

**Comments on IDA's "Proposed Policy
Approach to 3G Infrastructure Sharing in
Singapore"**

a) *Is the deployment of 3G facing delays due to unforeseen difficulties, including the availability of funding and technology? Would infrastructure sharing alleviate these difficulties?*

- The first version of 3G specifications (i.e., 3GPP Release 99) have only been finalised in early part of 2001. With these specifications now finalised, we expect to see initial 3G networks being launched during 2002 with extensive deployments to follow during 2003. Finalisation of 3GPP standardisation is also needed for the availability of commercial terminals. Slow market adoption of GPRS services has also prompted operators to revise their strategy and timing of the 3G rollout, as it is seen as a natural extension of their GPRS business. The fact that several European operators are currently still heavily in debt due to the high prices paid for 3G licences has also delayed 3G deployments to some extent.
- Sharing of network infrastructure among operator offers an opportunity for them to reduce their investment in WCDMA infrastructure – especially at launch. For operators that are required to provide coverage in large geographical areas, a shared network would enable them to achieve wider coverage at a lower cost and a faster pace. Since operators co-operate on coverage and infrastructure by sharing all network related planning and implementation costs, it becomes more cost-effective to cover a larger area. All in all, we believe that this will result in reduced Time To Market and earlier user acceptance of WCDMA and its related services.

Examples on infrastructure sharing solutions are:

a) Technology Sharing

The most obvious solution to reduce initial upfront investment for an incumbent operator would be to maximize and build upon its existing 2G assets for early rollout of the 3G service. The concept here would be to deploy a limited 3G launch and then rely on handover/roaming to the existing 2G network outside of the 3G services area.

The basic sharing principle would be to re-use existing GSM sites for 3G deployment and then gradually extend the 3G network by reusing as many of the GSM sites as possible, along with new 3G sites. This sharing principle will also require actively considering the 2G/3G dual-mode antenna as an option.

In Singapore, where GSM penetration has exceeded 70%, most 3G subscribers would already have a GSM subscription. As mature users of mobile technology, there will be a quick uptake of the new 3G higher bandwidth services that become available. GSM, provides not only a coverage complement, but also a capacity complement, to allow the operator greater flexibility to deploy 2G&3G spectrum in combination in the most efficient way.

b) Site Sharing between Operators

Site sharing can be implemented in several ways:

- Common in-building sites with shared feeders and antennas
- Shared coverage solutions for tunnels and MRT stations
- Joint utilisation of antenna towers

In the Site Sharing solution, operators share the site, mast and optionally the power, transmission or antenna, and deploy their own individual base stations, thus allowing them to keep their service partially independent.

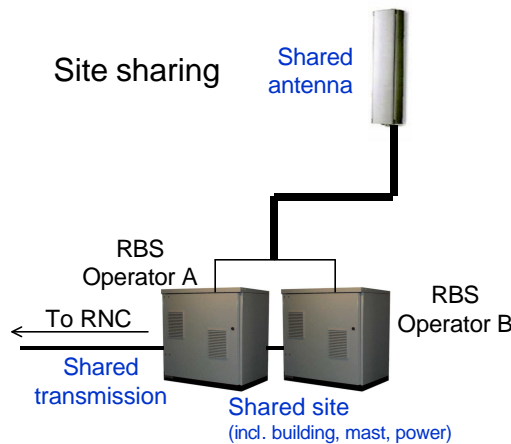


Figure 1. Illustration of Site Sharing

c) Network Sharing Between Operators

Network sharing is an umbrella concept for which several types of infrastructure sharing possibilities exist.

1. Common Shared Network

In the Common Shared Network solution, the operators would jointly build one common shared radio/core network and each operator's subscribers can then roam into the Common Shared Network. Typical applications for this scenario are initial coverage, joint coverage of larger rural areas that cannot be covered cost-effectively by individual networks. In many cases, such a network is built as a separate network from the concerned incumbent operators GSM networks and is managed by a separate company (e.g., UMTS Nat 2 in Sweden).

Common Shared Network: for lower cost coverage of rural areas, with low population.

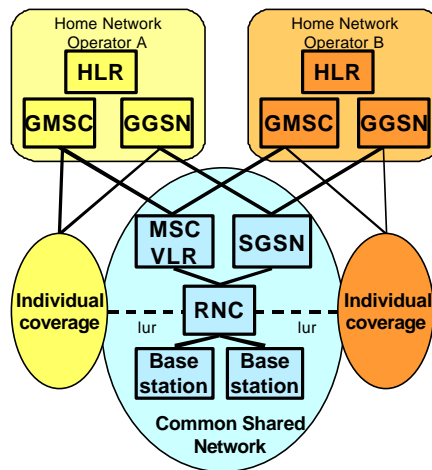


Figure 2. Overview of the Common Shared Network that is connected to each operator's individual Home Network, containing all subscriber-related data, services and interconnections. Besides the Common Shared Network, each operator can have additional coverage by its individual (radio) network.

2. Geographical Split Networks

In the Geographical Split Network solution, each operator builds its own network within a defined geographical area and the operators will allow national roaming into each other's network to cater for additional coverage. Typical applications of this solution are in large rural areas for initial coverage or cost effective coverage, whereby each operator covers part of the area.

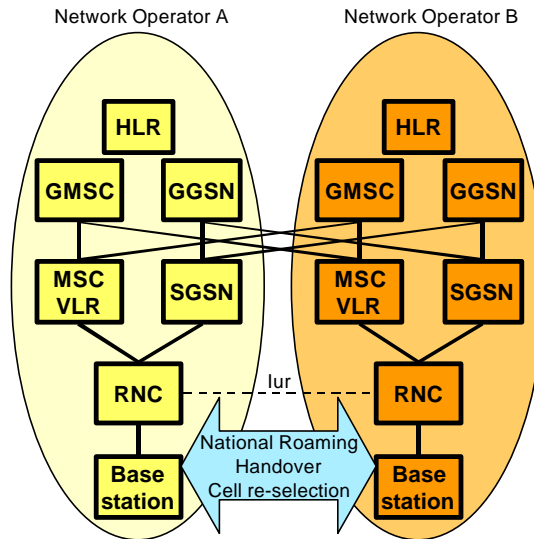


Figure 3. Overview of Geographical Split Network solution. Each operator has its individual network and coverage is enhanced through national roaming into the other operator's network.

3. Shared UTRAN

In the Shared UTRAN solution the operators build coverage jointly by sharing the sites and radio infrastructure while each operator has its individual carrier (dedicated hardware in the BTS) allowing to deploy its individual frequencies, cells and core network. Shared UTRAN can be seen as the most advanced site sharing solution, whereby even the radio base station is shared. Typical applications for this solution are in case the regulator does not allow solutions based on roaming, coverage of sub-urban areas or initial coverage of urban areas.

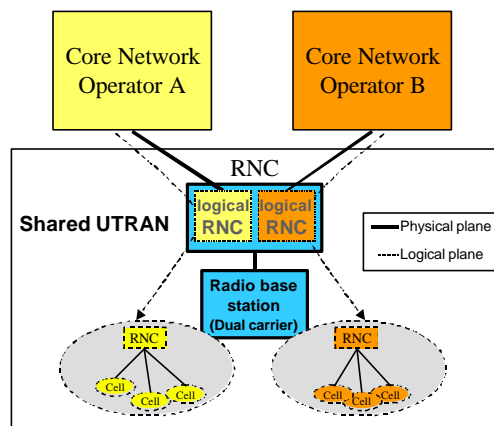


Figure 4. Overview of the Shared UTRAN solution based on the Virtual RNC feature. One physical UTRAN (Radio Base station and RNC) is split into two or more logical UTRAN's.

b) What are the potential and benefits arising from 3G infrastructure sharing that would accrue to our telecommunication industry as a whole and to consumers? Would infrastructure sharing actually lead to faster and better 3G services? How would infrastructure sharing lead to faster and better 3G services?

Licensing Conditions

Before a discussion on the possibilities of introducing infrastructure sharing could even start, we need to consider whether a formal market restriction/policy at this late stage in the process; almost one year after the awarding of the 3G licences; would effectively modify the initial licensing conditions.

Consider a Greenfield operator that has chosen *not* to apply for a 3G license due to the very high capital expenditure required for an island-wide network rollout. If the same operator now realises that the prescribed conditions have changed due to a new option for significant network sharing instead of building out its own network, legal claims could then be raised to compensate for any loss of business due to this change of policy.

Benefits/Drawbacks-Operators

The benefits of infrastructure sharing are greatest for a Greenfield Operator, that is, for a 3G operator, which does not have an incumbent GSM network. Shared Networks provides the Greenfield Operator an opportunity to work with another licensee to build-out his network, and limits his initial financial burden for infrastructure investment, as he is not able to rely on his GSM network as a fall back for coverage and capacity.

Shared Networks can offer advantages for all parties involved in WCDMA network deployment. The most important drivers for operators are the reduced CAPEX (investments) and OPEX (operational costs) and its effect on the key financial ratios. Another advantage is the increased rollout speed and coverage-area, which can result in an earlier deployment of 3G and contribute to the success of UMTS.

However, as all incumbent operators would have their own existing GSM network, technology sharing would be the obvious relief to reduce both CAPEX and OPEX. This solution would imply a limited 3G launch, for example in a CBD area and then rely on handover to the existing GSM network outside this area.

Benefits/Drawbacks-Regulators

Shared networks offers environmental benefits, as the sites are most effectively shared including reduced numbers of antennas. As coverage will be less competitive element, it will force operators to compete on new and innovative services; An important effect for the consumers of Shared Networks, is that operators will now be even more focus competing on End-User Services and Customer Care, as the WCDMA coverage area is similar for the different operators.

However, a concern could be that the operators, may in some cases, be reluctant to better the mandated coverage/service requirements, as their coverage area/service level will always be 'equal' due to the extensive sharing of network roll-out and operations.

c) What would be the appropriate type, nature and extent, and timing and duration, of infrastructure sharing? Please provide your reasons and rationale for this;

As described above in a), network sharing can be done in a number of different ways: Geographical split, demographical or political split, core-utran network split, shared transmission, power and antennas and total infrastructure sharing as well as technology sharing.

Considering the very densely populated composition of Singapore, a geographical split of the nation is not recommended from a quality perspective. As there are no large rural areas in Singapore, this does not provide for a compelling reason for sharing networks. In addition, Singapore is in a unique situation where, the 3G awarded licensees are all incumbent GSM operators.

Thus, the two key infrastructure-sharing principles that will definitely offer short and long-term benefits for Singapore are:

- a) Technology sharing - allowing the operators to build on their GSM assets to complement the 3G rollout/service.
- b) Site Sharing - allowing the best use of sites/common radio distribution infrastructure for reduced costs.

Technology sharing would be best utilised at the early stage of deployment to provide some relief to the high initial investments required for network launch. Later, when revenues from the growing subscriber base are becoming more substantial, the complete network infrastructure can be deployed in line with the requirements of the 3G licences.

d) Would any potential competition concerns arise with infrastructure sharing? If so, how would such competition concerns be addressed to ensure that there is no adverse impact on consumers benefits in terms of choice of service provider, access and availability of services as well as the range and quality of services and pricing?; and

In general, competition between network operators is achieved through:

- **Quality of Service**, i.e. by providing a technically high-quality network, the operator is increasing his market position by elimination technical flaws such as poor speech quality, service availability
- **Good Coverage**, i.e. by extending the network to cover a larger area and/or more public areas than the competition and ensuring seamless mobility
- **Subscriber Services**, i.e. by offering an extensive services package that is more adapted to market requirements and/or offers more content/choice than the competition.
- **Price** - the operator that can offer the best price/value ratio will catch the largest market share.
- **Segmentation** – focusing on specific market segments and tailoring both the service/network offering to meet their specific needs

When considering infrastructure sharing, one should consider not to compromise the delivery of any of the above end user parameters, as this would hamper the free market guiding principles.

e) What are the monitoring, and enforcement, issues that may arise on the extent of infrastructure sharing to be established and their scale-back? What would be appropriate monitoring criteria to ensure that infrastructure sharing takes place in accordance to an approved framework? How should scale-down of the infrastructure sharing be monitored?

According to the 3G licence conditions issued by IDA in 2001, the 3G network in Singapore shall be fully implemented before the end of year 2004. This requirement itself will ensure that the 3G operators plan their network development to reach full coverage at or before that date. This coverage can then be achieved either by deployment of individual 3G networks, or through some type of shared network

We believe that it is unnecessary to restrict/regulate the shared network implementations in any direction, as the core reason for building a shared network is primarily economical and hence, the decision on whether or not to terminate this venture depends on the growth and profitability of the 3G venture.

We would like to suggest that IDA should allow for 3G launch in a limited, well-defined area and to use the existing GSM network to cater for coverage in remaining areas at initial rollout.

IDA should continue to regulate each 3G licensee on how well each of their network (whether built how shared infrastructure or not) have met the end-user requirements.

IDA should not allow for a monopoly situation to take place where all 3G licensees operate only one single 3G network. Finally, the lifetime for a shared network, if implemented by the operators, should be based on financial evaluation criteria such as alternative solutions, earnings and OPEX considerations. We would not favour a regulated scale-down program imposed by the authorities (where scale-down is interpreted as a requirement on operators not to gradually own 100% of their own networks).

Summary

- Requirements on infrastructure sharing imposed at this late stage in the process **could have legal implications on the regulatory body (IDA)** as this would significantly alter the original business case for a Greenfield operator that would have initially been interested to apply for a 3G license in Singapore.
- Infrastructure sharing **should be done in consensus** between the existing 3G license holders and should be based on each operator's financial requirements and marketing aspirations. We do not recommend that a third party should hamper the development of the telecom sector by introducing restrictions to a free market environment such as Singapore.
- If infrastructure sharing is considered, the best way to utilise this would be to **reuse the existing GSM network** by introducing 3G radio sites, co-located with the GSM sites. That would offer the 3G subscribers instant nation-wide coverage combined with advanced 3G services, initially limited to a gradually increasing 3G launch area. **Technology sharing is the most cost-effective and fastest way** to enable fast nation-wide deployment.
- It is important that **the launch of 3G is done in a swift and controlled way** in order to allow for fast recovery of the operator's 3G licence fee and infrastructure investments. IDA should allow operators to do limited area, early soft-launches to end-users. This early marketing will go far to accelerate the development, acceptance and adoption of 3G services in the Singapore market.