FRAMEWORK FOR THIRD GENERATION (3G) CELLULAR NETWORK DEPLOYMENT AND SERVICES OFFERING IN SINGAPORE

RESPONSE FROM BRITISH TELECOM

1 INTRODUCTION

This submission is made in response to IDA's invitation for comment in its consultation document, "Framework for Third Generation (3G) Cellular Network Deployment and Services Offering in Singapore" dated 25 Oct 99. The submission outlines BT's views on the specific issues raised by IDA relating to 3G technology, networks and services. Also included are specific recommendations for IDA's consideration in the formulation of its policy framework for 3G cellular networks and services in Singapore.

2 BT RESPONSE ON 3G ISSUES RAISED BY IDA

The titles and section references follow those used in the IDA consultation document.

Assessment of development of 3G technology, likely services being developed, potential of 3G technology and the scope of the 3G licence (sections 4.1 a & b)

Developments in 3G technology have been driven primarily by the need to provide high capacity, high data rate mobile communication systems incorporating in their full form, terrestrial and satellite components. The eventual aim for 3G systems is to offer personalised mobile multimedia communications to the mass market regardless of location or terminal.

As a result of greater bandwidth and enhanced network intelligence, new multimedia service offerings can be expected in 3G networks such as the provision of combined voice, audio-visual and high speed data services. Featuring prominently are likely to be facilities such as high speed internet and intranet access and electronic mail, video telephony and conferencing, on-line banking and shopping and direct instant access to the home or office IT systems regardless of location. Entertainment services such as audio-on-demand and video games can also be expected. These developments promise to bring mobile networks significantly closer to the capabilities of fixed networks, providing mobile users with interactive multimedia capabilities at data rates of up to 2 Mbps. When fully developed, 3G networks can be anticipated to provide combined access to cordless, cellular and satellite networks from a single hand-held terminal.

IDA has sought comment on the potential of 3G technology and the scope that 3G licences should cover. It is envisaged that 3G networks will operate on a multi-level hierarchy comprising significant numbers of application/content/service providers and a smaller limited number of network operators who provide a mobile broadband access service. It is also likely that 3G services will be offered as part of an integrated service package, combining fixed and mobile elements tailored to the individual or corporate customer's needs. This fits in well with IDA's "inverted trapezoid" telecommunications industry structure. Increasingly, 3G applications and particularly the higher value-added-services will be developed by specialised players who are not network operators. It is significant that the regulatory environment is conducive for such players to flourish. At the network level however, investments are large and resource constraints high and as such only a limited number of players can be expected to create a viable business.

In order not to restrict the development of new services and applications, the 3G regulatory framework should provide for an environment that gives full freedom for service innovation and development. This would be best achievable with a separation of the way application/content service providers are treated from network operators. There should therefore be no limit on the scope of application/content services providers. Due to resource constraints however, a limited number of network operators should be licensed to provide the supporting infrastructure. These network operators would then be subject to commitments on quality of service, network coverage and capacity. So as to ensure full flexibility, 3G network operators should also be permitted to provide services either on their own or in association with other broadband content/application providers. Competition should be encouraged at all levels – access, service provision, packaging and content. Open access should be mandated across all networks as is currently the case with fixed networks.

Spectrum requirements per operator (section 4.1 c)

Technically, an operator could run a 3G network on just 5 MHz of paired spectrum (2 x 5 MHz). This would however severely limit the range, scope and quality of services that could be provided and would have serious implications on the viability of any investment in a 3G system. For example, hierarchical network design would not be possible as only one carrier would be available per cell. Current estimates are that only data rates of 384 kbps would be achievable (2 Mbps data would only be able to support one user per cell in an indoor environment without soft handover).

While 10 MHz of paired spectrum (2 x 10 MHz) would be somewhat more workable it is highly undesirable as the capability to support high speed multimedia services would still be limited. While the UK has taken the approach of allocating 10 MHz to existing operators, it should be noted that such licensees will also be allocated an additional 5 MHz of unpaired spectrum. The use of unpaired spectrum will alleviate

congestion and increase spectrum efficiency as data services are highly assymetric. Singapore's high density also necessitates a larger spectrum requirement to satisfy the high indoor and outdoor quality of service criteria and frequency coordination constraints in the border areas.

In an ideal scenario, 20 MHz of paired spectrum would provide maximum flexibility and efficiency in network design as a multi-layer hierarchical network could be deployed providing the ability to segregate high speed data from low speed data and voice services thus improving system efficiency. High speed wide area applications would also be supportable. In Japan, MPT has indicated that it will award three licences each with 2 x 20 MHz of spectrum.

BT is however cognisant of the implications that a 2 x 20 MHz allocation would have on the number of players in Singapore. We would suggest that a reasonable balance therefore between the amount of spectrum allocated to operators to facilitate flexible and efficient network planning and meeting national policy objectives of introducing further competition is to allocate 2 x 15 MHz per operator. This would allow a total of 4 licensees for 3G networks (a more detailed discussion of the number of operators and the entitlement of existing operators is provided later in this document). The UMTS forum has also recommended that the minimum spectrum requirement per operator is 15 MHz of paired spectrum plus 5 MHz of unpaired spectrum (i.e. 2 x 15 MHz + 5 MHz).

It is unclear from the consultation document as to IDA's plans in relation to the allocation of the unpaired segments of the 3G band (particularly the range from 2010-2025 MHz) and whether these will be made available for 3G services at this point or at a future date. One recommendation is for these bands to be allocated as unpaired additions to the recommended 2 x 15 MHz allocation per operator in order to facilitate provision of higher speed data services.

Optimal number of operators to licence (section 4.1 d)

The following discussion is premised on the spectrum availability information provided in the consultation paper, i.e. the availability of the full 60 MHz for allocation to 3G services in Singapore.

The minimum spectrum requirement per operator outlined above would suggest the optimal number of 3G network operators to be 4, with each operator allocated at least 2 x 15 MHz with possible additional unpaired spectrum. This would ensure that all operators have at least the minimum amount of spectrum to operate full mobile multimedia networks. Increasing the number of operators (and thus causing a reduction in spectrum) would restrict the ability of operators with insufficient spectrum to provide a full range of services and compete effectively.

Setting the number of 3G licences to 4 serves the twin objectives of allocating sufficient spectrum to all operators for full network deployment so that they can all compete effectively and at the same time introducing further competition through an additional licensee (based on 3 existing operators and one new one – further details are provided below). Reducing the spectrum allocation of even one operator to introduce further players would only serve to impede the operators' ability to compete effectively.

It is BT's understanding that there is at least one narrowband CDMA system currently operating in the band identified by IDA for 3G spectrum allocation. While the operation of the system in itself is not a cause for concern from a spectrum availability point of view (as the narrowband CDMA network can be migrated to a CDMA2000 sytem), the difference in band pairing of the system from the IDA 3G spectrum pairing plan has the potential for causing inter-system interference as the base station frequencies on one system operate adjacent to the mobile receiver frequencies of the other. Avoiding the inter-system interference would require guard bands which could potentially reduce the overall spectrum availability in the band.

Spectrum allocation mechanism (section 4.1 c)

This section provides BT's views on the four options outlined by IDA in section 3 of its consultation paper.

Licence upto 6 operators (each allocated 10 MHz); let market consolidate

BT is of the view that this would result in an unnecessary duplication of resources and inefficient networks as no operator would have sufficient spectrum to operate a full mobile multimedia service. Additionally, each network would incur significant investment outlays which would only serve to drive up the total cost of implementing 3G networks in Singapore. Operators would not be motivated to invest substantially in their networks and significant energies would be diverted away from network optimisation and service development due to consolidation efforts.

Licence up to 5 ops; 10 MHz for existing three, 15 MHz for new two

This approach would penalise the existing players in the market by giving them lesser spectrum. In the longer term, 3G spectrum will be the key area for service provision. Dual band 2G/3G operations will only serve as an interim arrangement for the initial few years. In the longer term, smaller spectrum allocation to existing operators will severely constrain operational ability as 3G technology matures. In addition, it is felt that this approach sends the wrong signal to investors that early entrants risk being penalised.

Leave to the existing operators and up to 2 new entrants to bid for 10 or 15 MHz

Existing operators have already bid for and won the right to operate cellular mobile communication networks in Singapore. Requiring existing operators to bid again for rights to spectrum would be introducing new restrictions and impediments to their operations (further discussion on treatment of existing operators is provided below). The restrictions and impact on competitiveness of allocating only 10 MHz of spectrum to operators (new or existing) have been described above and this option is therefore not recommended.

It is not clear in the consultation document whether reference to operators "bidding for 10 or 15 MHz" refers to a beauty contest type tendering process or an auction for the spectrum. This issue is in itself a significant matter and is addressed separately below.

Give each operator minimum of 10 MHz and allocate additional on a need basis

BT's view is that this is theoretically the most optimal method of allocating spectrum and it is BT's understanding that this is what is currently practised by IDA. In theory, this method of allocation assigns only a minimum amount of spectrum and sets aside additional spectrum to be allocated to users on a need basis, thus ensuring that spectrum is not wasted by being allocated to operators who may not fully utilise it. In practice however, this method of spectrum allocation is open to abuse as no consistently usable definition of spectrum efficiency can be determined. This method also has the potential to create situations where operators jostle for greater spectrum at the outset and throughout the duration that the spectrum is available in a bid to hoard as much as possible. This can also lead to intense political lobbying which is creates uncertainty for network planning.

This method of spectrum allocation therefore deprives operators of planning certainty as they have to keep redesigning their networks for the amount of spectrum available and each time additional spectrum is awarded. This does not augur well for efficient network design which would be possible if the full spectrum to be allocated were available.

For the above reasons, it is recommended that 15 MHz spectrum be made available to each operator at the outset of the licensing process so as to facilitate efficient and optimal network design.

Approach for licensing additional 3G service providers (section 4.1 e)

It is BT's view that licensing of additional 3G providers should be based on the competitive tender system as has been adopted by TAS/IDA in the past. The system is transparent and fair and is well suited to selecting the operator with the right technical

and commercial capabilities to achieve the national objectives of providing wide ranging services at high quality and competitive prices.

While IDA has not indicated in its consultation paper that it is considering auctions as a means of licensing additional service providers, it is felt worthwhile addressing it here briefly. While theoretically, auctions serve to set the right value to the spectrum resource, in practice, they have shown to achieve little more that raise money for governments and have no direct relation to the ability of successful bidders to meet the obligations of the licence. In fact, it has been shown that applicants that have successfully bid for spectrum have in some cases hoarded spectrum and have had to work out arrangements with the government to make good their financial commitments. In addition, high bid amounts to secure licences would eventually find their way into end user pricing or poor service quality which can only be to the detriment of the consumer in the long run.

IDA/TAS' position in the last PCMTS licensing exercise is therefore a very appropriate one – that a fixed licence fee be determined by the regulator and that there be no price component in the tender exercise. This way, bidders would be able to focus their attention on developing plans for services and products and the successful bidder should be selected based on having the best technical and business plans.

Treatment of existing mobile phone operators (section 4.1 f)

Existing 2G networks are getting increasingly congested and will get more so as penetration increases and new data services are introduced. While the existing three mobile operators can expect to upgrade their 2G networks to provide mobile data services to the fullest extent that 2G and 2.5G enhancements can support, these will fall far short of the mobile mutlimedia capabilities of 3G technologies. With the growing demand for data services and the increasing affordability of mobile terminals (even 3G terminals when they are launched), the lack of access to 3G spectrum by existing operators would be severely debilitating as they would have no means of competing effectively with new 3G operators, and would decidedly be forced out of the market.

Existing operators have made significant investments in infrastructure to meet their licence commitments. With the licences ranging from 17 to 20 years and all licensees in the initial years of their operations, a significant portion of the duration of the licence still remains. Depriving these operators from a viable migration path to 3G spectrum would significantly penalise these operators and could signal to investors that their investments in Singapore would not be safeguarded. Access to 3G spectrum for existing operators would provide some opportunity for continuity and to compete fairly for customers and market share.

It has been IDA's stated objective to be technology neutral. In the past, IDA/TAS has not only permitted but even encouraged mobile operators to migrate from the less efficient networks to more efficient ones (eg. SingTel Mobile's migration of its ETACS network to GSM). Restricting access of the existing three mobile operators to 3G spectrum would be a departure from this policy.

It is therefore important that spectrum is reserved for existing operators to provide them continuity and a means of competing effectively in the future. This however is not an attempt to restrict new market entrants or a restriction of competition. It has been stated above that the size of Singapore's market is expected to support up to 4 mobile network operators. The allocation proposed above of 2x15 MHz per operator allows this and has sufficient spectrum available for IDA to invite bids for one more network operator licence. This would also ensure that the 3G market is not restricted to the existing operators alone, yet providing some means for existing operators to compete fairly. This approach therefore provides for sustainable competition, which is in line with IDA's stated intention in its liberalisation initiatives thus far.

Timing for award of 3G licences and services launch dates (section 4.1 g)

Considerable work is currently being undertaken to develop and harmonise 3G standards worldwide. The timing for introduction of 3G services however vary. Japan is expected to see the first commercial operation of 3G systems as early as 2001. However, the pace of development in Japan is dictated by the severe spectrum congestion of existing mobile networks. As such, 3G systems in Japan are initially likely to start as predominantly voice systems with some broadband data capabilities and full scale capabilities coming on stream later. Europe should see commercial 3G networks around the year 2002 with full scale take up from the year 2003. So as to ensure early adoption of 3G networks, IDA could call a tender for service provision to commence as early as mid-2002. Some trials by existing operators are already underway and should continue to be supported. Spectrum should be made available to existing operators when needed for trials and as and when a reasonable technical and business case can be made to IDA.

3 CONCLUSION

The above are BT's views on the development of 3G technology and recommendations of the specific regulatory issues raised by IDA in its consultation paper.