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

RESPONSE FROM SINGTEL MOBILE PTE LTD

A   Summary

1.   The allocation of spectrum will have a significant effect on the implementation and success of Third Generation Cellular Systems (3G). SingTel Mobile Pte Ltd (SingTel Mobile) welcomes the opportunity to engage in consultation with the InfoComm Development Authority of Singapore ("IDA" or the "Authority"). SingTel Mobile definitely plans to provide 3G services in future and is therefore highly interested in the Authority's consultation paper on this issue.

2.   We strongly support an approach which considers the issues surrounding the implementation of 3G in a global context. In order to promote Singapore as an info-communications hub, taking a global perspective on the issue of 3G will ultimately benefit Singapore and Singapore consumers through increased opportunities for global roaming and lower equipment costs. Further, such an approach will create business opportunities for Singapore and Singapore operators seeking to expand their reach into new communications markets regionally and internationally.

3.   SingTel Mobile would also encourage the Authority to continue the process of industry consultation on this issue and to establish an industry working group to assist the Authority in identifying, considering and establishing a framework for the successful implementation of 3G systems in Singapore. We believe a close and co-operative industry approach will deliver the best outcome for Singapore and Singapore consumers.

B.   Background

1.   The ITU began looking at 3G systems in 1985. At that time the term used when referring to these ideas was Future Public Land Mobile Telecommunications Systems (FLMTS). From 1985 to 1992, the ITU developed general objectives for FLMTS. After 1992, the name changed to International Mobile Telecommunications – 2000 (IMT-2000) which refers both to the anticipated year in which such systems would be in the market, and the spectrum in which the systems were to be developed.

2.   IMT-2000 seeks to integrate mobile, fixed, terrestrial and satellite systems under a single standard or family of standards. This integration will develop and promote global service capabilities and interoperability. The 3G systems must be capable of bit transfer rates of 144 kbit/s at mobile speeds, 384 kbit/s at pedestrian speeds and 2 Mbit/s when stationary.

3.   Some of the key goals and objectives promulgated by IMT-2000 against which proposed 3G standards are evaluated include:

-    Enhance voice quality, provide ubiquitous coverage and enable operators to offer services at a reasonable price;

-    Provide increased network efficiency and enable new services which operators would be likely to offer;

-    Provide new voice and data services and capabilities;

-    Provide an evolutionary path from Second Generation Systems (2G) to 3G systems to protect investments in 2G systems.

C. **The Authority has posed a number of queries in its consultation paper, which we address below:**

1. Development of 3G Technology

1.1 SingTel Mobile supports the prudent approach taken by Europe and many operators in Asia where the implementation of 3G systems is an evolutionary one which builds upon a successful core GSM network. Investments in existing PCMTS networks are large and it would be both costly and inefficient not to adopt such an approach. Already, the GSM services and applications of the existing mobile operators are being evolved towards 3G and provide an ideal test bed for multimedia and IN-based services.

1.2 The first hurdle that must be overcome is the development of a common standard/family of standards for 3G systems. The leading vendors and standards bodies have not been able to agree a common route for a global standard for 3G systems. There are four main groups:

(i). International Mobile Telecommunications – 2000 ("IMT-2000")

Formerly known as Future Public Land Mobile Telephone System (FLMTS), this is an initiative of the International Telecommunications Union (ITU). As the name suggests, year 2000 was the expected year in which such services will be available and reflects the allocated spectrum i.e. 2GHz.

(ii). Japanese - Future Public Land Mobile Telephone System ("J-FLMTS")

This is the Japanese version of ITU's IMT-2000. It is expected that 3G services will be developed and delivered in Japan using this standard in the year 2000. The system is expected to enable bit transfer rates of up to 384 kbits/s with at least 144 kbits possible. As yet, there is no timeframe for enabling bit rates of up to 2 Mbit/s.

(iii). Universal Mobile Telephone Service ("UMTS")

This is another variation of the ITU IMT-2000 standard and is being sponsored by the European GSM community and supported by ETSI.

(iv). IS – 95

This is a standard being promulgated by the United States and is based on current CDMA technology with multi-carrier.

1.3 The ITU is carrying out standardisation work of IMT-2000 via Task Group 8/1 (TG 8/1). The ITU's current approach since the meeting of TG 8/1 in March 1999 is to develop a single flexible standard with multiple access methods. This would mean more than one technical interface standard. The drafting is due to be complete by the end of 1999

1.4 We note that the Authority states in section 2.2.1 of its consultation document:

"IDA will continue to maintain our technology neutral stand by accepting all 3G networks based on ITU-endorsed standards."

Whilst we agree that a technology neutral approach will enable operators to choose standards which may deliver the "benefits" of greater customer choice and innovation, the Authority and industry should weigh this against the "costs" of implementing multiple 3G standards such as increased technical complexity, the possible requirement for guard bands and a loss of economies of scale. A minimum number of 3G standards would deliver economies of scale.

1.5 In the initial phase of 3G system deployment, the demand for high speed 3G services is likely to be concentrated in selected areas such as hotels, the financial district, Changi airport etc. The cost of deploying an island wide 3G system is large and it would not be economical to do so. As such, implementation of a 3G system is likely to be in phases. Dual mode operation (i.e.2G and 3G) will enable a phased deployment and thus efficient investment. With dual mode terminals, customers would have 3G services in core areas and 2G services in all areas. Dual mode handsets would be useful for a phased 3G rollout and migration from 2G to 3G.

2.   Likely Third Generation Services

2.1 3G operators will need to build upon the 2G success and understand the needs of customers for new mobile services and to translate these needs into services which can be delivered in a phased program as the new 3G systems are developed and deployed. With the availability of 3G systems, the following are among the products and services that will be available to customers in a 3G environment:

(i)   Voice Services

For the initial period, voice will continue to dominate mobile use. The availability of 3G systems will enable, for the first time, mobile networks to deliver high quality voice communications.

(ii) Messaging Services

3G systems will enable the delivery of various messaging products including paging. 3G will enable longer messages, increased delivery rates and two-way paging. In addition, customers will be able to use multimedia e-mail applications such as photo/video postcards.

(iii) Switched Data

3G products and services would include availability of internet applications including browsing, subscribing to information, remote access to internet and intranet, as well as numerous e-commerce applications. These applications will rely on either packet switched data or circuit switched data at speeds of minimum 64 kbit/s, equivalent to services currently provided to fixed line subscribers using 56 kbit/s dial up modems.

(iv) Asymmetrical Multimedia Services

3G services such as digital quality audio/music, high resolution full motion video content, internet browsing and file download can be made available. Other specialised services such as remote security surveillance will also be capable of being provided. The bit transfer rates to support these types of services are 128 kbits/s outbound, and between 384 kbit/s – 2000 kbit/s inbound.

(v) Symmetrical Multimedia Services

This type of 3G services include such things as videophone, two-way video-conferencing and specialised services such as telemedicine, audio, and video transfer. The bit transfer rates range from 128 kbit/s to 384 kbit/s each way.

Phase 2 type services include large video, data file transfers and high fidelity video and high resolution video at bit transfer rates in a stationary mode of 2 – 10 Mbit/s. This type of services is expected to be deployed after the initial 3G Phase 1 deployment.

Whilst some of these services have been introduced on the current 2G or enhanced 2G systems, implementation of 3G systems will enable existing services to be improved and new services to be created and delivered.

3. Subscriber Demand for Third Generation Services

3.1 Since 1997, Singaporeans have adopted mobile services at a rapid rate with mobile penetration increasing from 13.6% in January 1997 to 42.9% by October 1999. Over the same period, internet dial-up subscribership has increased from 139,000 to 497,500, an increase of 257.9%. With the recent liberalisation of the ISP market and the strategies adopted by some of the ISPs, it is expected that internet subscribership will increase and penetration rates will continue to rise. With convergence, the likely result is subscriber demand for broadband mobile services. Demand for 3G services will be driven by a number of factors.

3.2 It is difficult to determine the consumer demand for 3G services. Social and economic factors influence demand, as will applications, network deployment and terminal development. We have no available data for Singapore. However, some studies in the United States

suggest that the estimated percentage of Americans who will subscribe to a specific 3G service in the next 10 years could be:

- Voice: 58%

- Messaging: 40%

- Switched Data Services: 20%

- Asymmetrical Services
  * 384/128 kbit/s   20%
  *2 Mbit/s/128 kbit/s   10%

- Symmetrical Services
  *128 kbit/s   10%

- Symmetrical Services
  *384Kbit/s   6%

- Phase II Services   3%

4. The Potential of 3G Technology

4.1   Whilst the path to 3G systems is an evolutionary one, the potential of 3G is revolutionary. 3G has the potential to revolutionise the way consumers view mobile operators and services. The success of 2G systems has created an environment characterised by improved quality, innovative services development and extensive roaming. This has resulted in customers now seeking to demand broadband capabilities and a desire to integrate fixed, mobile and satellite networks which will produce a seamless full function service operating at fixed line network quality and speeds.

4.2   The implementation of 3G systems will create networks which are capable of providing the same degree of quality and levels of service as fixed line networks. They will also be able to support a broad range of multimedia services and multi-mode, multi frequency handsets and enable seamless operation between fixed and mobile networks. Further, 3G can provide the ability to roam and operate anywhere in the world through integration with satellite networks in remote locations.

4.3   The key to the development of the 3G market will be to identify the applications, provide the network capacity and have the terminals available to enable these applications. Realistically, we believe that it will take up to 5 years before the applications which will capture the imagination of consumers will be available, handheld terminals will be affordable, compact and easy to use, and 3G systems are fully capable of delivering the full suite of 3G services.

4.4   When compared to the current 2G systems, 3G should provide the following benefits:

-       capability for seamless global roaming;
-       ability to use the same terminal for all applications and in all environments e.g. home, office, outdoor, shopping centres, vehicle, MRT etc;
-       flexible control over a broad range of services; and
-       availability of entirely new mobile services.

4.5   Consumers will have access to news, music entertainment, video, computer games, road traffic information, advertising, virtual shopping, e-commerce, online banking, and be able to purchase a wide range goods and services. As customers are shopping on Orchard Road, they will be able to compare prices on the WWW while in a store. Foreign visitors will be able view street directions, book a hotel, and organise airport transport.

4.6   3G terminals are expected to be multimedia and possess a combination of features and functions seen in the laptops, handheld products such as the palmtop and the mobile phone. It will have large display, operate in text and/or graphics mode, both key pad and pen data entry mode and function selection capability. These new handsets will mark the emergence of a consumer market but will not appear at mass market prices for some time. For the next 5 years, no single group will dominate the market as users needs will be varied. The Nokia 9000 Communicator represents an early example of the direction for 3G handsets.

4.7   Developments in the US and elsewhere in the world herald an exciting future for 3G systems. In June 1999, Motorola agreed to a $US 1billion, 10 year venture with Sun Microsystems. Microsoft, after acquiring OmniBrowse, launched its MSN Mobile portal. Yahoo! acquired Online Anywhere and secured deals with PageNet and Sprint PCS. Netscape and Lucent are working to develop mobile applications, whilst Alcatel is working on the development of a mobile e-mail application. Further, Nortel and Samsung Electronics are working together to develop a terminal and system capable of handling images which is to be piloted in the US, Canada, and Australia later this year.

5.   The Scope of the Third Generation Licence

5.1   3G systems will enable operators to develop and deliver new and innovative high speed data services. Much of the commercial justification to support the deployment of an expensive 3G network stems from an ability to generate returns from the provision of 3G services to customers. Reliance on revenue from subscription and voice services will be insufficient to justify the high cost of deploying a 3G network. Failing to provide 3G operators with the ability to do so

would jeopardise the business case for 3G and render 3G operators to the role of simply being a core network provider.

5.2   As such, it would be inappropriate to license an operator to build a 3G network and yet not be licensed to deliver 3G services.

6.   The Spectrum Allocation Mechanism

6.1   The Authority states in section 2.3.1:

"The next issue to be addressed is whether 3G spectrum should be automatically reserved for the existing PCMTS operators or should they have first right of refusal."

SingTel Mobile supports the automatic reservation of 3G spectrum for the existing PCMTS operators.

6.2   One of the goals of IMT-2000 is to provide an evolutionary path from 2G systems to 3G systems to protect investments in 2G systems. The existing Public Cellular Mobile Telecommunications Services (PCMTS) operators have invested considerable amounts in implementing 2G systems infrastructure and in successfully developing and growing the mobile market. 3G represents a natural evolutionary path for existing operators to continue to meet the demands of their customers for new and innovative services.

6.3   The Singapore market is relatively small and strong competition among the three alternative mobile providers should deliver the policy objectives of the Authority. Deploying a 3G system would prove extremely costly, particularly where that operator does not possess existing infrastructure which can be upgraded to accommodate 3G.

Further, existing operators will require the additional spectrum to meet growth requirements and the delivery of new services. As we have alluded to above, existing operators also possess the requisite market expertise and experience in operating a mobile network and have much of the infrastructure in already in place e.g. retail outlets, sites etc. and are thus able to take advantage of economies of scale and scope.

7. The Spectrum Requirements Per Operator

7.1   SingTel Mobile supports the allocation of 2x20MHz paired spectrum to each of the existing 2G mobile operators. This allocation will allow hierarchical cell structures and thereby provide the greatest possible flexibility for 3G operators to develop and deliver the many and varied services which 3G systems make possible. It would support multi-users of 2 Mbit/s services. This approach is consistent with the guideline issued by the MPT in Japan. This is also consistent with the UMTS Forum Report No.1.

7.2   In our view, available spectrum should not be withheld from the operators. Where spectrum is withheld, there is potential that operators may have insufficient spectrum to service their subscriber demands. Further, such an approach would ultimately give rise to a need to establish a process whereby operators may seek additional allocations of spectrum and the development of criteria to assess requests for additional allocations. Such a process would add additional and unnecessary complexity.

7.3   Alternatively, we would support an approach whereby the existing 2G mobile operators were initially awarded 2x15MHz of paired spectrum and 5MHz of unpaired spectrum. The "spare" spectrum may be reserved to cater for future growth, unforeseen changes in call patterns or a potential guard band requirement

7.4   The requirement for either 2x20MHz or 2x15MHz is driven not only by technical constraints, but also by the scope of 3G services. We would note that, as the Authority has observed in its consultation paper, this is consistent with that which is intended in other jurisdictions. In Europe, the more recent recommendation of the UMTS Forum Report No.5 recommends this allocation as the preferred minimum spectrum requirement for an operator in the initial phase (year 2002 to 2005). Further, this allocation is consistent with the recommendations of the OFTA IMT-2000 Focus Group in Hongkong.

8.   The Optimal Number of Operators to License

8.1   In accordance with the spectrum requirements per operator above, the maximum number of operators which can be supported is three (3) to four (4).

8.2   We would recommend that the optimal number of operators is three (3). Should the Authority decide to allocate 2x15MHz paired and 5MHz unpaired per operator, the spectrum withheld should be retained for future allocations of additional spectrum to meet the demands of consumers.

9.   The Approach to License Additional Third Generation Operators

9.1   SingTel Mobile would urge the Authority to award the 3G licences to the existing 2G PCMTS operators. We do not believe that an additional licence should be awarded to a fourth operator. The award of an additional licence to a fourth operator will ultimately reduce the flexibility of 3G operators to deliver services at high bit transfer rates of 2 Mbit/s and above.

9.2   Many 3G type applications will be trialed on 2G extensions such as HSCSD and GPRS to allow consumers to get used to higher speed data applications and start creating the market demand for "true" 3G services. Awarding 3G licences to the existing PCMTS would provide for migration and complementary operation enabling existing PCMTS operators to continue to meet their capacity requirements and the growing demand from their customer to develop and offer innovation 3G services. This approach will enable a shorter path to commercial 3G services and, with an ability to use existing 2G administrative elements and network elements, result in efficient utilisation of existing infrastructure and lower implementation costs.

9.3   Should the Authority consider awarding a licence to a fourth operator, we recommend that a licensing approach similar to that undertaken with the most recent award of a third PCMTS licence. The process should include the following key features (without limitation):

        (i)   Application process;
        (ii)   Assessment process;
        (iii)   Licence fee;
        (iv)   Committed network rollout;
        (v)   Performance bond.

10.   How Existing Mobile Operators Should be Treated

10.1   As we have indicated above, SingTel Mobile believes that the three existing PCMTS operators should automatically be awarded 3G licences and allocated 2x20MHz of paired and 5MHz of unpaired spectrum.

10.2   This would provide for migration and complementary operation enabling existing PCMTS operators to continue to meet their capacity requirements and the growing demand from their customer to develop and offer innovation 3G services. This approach will enable a shorter

path to commercial 3G services and with an ability to use existing 2G administrative elements and network elements result in efficient utilisation of existing infrastructure and lower implementation costs.

11.   The Timing for Award of 3G Licences

11.1   SingTel Mobile sees no reason for the Authority to delay the award of 3G licences.

11.2   Whilst the introduction of 3G services should be driven by consumer demand, it is unlikely that the licensing process could be coordinated in such a manner as to coincide with market demand. The existing mobile operators are already undertaking the process of evolving from 2G systems to 3G systems and have invested in new facilities to enable higher bit transfer rates and a degree of inter-working between different technologies e.g. HSCDC and GPRS. The early awarding of licences will provide the necessary commercial certainty for existing 2G operators to continue their evolutionary path to developing 3G systems and services. It will serve to place them in a position where they are better able to efficiently plan their network evolution and make the appropriate investment decisions. Early award of licences would also provide ample time for many of the other issues associated with 3G system deployment to be considered and addressed e.g. numbering, portability, interoperability.

12.   3G Services Launch Date

12.1   SingTel Mobile believes that the introduction of 3G services should be driven by market demand and not by artificial regulatory intervention or simply due to the availability of 3G systems.

13. Other Issues Associated with the Introduction of 3G Systems

13.1 (i) <u>Regulatory Framework for 3G Network Access</u>

We are particularly concerned by the Authority's statement in 2.2.2:

"Notwithstanding this, IDA will still require that 3G operators allow open access via their 3G systems for broadband content/applications/services providers just as we now require for the fixed network operators."

(ii) Implementing a 3G system will require substantial investment in infrastructure and much of the value to be derived from such investment will be via the delivery of advanced 3G services. Under such an approach, a 3G operator is relegated to simply being a network provider. The Authority should carefully consider its approach to ensure there is a balance between promoting competition in services and competition in infrastructure. 3G operators must have some commercial incentive to invest in 3G systems.

13.2 <u>Numbering Scheme</u>

The Authority will need to consider the numbering plan for 3G systems and take into account the existing numbering scheme for 2G systems to facilitate the evolution of 2G systems and the migration of customers from 2G to 3G.

13.3 <u>Additional Spectrum</u>

The 16th TG 8/1 meeting approved a recommendation for additional terrestrial spectrum requirement of 160MHz and a total mobile satellite service (MSS) requirement of 2x67MHz by year 2010.

13.4   Guard Bands

Implementation of multiple 3G standards may need guard bands.

D.   **Conclusion**

1.   3G systems represent a natural evolution path for existing 2G systems. The implementation of 3G systems will be in phases and reflect consumer demand. The deployment of 3G systems will be revolutionary for customers who will have access to a wide range of innovative content rich products and services. Existing PCMTS operators are in the best position to exploit 3G systems and are already creating the future 3G market by providing 3G like services via enhancements to existing 2G systems. The award of licences to existing PCMTS operators will quicken the delivery of commercial 3G services and enable the efficient use of existing infrastructure thereby reducing costs of implementation. Ideally, 2x20 MHz (paired) and 5 MHz (unpaired) should be allocated to the each of the existing PCMTS operators. However, a minimum of 2x15 MHz (paired) and 5 MHz (unpaired) will be required for the initial phase. The balance should be held to cater for future growth depending on each operator's capability to deliver the services.

2.   We look forward to continued consultation with the Authority on the issues involved in 3G implementation and would recommend, if

necessary, that the Authority establish a study group to assist in the deliberations.