

**REQUEST BY SINGAPORE TELECOMMUNICATIONS LIMITED FOR  
EXEMPTION FROM DOMINANT LICENSEE OBLIGATIONS WITH RESPECT  
TO THE INTERNATIONAL CAPACITY SERVICES MARKET PURSUANT TO  
SECTION 2.6.1 OF THE CODE OF PRACTICE FOR COMPETITION IN THE  
PROVISION OF TELECOMMUNICATIONS SERVICES**

**1. INTRODUCTION**

1.1 Singapore Telecommunications Limited (“SingTel”) hereby submits its request to the Info-communications Development Authority of Singapore (“IDA”) to grant an exemption to SingTel pursuant to section 2.6.1 of the Code of Practice For Competition in the Provision of Telecommunication Services (the “Code”) from Dominant Licensee obligations as set out in the Code with respect to the International Capacity Services (“ICS”) market.

1.2 The ICS provided by SingTel, which this request for exemption relates to, includes but is not limited to the following SingTel international capacity services:

- (i) International Private Leased Circuits;
- (ii) International Frame Relay;
- (iii) International ATM;
- (iv) International IP VPN;
- (v) Domestic Backhaul;
- (vi) Satellite TV Uplink/Downlink;
- (vii) Very Small Aperture Terminal (VSAT) Service;
- (viii) Digital Video Broadcast (DVB) IP;
- (ix) Leased Satellite Bandwidth;
- (x) IP Transit service.

1.3 With respect to ICS, SingTel requests the IDA to grant exemption from its current Dominant Licensee obligations including the following provisions of the Code (without limitation):

- (i) Section 3.3.1 - Duty to provide service on demand
- (ii) Section 3.3.2 - Duty to provide service at just and reasonable prices, terms and conditions
- (iii) Section 3.3.3 - Duty to provide service on a non-discriminatory basis
- (iv) Section 3.3.4 - Duty to file and provide service pursuant to tariffs
- (v) Section 3.3.5 - Duty to provide unbundled telecommunications services

- (vi) Section 5.8.1 - Duty to Allow Resale of End User Telecommunication Services
- (vii) Section 5.8.2 - Duty to Allow Sales Agency
- (viii) Section 5.8.3 - Duty to Tariff and Make Wholesale Telecommunication Services Generally Available
- (ix) Section 7.2.1 - Pricing Abuses, including subsections 7.2.1.1 to 7.2.1.3
- (x) Section 7.2.2 – Other Abuses, including subsections 7.2.2.1 to 7.2.2.2

1.4 SingTel submits that the criteria under section 2.6.1 of the Code for the IDA to grant an exemption from the Dominant Licensee obligations applicable to the ICS market are satisfied, namely:

- that the continued application of the Dominant Licensee obligations are not necessary to protect end users; and
- the continued application is not necessary to preserve effective competition amongst Licensees,

as supported by the verifiable data contained in this submission.

1.5 Full contestability in the ICS market means that end users and operators enjoy, and will continue to benefit from, significant and sustained price reductions. Furthermore, low barriers to entry for new operators means that there is a broad range of choice of technologies and service providers for ICS.

1.6 Both the characteristics of the market structure and the market outcomes demonstrate that competition is operating effectively for ICS. There is also every indication that competition is well-entrenched.

1.7 Accordingly, these factors satisfy the threshold to be applied by the IDA in determining whether or not to grant this exemption in respect of SingTel's participation in the ICS market.

1.8 SingTel therefore submits that the ICS market in Singapore is vigorously competitive and accordingly SingTel should be granted an exemption from the Dominant Licensee obligations under the Code with respect to the ICS market.

## 2. EXECUTIVE SUMMARY

2.1 The highly competitive ICS market currently includes the following SingTel services:

- (i) International Private Leased Circuits;
- (ii) International Frame Relay;
- (iii) International ATM;
- (iv) International IP VPN;
- (v) Domestic Backhaul;
- (vi) Satellite TV Uplink/Downlink;
- (vii) Very Small Aperture Terminal (VSAT) service;
- (viii) Digital Video Broadcast (DVB) IP;
- (ix) Leased Satellite Bandwidth;
- (x) IP Transit service.

The SingTel product names of the ICS above are listed in **Annex 1**.

2.2 Most regulators conclude that market forces should be relied upon unless there is a market failure. Market evidence would indicate that there is no market failure in the ICS market. The Singapore ICS market is vigorously competitive and the continued imposition of Dominant Licensee regulation is unnecessary and unwarranted. Some indicators of the high degree of competitiveness of the ICS market are:

- Substantial submarine cable capacity and connectivity landing in Singapore;
- Substantial submarine cable capacity in Asia;
- Multiple competitors providing ICS services;
- Many alternative technologies including satellite delivery, managed services and IP connectivity;
- No or low entry barriers to the ICS market;
- Global and regional competitors;
- Substantial ICS price declines;

- Tariff and product diversity;
  - Access to co-location at SingTel submarine cable landing stations and satellite earth stations;
  - Access to connection services at SingTel submarine cable landing stations and satellite earth stations;
  - Availability of wholesale services to and from FBOs and SBOs.
- 2.3 Competition in ICS is prevalent on a pan-Asian scale. Many regional and global operators have rights in submarine capable capacity and provide ICS in the region, including Reach, Ascent Media, Cable & Wireless, AT&T, Sprint, MCI, Equant, T-Systems, Verizon and many others. This reflects Singapore's status as a key hub and the explosive growth in international capacity which is driving ICS competition.
- 2.4 Furthermore, SingTel competes on a regional basis when providing wholesale international capacity services because Singapore is competing as a hub. In addition, with respect to international capacity services such as International Frame Relay, International ATM, International IP VPN, Leased Satellite Bandwidth and IP Transit services, SingTel competes both regionally and globally. Regional and global players include Reach, Asia Netcom, MCI, Sprint, AT&T, BT and Equant etc.
- 2.5 In terms of IP Transit services, liberalisation commenced before 2000 and there are now some twenty-three (23) providers of internet exchange services including UUNET, Cable & Wireless, Equant, Reach and Verizon.
- 2.6 Similarly, liberalisation of satellite services commenced well before 2000. There are many FBOs/SBOs offering international capacity for data, voice, IP, video, etc. via satellite including NewSkies, Echostar, Intelsat, Loral Skynet, NTL, ST Teleport, Ascent Media (formally Asia Broadcast Centre). In addition, broadcasting companies such as Mediacorp, ESPN Star and Walt Disney hold licenses enabling the receipt and distribution of their content using international satellite capacity.

- 2.7 ICS are typically provided to corporate and government end users. The corporate and government end user segment is particularly characterised by a large number of multi-national corporations that enjoy countervailing market power. The lucrative nature of the corporate and government end user segment has led to a proliferation of ICS operators competing for opportunities with this segment targeted by competing operators for two main reasons: their overall telecommunications spend is higher and, given the nature of multi-national end users in Singapore, the capture of an account means an opportunity for further regional telecommunications expenditure. Operator entry into the ICS market has therefore been extremely high. SingTel directly competes against a multitude of other FBOs including StarHub, MCI, Reach, AT&T and Cable & Wireless etc.
- 2.8 The continuation of Dominant Licensee obligations on SingTel in relation to the ICS market is inconsistent with the objectives of the Code. Further, continued imposition of Dominant Licensee obligations on SingTel in relation to the ICS market is inconsistent with market evidence of the level of competitiveness in the ICS market. There is no evidence of any market failure in the ICS market.
- 2.9 The ICS market in Singapore is highly competitive. The continued application of Dominant Licensee status to SingTel for ICS is not necessary to protect end users or to preserve competition among licensees.
- 2.10 In the event that the IDA takes the view that not all of the abovementioned services form part of the ICS market and adopts a narrower market definition (which we disagree), SingTel submits that the market evidence clearly shows that even in these narrower markets, services are competitive.

### **3. REGULATORY FRAMEWORK FOR THE REVIEW**

- 3.1 It is an established principle that regulation is only appropriate as a surrogate for competition in the absence of competition. That is, regulation purports to achieve the outcome that – in theory – would be achieved by market forces alone if the market were subject to competitive pressures. It necessarily follows, then, that if a market demonstrates effective competition, there is no need to regulate.
- 3.2 The Code specifically provides that regulation will be applied proportionally and only to the extent required to fulfil its objects. Specifically:

- *“Market forces are generally far more effective than regulation in promoting consumer welfare. Competitive markets are most likely to provide consumers with a wide choice of services at reasonable prices.”<sup>1</sup>; and*
- *that regulatory requirements will be, “...carefully crafted to achieve clearly articulated results” and will be “...no broader than necessary to achieve IDA’s stated goals”<sup>2</sup>.*

3.3 Furthermore, in section 2.1.2 of the Code, the IDA indicates that it will:

- *“impose minimum regulatory ‘rules of the road’” on Licensees subject to competitive market forces; and*
- *under section 2.6, recognise that with respect to the special requirements imposed on Dominant Licensees, “as competition develops it may no longer be necessary to apply each of these requirements to every facility operated and/or service provided by the Dominant Licensee.”*

3.4 Various sections of the Code provide for reviews by the IDA to ensure that regulation keeps pace with the state of the market. Under section 1.6 of the Code, the IDA reserves the right to grant exemptions from specific provisions of the Code. Under section 2.5.1 of the Code, a Licensee may be reclassified and under section 2.6, a Dominant Licensee may request exemptions from the special requirements applicable to such licensees.

3.5 The criteria required to be demonstrated by SingTel in requesting this exemption is set out in section 2.6.1 of the Code, namely that the exemption sought will not result in detriment to end users, nor will it negatively impact on the promotion and preservation of effective competition amongst Licensees. These factors are similarly reflected in the application of competition tests to dominance under the regulatory schemes of other jurisdictions.

3.6 In its recent assessment of the non-dominance position of Reach in the external circuit market, OFTA applied its test for dominance<sup>3</sup> in the relevant market by analysing a series of issues including:

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<sup>1</sup> Section 1.5.1

<sup>2</sup> Section 1.5.3

<sup>3</sup> Established in its *Guidelines to Assist the Interpretation and Application of the Competition Provisions of the Fixed Telecommunications Network Services (FTNS) Licence*, June 1995.

- market concentration and the availability of alternative suppliers;
- the barriers to enter into the market; and
- the pricing of services over time.<sup>4</sup>

3.7 SingTel submits that these tests are broadly consistent with the criteria set out in section 2.6.1 of the Code. That section requires an analysis of the characteristics of the ICS market and whether it has given rise to competitive outcomes.

3.8 Applying the above regulatory objects and criteria in the Code to the evidence detailed in this submission, the goals of liberalisation have been clearly achieved in respect of ICS. As such, the rationale for the Dominant Licensee obligations presently applicable to SingTel in respect of the ICS market has ceased to apply. Within this context, this submission:

- sets out the definition of the ICS market; and
- examines the level of competition within that market.

#### 4. MARKET DEFINITION

4.1 Market definition is important for two reasons:

- it establishes the boundaries of the requested exemption; and
- it forms the basis of the examination of the current and likely state of competition for international capacity services.

4.2 As noted in the IDA's draft Consolidation Guidelines, market definition has two principal dimensions; product and geography:

##### ***“6.2.1.1.1 Product Markets***

*The relevant product market for a specific service provided by a Licensee consists of both the specific services provided by the Licensee and any additional services that buyers regard as interchangeable with, or substitutes for, the Licensee's service. To determine which services are in the same product market as the Licensee's service, IDA will consider all relevant evidence. This may include determining which other services have a similar function, characteristics or potential customer base as the Licensee's service. IDA also may consider which others services buyers would switch to if the price of the Licensees' service increased by a small but significant, non-transitory amount.*

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<sup>4</sup> *Application by Reach Limited for Declaration of Non-Dominance in the market for External Bandwidth Services*, Statement of the Telecommunications Authority Hong Kong, 15 March 2002.

### **6.2.1.1.2 Geographic Markets**

*The relevant geographic market for a specific service provided by a Licensee consists of the geographic area in which the Licensee (and other entities that provide substitutable services) provides service and any additional geographic locations from which buyers would obtain those services if prices increased by a small but significant, non-transitory amount. To determine which locations are in the same geographic market as the Licensee's service, IDA will consider all relevant evidence. In general, the relevant market will consist of all locations with Singapore.”<sup>5</sup>*

4.3 SingTel submits that the market for ICS includes the following products:

- (i) International Private Leased Circuits;
- (ii) International Frame Relay;
- (iii) International ATM;
- (iv) International IP VPN;
- (v) Domestic Backhaul;
- (vi) Satellite TV Uplink/Downlink;
- (vii) Very Small Aperture Terminal (VSAT) service;
- (viii) Digital Video Broadcast (DVB) IP;
- (ix) Leased Satellite Bandwidth;
- (x) IP Transit service.

4.4 When investigating market definition, it is important to recognise the central principle of technological neutrality as required by the Code:

*“IDA’s regulatory requirements will reflect the phenomenon of convergence, which is eroding historic differences among platforms such as wireline, cable, wireless and satellite. Regulatory requirements will be based on sound economic principles and, to the extent feasible, will be technology-neutral.”<sup>6</sup>*

4.5 International Private Leased Circuits (“IPLCs”) are used for delivery of voice and data services. These leased lines are provided by FBOs or SBOs (Individual) over either submarine cable networks or satellite networks. The demand for these services comes from corporate end users who use such services for their own intra-corporate international voice and data, from FBOs and SBOs who acquire ICS for the purpose of resale or as inputs for their own services such as IPLC,

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<sup>5</sup> IDA, Proposed Consolidation Review Guidelines, October 2001

<sup>6</sup> Code at paragraph 1.5.4



International IP VPN, International Frame Relay, International ATM and other managed services and IP connectivity.

- 4.6 IPLCs also compete with IRU capacity and hence IRU capacity should be considered to be part of the same product market. FBOs are able to acquire IRU capacity on submarine cable systems which have landed in Singapore including (without limitation) APCN, APCN2, C2C, SEA-ME-WE 3. SingTel does not have any actual or effective control over any of these consortia cable systems. Asia Netcom also offers IRU on its EAC submarine cable system. In addition, under the IDA Interconnection and Access Framework, FBOs are able to obtain access to co-location space in SingTel's submarine cable landing stations and obtain connection services as Interconnect Related Services ("IRS") under the SingTel Reference Interconnection Offer ("RIO"). This enables FBOs who acquire IRU capacity in APCN, APCN2, C2C and SEA-ME-WE 3 to co-locate at the relevant SingTel submarine cable landing station and acquire a connection service to access their IRU capacity on the relevant cable system. By way of example, StarHub has acquired IRU capacity on various cable systems, acquired co-location at each and all of SingTel's submarine cable landing stations and obtained connection to their IRU capacity to offer ICS. Further, StarHub states that their IPLC coverage reaches major business centres around the world, including Australia, Brunei, Cambodia, China, Germany, Hong Kong, India, Indonesia, Japan, Korea, Malaysia, Philippines, Sri Lanka, Taiwan, Thailand, South Korea, United Kingdom, United States and Vietnam and can offer cable diversity via major cable networks including APCN, APCN2, EAC, FLAG, SEA-ME-WE 3 and other cable systems<sup>7</sup>.
- 4.7 The prices of IPLCs are constrained by the availability of IRU capacity (and suppliers of IPLCs are also able to supply IRUs). As stated by OFTA in Hong Kong in relation to the Reach's non-dominance application:

*"The prices of IPLCs are likely to be restrained by prices of IRUs. From the supply substitutability point of view, suppliers of IRUs can also supply IPLCs. Service providers with IRUs can also make use of the capacity under the IRUs to supply IPLCs. Thus longer or shorter term of leases of external capacity should be in the same product market."<sup>8</sup>*

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<sup>7</sup> [www.starhub.com.sg](http://www.starhub.com.sg)

<sup>8</sup> OFTA, Application by Reach Limited for Declaration of Non-Dominance in the market for External Bandwidth Services, Statement of the Telecommunications Authority, 15 March 2002 at page 12

4.8 The next issue is that of backhaul services. SingTel submits that an element of the ICS market is backhaul. Backhaul provides FBOs with capacity on the terrestrial fibre optic cables from submarine cable landing stations to metropolitan areas. With respect to SingTel, backhaul connects SingTel's submarine cable landing stations for designated cable systems to SingTel's Global Network Connection Centre. In addition, a point-to-point backhaul service is available which connects SingTel's submarine cable landing stations for designated cable systems to the FBOs point-of-presence within Singapore.

4.9 Backhaul should be considered as part of the ICS market because backhaul is bundled or clustered with international capacity. It is efficient to provide both international capacity and backhaul in a bundle and hence it is supplied in this manner. Again, OFTA concluded in respect of the Reach non-dominance application that (although local connectivity should not be bundled with international capacity) with respect to backhaul:

*“An element of the external circuits is the ‘backhaul’. Backhaul refers to the circuits (usually high-capacity fibres) connecting the point of landing of the external circuits (which may be a cable landing station, a satellite earth station or a terrestrial radio link station) to a point of interconnection with a local network (usually the external operator’s ‘external gateway’ or ‘Point-of-Presence’)”<sup>9</sup>.*

4.10 OFTA found that the provision of backhaul services, as part of the international capacity market was competitive<sup>10</sup>.

4.11 SingTel further submits that satellite capacity is substitutable for cable capacity. SingTel submits that the Code expressly recognises the importance of substitutability between cable and satellite capacity in the statement of technology neutrality in paragraph 1.5.4 of the Code.

4.12 The ACCC in Australia has stated that satellite can provide an acceptable alternative to optical fibre<sup>11</sup>.

4.13 So far as Singapore is concerned, we submit that satellite capacity and submarine cable capacity are substitutable.

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<sup>9</sup> Ibid at page 6

<sup>10</sup> Ibid at page 23

<sup>11</sup> ACCC, Competition in data markets, October 1998, Appendix 7, page 116

4.14 Also, the IDA describes the market as “international bandwidth” in the Code when describing co-location rights as follows:

*“In order to enable Facilities Based Requesting Licensees to access these facilities, Dominant Licensees must offer to provide co-location space at any frontier station, cable landing site, international gateway and the international satellite transmission site for the purposes of accessing and interconnection to international bandwidth<sup>12</sup>”.*

4.15 SingTel therefore submits that satellite and submarine cable capacity are substitutable in Singapore. Hence, SingTel submits that the ICS product market should include satellite capacity because it constrains the price of cable capacity.

4.16 In relation to the substitutability between IPLCs and other managed services, SingTel submits that each is substitutable for the other. That is, IPLCs are inputs for and compete with International Frame Relay, International ATM, International IP VPN and other managed services. Again, this view is consistent with the OFTA position in Hong Kong regarding the Reach non-dominance submission so far as managed network service (which provide dedicated capacity) were held to be substitutable for IPLCs<sup>13</sup>.

4.17 Hence, SingTel submits that the ICS product market should include International Frame Relay, International ATM, International IP VPN and other managed services because they constrain the price of IPLCs in Singapore.

4.18 SingTel also submits that internet connectivity is substitutable for IPLCs and/or satellite services. The important point is that bandwidth is acquired in a number of ways and in recent years there has been the emergence of IP exchanges which exchange bandwidth minutes around the world (e.g. Band-X and Arbinet). SingTel is competing with these IP bandwidth exchanges when supplying IPLCs, satellite services and the managed services described above.

4.19 Speedcast Broadband is another example, offering a suite of service plans to meet the varied broadband Internet connectivity requirement of end users throughout Asia via a combination of cable and satellite solutions. Based on Speedcast Broadband’s extensive satellite IP platform, the two-way service allows for

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<sup>12</sup> Telecom Competition Code, Appendix Two, paragraph 7.3.2

<sup>13</sup> OFTA, Application by Reach Limited for Declaration of Non-Dominance in the market for External Bandwidth Services, Statement of the Telecommunications Authority, 15 March 2002 at page 12

delivery of Internet traffic with different bandwidth to serve diverse network sizes and usage profiles<sup>14</sup>.

- 4.20 As noted above, in the IDA's draft Consolidation Guidelines, market definition has only two principal dimensions; product and geography. With respect to ICS, the product dimension may have two levels - a retail functional level and a wholesale functional level. At the retail functional level, competing ICS operators such as StarHub, Cable & Wireless, AT&T, MCI/UUNET, Reach, Asia Netcom, Equant and Sprint provide a wide variety of ICS to end users such as IPLCs, International Frame Relay, International ATM, International IP VPN, IP Transit and satellite service. At the wholesale functional level, competing ICS operators provide services such as IRU, IRS, backhaul etc.
- 4.21 Furthermore, SingTel competes on a regional basis when providing ICS because Singapore is competing as a hub. In addition, with respect to international capacity services such as International Frame Relay, International ATM, International IP VPN, Leased Satellite Bandwidth and IP Transit services SingTel competes both regionally and globally. By way of example, global operators competing in the ICS market include MCI/UUNET, Sprint, AT&T, and Equant along with regional competitors including Reach and Asia Netcom.
- 4.22 Therefore, the product dimension of the market could be considered in terms of the two functional levels. At both levels there are many different and competing service offerings, including in Singapore and internationally.
- 4.23 Finally, in relation to the geographic market, ICS providers are competing on a pan-Asian scale. Singapore is vying with other countries and other international operators to be the hub of Asian capacity. In doing so, many foreign operators have rights in submarine cable capacity and provide ICS in the Asia-Pacific region including operators such as Cable & Wireless, AT&T, MCI, Reach, Asia Netcom, Equant, Sprint, T-Systems and many others.
- 4.24 SingTel submits that the geographic dimension is a regional or global ICS market or that of all international capacity services to and from Singapore but not on a route-by-route basis.

- 4.25 OFTA reached the conclusion in Hong Kong that there were not route-by-route markets for international capacity, however, SingTel does not agree with their conclusion that the geographic dimension is not a regional or global ICS market:

*“The TA considers that, for external bandwidth services, with ample capacity to hubs outside Hong Kong, circuits routed through these hubs would provide close supply-side substitutes for customers seeking particular routes of paired origin-termination. Thus the TA considers that the geographic market for external bandwidth services should not be on a ‘route-by-route’ basis.<sup>15</sup>”*

- 4.26 For these reasons, SingTel submits that the appropriate product market for which the exemption should be granted is in respect of all ICS available. Retail and wholesale functional levels may also exist in the product dimension of the ICS market, where there are many product offerings from competing providers both in Singapore and outside Singapore. The geographic dimension is a regional or global ICS market or that of all ICS to and from Singapore.
- 4.27 In the event that the IDA takes the view that not all of the abovementioned services form part of the ICS market and adopts a narrower market definition (which we disagree), SingTel submits that the market evidence clearly shows that even in these narrower markets, services are competitive.

## **5. COMPETITIVENESS OF THE INTERNATIONAL CAPACITY SERVICES MARKET**

### **Introduction**

- 5.1 SingTel submits that the ICS market is highly competitive. Mr David T E Lim, Acting Minister For Information Communications & The Arts stated the following in 2002:

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<sup>15</sup> OFTA, Application by Reach Limited for Declaration of Non-Dominance in the market for External Bandwidth Services, Statement of the Telecommunications Authority, 15 March 2002 at page 15

*“Over the past two years, telecommunications bandwidth had exploded by 400 times, rising to 20 terabits of high speed submarine cable bandwidth to more than 30 countries today. Liberalisation has also brought telecommunication costs down sharply for consumers and business.”<sup>16</sup> (Emphasis Added)*

- 5.2 In November 2002, the IDA released its 4th Infocomm Technology Roadmap Report 2002 wherein the IDA stated:

*“In terms of international connectivity, Singapore has become one of the most connected cities in the world. Singapore has direct internet connections to over 30 countries with more than 90Mbps to each key regional markets, such as Australia, China, Hong Kong, India, Japan, South Korea and Taiwan, making us one of the most connected business capitals around.*

*Singapore has an extensive submarine cable network comprising of pan-Asian cables like APCN2, C2C, EAC2, and i2i, among others. Singapore’s total cable capacity is over 21Tbps.*

*Singapore has around 20 Internet Data Centres (IDCs) in operation. Content and service providers can choose from a wide range of competitively priced services. Some of the leading IDCs have regional and international points of presence and use Singapore as a gateway to the region. NTT Communications, for example, launched its S\$23.5 million IDC in Singapore in July 2001. The centre is an integral part of NTT’s global IDC network.<sup>17</sup>”*

- 5.3 We support the above statements and observations regarding the explosive growth in international capacity, Singapore’s international connectivity, the extensiveness of the submarine cable network and the wide range of competitively priced services available to content and service providers. SingTel submits that the continued imposition of Dominant Licensee obligations on SingTel is no longer justified or warranted. Accordingly, the IDA should determine that the ICS market is competitive and exempt SingTel from the application of the Dominant Licensee obligations under the Code with respect to the ICS market.

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<sup>16</sup> Keynote address by Mr David T E Lim, Acting Minister for Information, Communications & the Arts, World Congress on IT 2002, 1 March 2002 (emphasis added).

<sup>17</sup> [www.ida.gov.sg](http://www.ida.gov.sg)

**A. Measures of effective competition: Market structure characteristics**

**No or Low Entry Barriers**

- 5.4 In the ICS market, entry to market, or barriers to entry can be assessed in terms of restrictions to establishing operations in the market. With respect to the ICS market in Singapore, there are no or low barriers to entry for the provision of ICS.
- 5.5 The ICS market is characterised by low or no barriers to entry. Features of the regulatory framework include (without limitation):
- (i) No Foreign Ownership Restrictions  
In January 2000, direct and indirect foreign equity limits for all public telecommunications services licences were lifted.
  - (ii) Clear and Transparent Licensing Framework  
The IDA has established a clear and transparent framework releasing detailed licensing guidelines.
  - (iii) No Limits on the Number of Licensees  
There are no limits on the number of ICS licensees that can be licensed.
- 5.6 In addition, the economic barriers to entry for the ICS market are minimal. The sunk cost nature of investment in the international capacity market does not constitute a barrier to entry. Large multi-national companies are investing in Singapore, as noted by the IDA, and the stimulation of demand by competition in Singapore is evidence of the low nature of this barrier to entry. Further, more competitors have invested in Singapore and in cable capacity despite any potential over-supply of cable capacity. As OFTA noted in Hong Kong, the availability of spare capacity is more likely to result in lower prices to customers than to constitute a barrier to entry<sup>18</sup>.
- 5.7 Furthermore and consistent with the concentration of hubbing at the regional level, low economic barriers to market entry are evident in the commercial supply and acquisition of capacity on a regional basis, where buyers purchase networks rather than specific routes.<sup>19</sup> The commercial realities of the ICS market are that any previous incumbency advantages are negated by competing operators with the

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<sup>18</sup> *Application by Reach Limited for Declaration of Non-Dominance in the market for External Bandwidth Services*, Statement of the Telecommunications Authority Hong Kong, 15 March 2002 at page 20.

<sup>19</sup> Telegeography, *International Bandwidth 2001*, p 14.

capability to target and establish a customer base. This is particularly prevalent in the case of large multi-national customers, where strategic operational measures can be employed to attract and maintain selective high-revenue customers. The commercial environment itself does not impose barriers to entry, but is instead indicative of the high degree of competition in the ICS market where established operators are open to challenge by new entrants on price and service criteria.

- 5.8 The large number of FBOs and SBOs in the ICS market is a clear indicator that there are no or low barriers to entry to the ICS market (see below regarding evidence of new entry).

**Availability of Interconnection and Access:**

- 5.9 The ability of competitors to access bottleneck facilities is relevant to a determination of dominance as specified in the classification of dominance under section 2.5.2.1 of the Code. Hence, the provision of access to bottleneck facilities through requirements imposed under the Code is directly relevant to this exemption application. SingTel provides access to the only remaining alleged bottleneck facilities and hence competition is able, and has been promoted to the full extent necessary.

**Access to Co-location Space at Submarine Cable Landing Stations and Satellite Earth Stations**

- 5.10 FBOs wishing to enter the ICS market can obtain co-location space at SingTel's submarine cable landing stations and satellite earth stations.
- 5.11 Under section 5 of the Code, as a Dominant Licensee, SingTel is required to provide co-location space at the SingTel submarine cable landing stations and satellite earth stations. Schedule 8 of SingTel's Reference Interconnection Offer ("RIO") contains the price and non-price terms and conditions applicable to co-location. The RIO was approved by the IDA on 31 January 2001.
- 5.12 New entry in the ICS market has, and is, facilitated by access to co-location at SingTel's submarine cable landing stations and satellite earth stations under the IDA approved RIO.



**Access to Connection Services at Submarine Cable Landing Stations and Satellite Earth Stations**

- 5.13 FBOs wishing to enter the ICS market and provide ICS services are able to obtain connection services at the SingTel submarine cable landing stations and satellite earth stations to connect to their cable and/or satellite capacity.
- 5.14 New entry in the ICS market has, and is, facilitated by access to connection services at SingTel's submarine cable landing stations and satellite earth stations.

**Availability and Access to Backhaul Services**

- 5.15 With respect to backhaul service, which is one element of international capacity, FBOs may acquire competitive services from a number of alternative providers such as SingTel, StarHub, MCI, France Telecom and Reach.
- 5.16 Further, vigorous competition has produced service innovation where FBOs seeking to acquire backhaul services are able to negotiate customised backhaul services, acquire Point-to-Point backhaul services, obtain service level guarantees, and acquire "no frills" Point-to-Point backhaul services.
- 5.17 As clearly evidenced by the above, the provision of backhaul services in Singapore is highly competitive and does not constitute a bottleneck. It is interesting to note that OFTA reached a similar conclusion in Hong Kong, despite there being a restriction on non-FTNS operators self-providing backhaul until 1 January 2003<sup>20</sup>. Of course, there is no such restriction on the self-provision of backhaul by FBOs in Singapore, hence supporting the point that backhaul is competitively supplied in Singapore.

**Large Number of Competitors**

- 5.18 In the ICS market in Singapore, FBOs may install their own international facilities, co-locate at SingTel submarine cable landing stations and satellite earth stations, and acquire connection services at the SingTel submarine cable landing stations and satellite earth stations to connect to their capacity. Alternatively, FBOs in the ICS market may acquire backhaul services to connect to their international capacity or FBOs and SBOs may acquire international capacity from other FBOs and SBOs to meet their own and their end-users' requirements.

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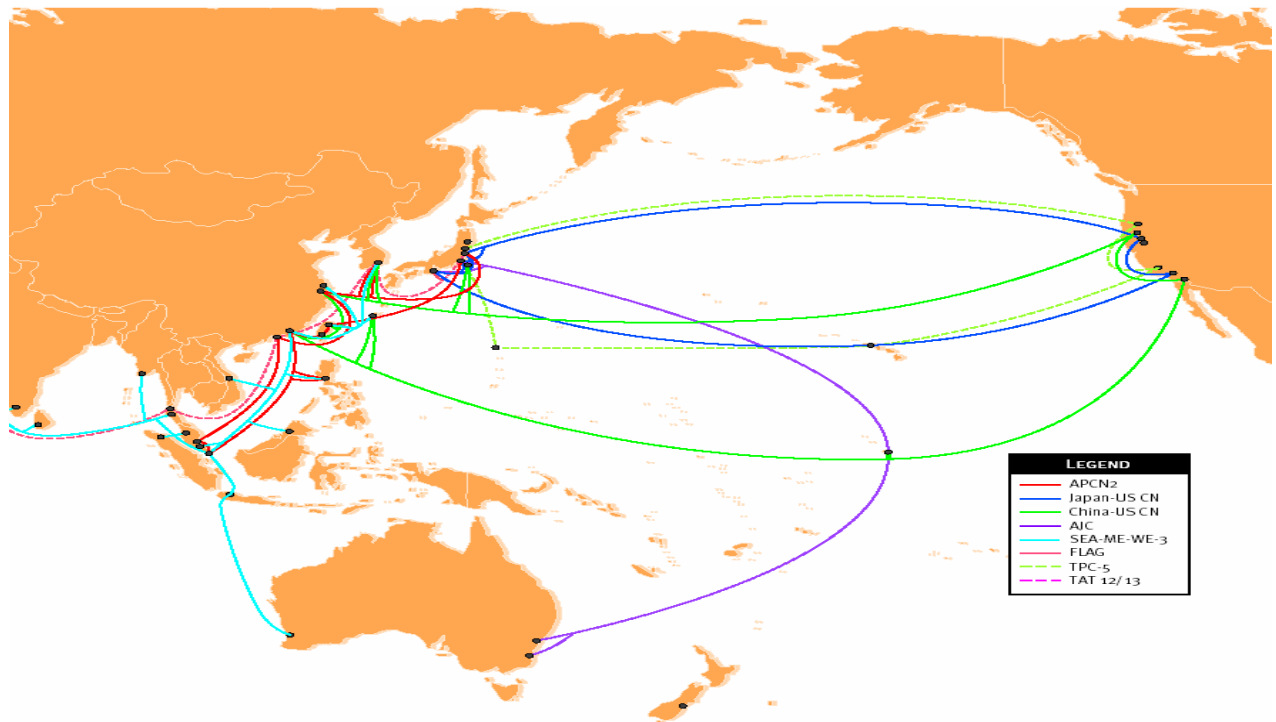
<sup>20</sup> *Application by Reach Limited for Declaration of Non-Dominance in the market for External Bandwidth Services*, Statement of the Telecommunications Authority Hong Kong, 15 March 2002 at page 22.

- 5.19 The ICS market is a highly competitive multi-operator environment. With full liberalisation of the Singapore market in April 2000, there were thirty-two (32) licensed Facilities Based Operators (“FBOs”)<sup>21</sup> as at 1 March 2004. As mentioned above, these FBOs operate in both functional layers of the product market. FBOs such as StarHub, MCI, Asia Netcom, AT&T, Belgacom, C2C, Reach, Cable & Wireless, France Telecom, KDDI and Tyco have entered the ICS market in Singapore. As the IDA has recognised in its 4th Infocomm Technology Roadmap Report 2002, among the operators that have entered the Singapore market are global and regional players such as MCI, Reach, and France Telecom.
- 5.20 By way of example, Cable & Wireless, MCI, AT&T and Sprint, have significant ownership in the Trans-US and European cables and comprehensive domestic infrastructures in respective home markets. The size of their home markets allows these types of global operators to derive significant economies of scale resulting in low cost structures providing a competitive edge over a Singapore operator in pricing their half-end of the international capacity. This in turn enables these types of global operators to provide competitive ICS from Singapore to the United States or Europe for their US and European based customers. The cost savings that they are able to derive due to the size of their home market is many more times greater than the cost savings obtained from the small Singapore market. As a result, this places Singapore operators such as SingTel in a less competitive position when competing for the provision of international capacity on a global basis.
- 5.21 Regional operators such as Asia Netcom own and operate the EAC submarine cable system which connects five major Asian markets: Hong Kong, Taiwan, Korea, Singapore and Philippines, to Japan, where it connects to Asia Netcom’s trans-Pacific IRU capacity on Pacific Crossing terminating on the West Coast of the United States. As previously indicated, the Asia Netcom network has coverage to over 300 cities in 30 countries, providing ICS including IPLCs, International ATM, International Frame Relay, International IP VPN and IP Transit.
- 5.22 Similarly, Reach has extensive cable interests and ownership, with interests in more than 50 submarine cables and international satellite systems globally, nearly 40 of which are located in the Asia-Pacific. Through its cable interests and ownership, Reach offers connectivity to all major markets in the region and offers ICS including IPLCs, International Frame Relay, International ATM, international IP VPN and IP Transit.

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<sup>21</sup> [www.ida.gov.sg](http://www.ida.gov.sg), 1 March 2004

5.23 The submarine cable systems that land in Singapore include (without limitation) APCN, APCN2, SEA-ME-WE 2, SEA-ME-WE 3, C2C, APC, EAC and i2i, aiding the competitive environment. Through these cable systems, operators are able to access large quantities of capacity to regional locations. SingTel then competes with operators in these regional centres (e.g. Hong Kong and Japan) throughout the world in the provision of ICS.<sup>22</sup>



5.24 With respect to International Frame Relay, International ATM and International IP VPN services, there are a number of alternative providers including local, regional and global providers. In addition to IPLCs, StarHub offers end-to-end International Frame Relay and International ATM services. Further, StarHub offers global managed services using frame relay, ATM and IP including:

- Arcstar Global Managed services;
- BT Global Managed Services;
- Savvis Intelligent IP Services;
- AT&T International End-to-End Services.

<sup>22</sup> Fleming, J, *Asia's Backbones*

- 5.25 Operators such as Cable & Wireless, Sprint, MCI, Equant and AT&T offer a suite of services including IP VPN, frame relay and ATM. For example, in addition to offering IPLCs, Sprint established a Singapore node and is offering Sprint Global Frame Relay and Sprint Global ATM amongst other services. Equant offers International Frame Relay in more than 600 locations in nearly 130 countries and International ATM services in more than 50 countries with more than 300 points of presence<sup>23</sup>. Similarly, in addition to IPLCs, MCI offers (amongst other services) International Frame Relay and International ATM services. Cable & Wireless also offers International Frame Relay, International ATM in addition to IPLCs.
- 5.26 In addition to FBOs, a number of SBOs have also entered the ICS market, there are some twenty-three (23) providers of internet exchange services<sup>24</sup> (also known as IP Transit services) including UUNET, Cable & Wireless, Equant, Reach, Sprint, T-Systems and Verizon. Internet exchange service or IP Transit operators increase the competitiveness of the ICS market by enabling ISPs to achieve economies of scale through sharing international capacity and aggregating traffic.
- 5.27 Furthermore, providers such as UUNET and Cable & Wireless through their parent companies are Tier 1 Internet Providers in the US and by virtue of their Tier 1 status are able to obtain preferential interconnection in the US market. In contrast, SingTel is not recognised as a Tier 1 Internet Provider and as a result is required to pay for interconnection to Tier 1 Internet Providers in the US.
- 5.28 The IP Transit market is not limited to the local market. As with all other ICS, Singapore competes with various other hubs like Hong Kong and Japan where regional and global providers such as those listed above compete.
- 5.29 The growth and expansion of Telehouses and Internet Data Centres (“IDCs”) has also increased the competitiveness of the ICS market. As the IDA has recognised in its 4th Infocomm Technology Roadmap Report 2002:

*“Singapore has around 20 Internet Data Centers (IDCs) in operation. Content and service providers can choose from a wide range of competitively priced services. Some of the leading IDCs have regional and international points of presence and use Singapore as a gateway to the region.”<sup>25</sup>*

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<sup>23</sup> [www.equant.com](http://www.equant.com)

<sup>24</sup> [www.ida.gov.sg](http://www.ida.gov.sg), 1 March 2004

<sup>25</sup> [www.ida.gov.sg](http://www.ida.gov.sg)

- 5.30 The providers of Telehouses and IDC's include both local and global operators including operators such as NTT and MCI. Like Internet exchange service operators, IDCs and Telehouses increase the competitiveness of the ICS market by enabling their occupants to achieve economies of scale through sharing international capacity and aggregating traffic.
- 5.31 In addition, a number of capacity trading companies have been established, such as Band-X, RateXchange and Arbinet, and capacity is bought and sold at such capacity trading companies.
- 5.32 With respect to the provision of international capacity via satellite, there are many FBOs/SBOs offering international capacity for data, voice, IP, video etc. via satellite including NewSkies, Echostar, Intelsat, Loral Skynet, NTL, ST Teleport, Ascent Media (formally Asia Broadcast Centre). A summary of parties competing in the provision of international capacity via satellite is provided in **Annex 2**. It is notable that many of these are global and regional players in the market for international capacity via satellite and supply services to customers in Singapore and in the region.
- 5.33 In Singapore, there are a number of available satellite systems from which any interested operator can acquire transponder capacity. A list of such satellite systems is provided in **Annex 3**. We would note that there are at least ten (10) such satellite systems, all of which sell capacity to any global or regional satellite service provider. In turn, any customer can acquire transponder capacity from any global or regional satellite service provider.
- 5.34 In addition, broadcasting companies such as Mediacorp, ESPN Star and Walt Disney hold licenses enabling the receipt and distribution of their content using international satellite capacity.
- 5.35 By way of example, ST Teleport is a full service satellite communications solution provider that provides services to the broadcasting and telecommunications markets. ST Teleport offers satellite communications and value-added services including satellite TV uplink/downlink, international gateway, regional VSAT, IP Multicast and broadcast services.
- 5.36 The large number of FBOs and SBOs competing in the ICS market is an indicator of the vigorous competition in the ICS market. We enclose a non-exhaustive list of the participants in the ICS market in **Annex 4**.

## **B. Measures of effective competition: Market outcomes**

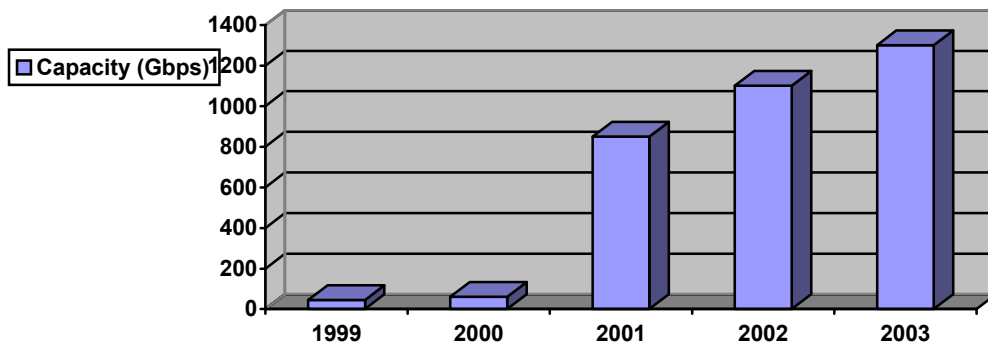
### **Substantial Submarine Cable Capacity And Connectivity In Singapore**

- 5.37 As indicated in the above statements by the IDA, Singapore has an extensive submarine cable network comprising of pan-Asian cables such as APCN, APCN2, SMW-3, C2C, EAC, and i2i, among others. Singapore's total cable capacity is over 21Tbps.
- 5.38 In January 2002, C2C completed the southern ring connecting Singapore to major cities in Asia. The network consists of two intra-Asian rings connecting Japan, South Korea, Taiwan, Hong Kong, the Philippines, Singapore and China and also provides capacity between Japan and the United States. The C2C cable network has a design capacity of 7.68 Terabits per second. Unlike traditional submarine cable systems in Asia that provide shore-to-shore connectivity, C2C works with local operators in the various markets to provide a one-stop-shop for city-to-city (C2C) connectivity. This means that C2C customers can purchase capacity on direct links to the various major business centres in Asia and the United States from C2C and its landing parties. Capacity on the C2C network is available on a wholesale basis to other carriers that have a need to carry traffic to, from and within the Asian region and onwards to North America.
- 5.39 Another recently landed cable is the EAC cable which connects five major Asian markets: Hong Kong, Taiwan, Korea, Singapore and Philippines, to Japan, where it connects to Asia Netcom's trans-Pacific IRU capacity on Pacific Crossing terminating on the West Coast of the United States. In addition, in combination with the Global Crossing Network, EAC provides access to more than 300 cities in 30 countries.
- 5.40 The large number of submarine cables in Singapore is an indicator of the intense competition in the ICS market which followed full liberalisation in April 2000.

### **Substantial Submarine Cable Capacity In Asia**

- 5.41 In addition to the growth in capacity in Singapore, throughout Asia substantial investments in submarine cables capacity were made in anticipation of significant growth capacity intensive applications.
- 5.42 Some examples include submarine cables such as PC-1, JUCN, EAC, Tiger, Flag Pacific and TGNS. The new submarine cables are capable of providing capacity in magnitude of terabits. The graph illustrates the capacity build-up in the past few

years (source: Telegeography). It was reported that these new cables have led to an unprecedented growth in intra-Asian capacity.



- 5.43 The exponential growth in submarine cables in Asia is an indicator of the intense competition in the ICS market. Singapore operators competing in the ICS market also compete with other operators in the region who have capacity on the various submarine cables which have landed throughout Asia. By way of example, a Singapore operator must compete with operators in other Asian info-communications hubs. A multi-national corporation can readily obtain the necessary connectivity and capacity either from Singapore, Hong Kong, Taiwan, India, Australia etc. A multi-national could for example connect from Singapore to Hong Kong and then from Hong Kong connect to other cities and countries via operators and submarine cables in Hong Kong.

#### **Substantial ICS Price Declines**

- 5.44 ICS price trends are indicative of vigorous competition in the ICS market and the substantial capacity available.
- 5.45 Whilst it is difficult to quantify in absolute terms the average price reduction since April 2000, we support the IDA's public statements above and the recent statement by Mr Lam Chuan Leong, Chairman:

*"Prices of services have dropped significantly as in the case of IDD rates (by up to 80%), international leased circuits rates (by up to 65%) and local leased circuits (by up to 35%)."*<sup>26</sup> (Emphasis Added)

<sup>26</sup>

Speech by Mr Lam Chuan Leong, IDA Chairman, E-Symposium, 4 September 2002.

- 5.46 New market entry and the increase in capacity have meant that FBOs and SBOs in the ICS market compete primarily on price. In analyses done by Gartner, it has been highlighted that price competition is severe.<sup>27</sup>.
- 5.47 Larger operators are constrained by the price competition established by the smaller operators (and vice versa) and, because barriers to entry are low, the threat of further competition from new entrants is very real and inevitable.
- 5.48 ICS are typically provided to corporate and government end users. The corporate and government end user segment is particularly characterised by a large number of multi-national corporations that enjoy countervailing market power. Corporate and government end users are extremely sophisticated and knowledgeable about telecommunications services. Further, large corporations typically manage all telecommunications services as an in-house account, or a regional account in the case of multi-national corporations. Their countervailing market power can be seen in the extent to which corporate and government end users are performance-focused and price-driven. ICS operators must compete for their initial clientele and deliver continuous excellence in service to retain their accounts. Rivalry is high and ICS operators constantly look for opportunities to win or win back corporate and government end users.
- 5.49 In today's ICS market, end users are also calling for tenders when reviewing their international capacity requirements. With tenders, end users specify the terms of the proposal which may include not simply price but also cable systems, cable routes, latency measures, network availability etc. End users are well informed and are able to select the FBO or SBO that best meets their requirements. It is also noticeable that often the end users will select more than one FBO/SBO.
- 5.50 In addition, end users are no longer as prepared to enter into long term contracts for services as they were previously prepared to as they anticipate continued price declines as a result of intense competition and the growth in international capacity.
- 5.51 As a regional hub, many multi-national corporations acquire their international capacity from global operators rather than from the respective in-country operators for reasons such as continuity, larger bulk discount prices and familiarity.

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<sup>27</sup> Gartner, *Asia/Pacific IP Backbone Opportunities*, Focus Report 2002 & Focus Report 2003



- 5.52 The significant declines in ICS prices are clear indicators of the intense competition in the ICS market which followed full liberalisation in April 2000. Furthermore, the shorter-term nature of the contracts means that barriers to entry remain low.

#### **Competitive prices under IDA Price Control Framework**

- 5.53 Under the IDA price control framework, SingTel is required to comply with benchmark prices set to ensure that IPLC services remain internationally competitive vis-à-vis other major financial centres, newly-industrialised economies and neighbouring countries.
- 5.54 SingTel's IPLC prices are thus subject to pair-wise comparisons where they are to be equal or less than the prices for similar circuits in Jakarta, Kuala Lumpur, Manila, Bangkok, China, New Delhi, Hanoi, Hong Kong, Tokyo, Sydney, Taipei, Seoul, New York and London.

#### **No Barriers to Switching Suppliers and/or Products**

- 5.55 There are few if any barriers to switching suppliers in the ICS market. There are multiple cable systems landing in Singapore. Shorter term contracts also make switching between suppliers less costly.
- 5.56 Furthermore, with the emergence of bandwidth trading hubs, the international bandwidth market is highly commoditised and bandwidth is available at competitive prices.

#### **Tariff and Product Diversity**

- 5.57 With the entry of a large number of FBOs and SBOs in the ICS market and the substantial growth in international capacity, there is a wide variety of ICS tariffs which is further evidence of a vigorously competitive ICS market.
- 5.58 Further, corporate and government end users commonly require packaged or customised telecommunications services. Corporate and government end users demand packages which are tailored to their individual needs and requirements. This includes flexible and innovative solutions which can develop in conjunction with their growth. Consequently, often a standard service offering is not appropriate for corporate and government end users. This is reflected in the way operators compete for corporate and government end users such as through a tender process, responses to requests for proposals or bids.

- 5.59 Aggressive competition has brought forth non-price features in the ICS market. For example, there is diversity with respect to network management, billing and invoicing, SLAs, architecture, security, QoS, diversity etc etc. In the ICS market there is growing trend for short-term contracts (i.e. 1-2 years). Customers are also beginning to request ICS on specific cables, specific cable routes, latency measures, network availability etc.
- 5.60 The availability of diverse ICS tariffs and the development of non-price features is a clear indicator of the intense competition in the ICS market.

## 6. CONCLUSION

- 6.1 For the reasons outlined above, SingTel submits that the IDA should grant an exemption to SingTel from Dominant Licensee obligations pursuant to Section 2.6.1 of the Code. SingTel submits that the ICS market in Singapore is vigorously competitive and accordingly SingTel should be granted an exemption from the Dominant Licensee obligations under the Code with respect to the ICS market.
- 6.2 It is essential to note that despite the removal of the Dominant Licensee obligations currently applicable to SingTel in the ICS market, SingTel will remain subject to regulatory oversight. The granting of the exemption sought will not affect the IDA's current powers to intervene in instances of anti-competitive conduct under the Code.<sup>28</sup> The exemption will not affect the continued provision of interconnection and access services by SingTel to Requesting Licensees under its RIO. Competing operators' entry to the ICS market will therefore not be impeded by the granting of this exemption. The decision to grant the exemption does not require the IDA to make a choice in favour of no regulation of SingTel or the ICS market itself.
- 6.3 SingTel submits that there is now no need for the IDA to regulate SingTel in the ICS market through the Dominant Licensee ex ante measures. It is clear that competition is operating well in the ICS market in Singapore and that lower administrative costs would be incurred by removing this additional layer of regulation.

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<sup>28</sup> Section 7.4

- 6.4 SingTel also submits that continued regulation of SingTel as a Dominant Licensee will impact upon Singapore's global competitiveness, particularly in the Asia Pacific and trans-Pacific marketplace. Singapore is aiming to become a significant hub of telecommunications traffic. Regulatory barriers against SingTel are unnecessary and, as such, add unnecessary costs and should be removed. Since 1996 in the United States, 1997 in Australia and March 2002 in Hong Kong, the ICS market has not been subjected to dominant carrier regulation. SingTel submits that Singapore should now adopt a similar approach.
- 6.5 The criteria prescribed in the Code demonstrate that continued application of the dominance obligations with respect to the ICS market is no longer necessary. At the retail level, the ICS market is a highly competitive one for international capacity services to and from Singapore. At the wholesale level, the ICS market is also highly competitive. This is because of the competitive environment both in Singapore and due to the existence of other hubs for ICS. The deployment of cable systems and the development of hubbing mean that the market has rapidly changed to a highly competitive one where international capacity is commercially priced and available. For these reasons, SingTel submits that the IDA should grant the exemption sought.
- 6.6 In the event that the IDA takes the view that not all of the abovementioned services form part of the ICS market and adopts a narrower market definition (which we disagree), SingTel submits that the market evidence clearly shows that even in these narrower markets, services are competitive.

## PRODUCT NAMES

No.	International Capacity Service	Product Name(s)
(i)	IP Transit	<ul style="list-style-type: none"> <li>▪ SingTel IX Universal Internet Access Service (SingTel IX UIAS) or SingTel IX (STIX)</li> <li>▪ SingTel EXPAN MyNetwork</li> </ul>
(ii)	International Private Leased Circuits	<ul style="list-style-type: none"> <li>▪ SingTel Bilateral IPLC</li> <li>▪ SingTel ConnectPlus IPLC</li> <li>▪ Acasia ILC</li> </ul>
(iii)	International Frame Relay	<ul style="list-style-type: none"> <li>▪ International Frame Relay</li> <li>▪ SingTel ConnectPlus Frame Relay</li> <li>▪ Acasia Frame Relay</li> </ul>
(iv)	International ATM	<ul style="list-style-type: none"> <li>▪ International ATM</li> <li>▪ SingTel ConnectPlus ATM</li> <li>▪ Acasia ATM</li> <li>▪ Infonet ATM</li> </ul>
(v)	International IP-VPN	<ul style="list-style-type: none"> <li>▪ ConnectPlus VoIP VPN (Voice-Over-Internet Protocol Virtual Private Network)</li> <li>▪ SingTel ConnectPlus Internet Protocol Virtual Private Network (IP VPN)</li> <li>▪ Acasia IP-VPN</li> </ul>
(vi)	Domestic Backhaul	<ul style="list-style-type: none"> <li>▪ SingTel Backhaul</li> </ul>
(vii)	Satellite TV Uplink/ Downlink	<ul style="list-style-type: none"> <li>▪ SingTel Telecast Service</li> </ul>
(viii)	VSAT (Very Small Aperture Terminal)	<ul style="list-style-type: none"> <li>▪ SingTel VSAT Service</li> </ul>
(ix)	Digital Video Broadcast (DVB) IP	<ul style="list-style-type: none"> <li>▪ SingTel DVB IP</li> </ul>
(x)	Leased Satellite Bandwidth	<ul style="list-style-type: none"> <li>▪ Leased Satellite Bandwidth</li> </ul>

## INTERNATIONAL CAPACITY VIA SATELLITE PROVIDERS

<b>Telecast</b>	<b>Leased Satellite Bandwidth</b>	<b>DVB-IP</b>	<b>VSAT</b>
Liberty Livewire ST Teleport Ascent Media Media Corp ESPN NTL Globecast TVNZ	Asiasat PanAmSat Intelsat Thaicom Insat New Skies Telesat Sinosat Measat	Loral Cyberstar PAS SpeedCast ShinSat Teleglobe PanAmSat	ShinSat Intelsat Eutelsat Agila Palapa New Skies Apstar Loral Reach PCM APTT Infocom, BT Concert Corporate Access CAT

## LIST OF SATELLITE SYSTEMS THAT LICENSEES CAN ACQUIRE TRANSPONDER CAPACITY

No.	Satellite Operator, Country	Satellite Name (Orbital Slot)
1	APT Satellite, Hong Kong.	APSTAR 1 (138°E)
		APSTAR 1A (134°E)
		APSTAR 2R (76.5°E)
2	AsiaSat, China.	ASIASAT 2 (100.5°E)
		ASIASAT 3S (105.5°E)
		ASIASAT 4 (122°E)
3	Sinosat, China.	SINOSAT-1 (110.5°E)
4	China Orient, China.	CHINASTAR-1 (87.5°E)
5	Binariang Satellite Systems, Malaysia.	MEASAT 1 (91.5°E)
		MEASAT 2 (148°E)
6	Satelindo, Indonesia.	PALAPA C2 (113°E)
7	P.T. Telkomunikasi (TELKOM), Indonesia.	TELKOM-1 (108°E)
8	Shin Satellite, Thailand.	THAICOM 1A (120°E)
		THAICOM 2 (78.5°E)
		THAICOM 3 (78.5°E)
9	PanAmSat, USA.	PAS 8 (166°E)
10	Mabuhay, The Philippines.	AGILA II (146°E)

## PARTICIPANTS IN THE RETAIL AND WHOLESALE MARKET FOR ICS

No.	Service	Examples of participants in retail (R) or wholesale (W) market
(i)	IP Transit	StarHub, Reach, Sprint, T-Systems (Deutsche Telekom), UUNET, Cable & Wireless, Equant, Verizon, Infonet, 1-Net
(ii)	International Private Leased Circuits	Equant, Infonet, StarHub, AT&T, MCI, Sprint, BT, Cable & Wireless and Reach
(iii)	International Frame Relay	StarHub*, Cable & Wireless, Sprint, MCI, Equant and Reach
(iv)	International ATM	StarHub*, Cable & Wireless, Sprint, MCI, Equant, Infonet, Reach and AT&T
(v)	International IP-VPN	StarHub*, Sprint, MCI, Equant, Infonet and AT&T
(vi)	Domestic Backhaul	StarHub, MCI, Reach, France Telecom, AGC (Backhaul is only sold on a wholesale basis)
(vii)	Satellite TV Uplink/ Downlink	Liberty Livewire [R], ST Teleport [R&W], Ascent Media [R], Media Corp[R], ESPN[R], NTL[R], Globecast[R&W], TVNZ[R]
(viii)	Very Small Aperture Terminal (VSAT)	ShinSat[R], Intelsat[R&W], Eutelsat[R&W], Agila[R&W], Palapa[R&W], New Skies[R&W], Apstar[R&W], Loral[R&W], Reach[R&W], PCM[R&W], APTT[R], Infocom,[R], BT Concert[R&W], Corporate Access[R&W], CAT[R&W]
(ix)	Digital Video Broadcast (DVB) IP	Loral Cyberstar[R&W], PAS[R&W], SpeedCast[R], ShinSat[R&W], Teleglobe, PanAmSat[R&W]
(x)	Leased Satellite Bandwidth	Asiasat [R&W], PanAmSat[R&W], Intelsat[R&W], Thaicom[R&W], Insat[R&W], New Skies[R&W], Telesat[R&W], Sinosat[R&W], Measat[R&W]

R – Retail

W- Wholesale

Breakdown in terms of R vs W not available for others

\*In addition, StarHub also offers International ATM, International Frame Relay and International IP VPN in collaboration with its joint partners, under the brands of Arcstar Gblal Managed services, BT Global Managed Services, Savvis Intelligent IP services, AT&T International End-to-End Services.

Note : this is a non-exhaustive list