 8 Lab Technicians and 1 Administrator)	\$6,144,000
	<u>Equipment</u> Probe and Test Development Reliability Testing IC Product Analysis	\$55,371,000 (27,476,000) (8,482,000) (19,413,000)
	<u>Other Direct Costs</u> (including hardware leasing, consumable parts and marketing expenses)	\$11,119,000
	<b>Sub-total</b>	<u>\$72,634,000</u>
<b>5.2</b>	<b>Amount of Sponsorship</b>	
	<b>Sub-total</b>	<u>\$11,335,000</u>
<b>5.3</b>	<b>Net Amount Requested from the Innovation and Technology Fund</b>	

<b>Total Expenditure</b>	<b>Total Sponsorship</b>	<b>Total Income</b>	<b>Net Requested Amount</b>
\$72,634,000	\$11,335,000	\$3,440,000	\$57,859,000