Pricing
NSW Government mobile radio services

ISSUES PAPER

21 APRIL, 2011

1 Context and purpose:

The Independent Pricing and Regulatory Tribunal (IPART) has been requested by the NSW Government to review the pricing of mobile radio services and to develop a methodology for setting the prices that government and non-government agency users are charged for using the Government Radio Network ("NSW GRN").

The GRN is a trunked or shared radio network which came into operation in 1993 and currently provides services to 34 agencies, the largest of which are those agencies responsible for law enforcement, public safety and emergency services in NSW and the ACT.[1] The GRN currently operates alongside a number of other conventional non-shared mobile radio networks which are used by various NSW government agencies,[2] however, the NSW Government has proposed to make significant structural changes to consolidate the GRN and other conventional mobile radio network services to create a single state-wide mobile radio service.

As part of its review, IPART has recently released an issues paper[3] outlining its proposed pricing methodology and is seeking submissions from interested parties in relation to a list of issues.

In summary, the terms of reference for IPART's review requires IPART to:

- develop a pricing methodology based on full cost recovery principles for application to users of the GRN, and in doing so, take into consideration various applicable risk factors (e.g. impact of future COAG reforms on the pricing and availability of radio spectrum);
- provide advice on the cost impact of the proposed methodology on eligible users and government agencies from 2011-12;
- examine the cost impact and implications of the proposed methodology on statutory contributions for mobile radio for the insurance industry and local government[4]; and
- based on the proposed methodology, recommend prices to commence on 1 July 2011.

[1] The largest users of the GRN are the NSW Rural Fire Service, Fire and Rescue NSW, NSW State Emergency Service, Ambulance Service of NSW and ACT Emergency Services.
[2] These conventional mobile radio networks were developed prior to the GRN and continued after the development of the GRN given that the GRN did not cover the whole state and was unable to meet specific user requirements, e.g. for the NSW Police Force.
[3] IPART, Pricing NSW Government mobile radio services, Developing a pricing methodology and recommending prices from 1 July 2011, Other Industries – Issues Paper, March 2011.
[4] The NSW Rural Fire Service, Fire and Rescue NSW and NSW State Emergency Service receive most of their funding from statutory contributions from the insurance industry and local governments, who will therefore be affected by future price changes.

Amongst other things, IPART has proposed to adopt a "building block" pricing methodology for establishing the total efficient costs of providing the GRN's services and has identified a list of 14 issues that it is seeking comment from interested parties.

An important issue identified in the Issues Paper is the potential for significant future price increases to users as a result of moving to full cost recovery, given the extent to which existing costs are recovered from the current user charges and also given the size of the capital investment that is required to upgrade and consolidate the GRN and other conventional mobile radio networks[5]. It also raises the issue of how best to recover those costs in charges. IPART's Issues Paper canvasses the possible need to minimise the potential price shocks to customers via the phasing in of fully cost reflective prices or via community service obligations.

This submission details Motorola's response to IPART's Issues Paper. Whilst not directly impacted by any pricing decisions arising from this review, Motorola believe we can provide support to the evaluation process by making comment based on our experience from involvement in the NSW GRN, and with similar networks in Australia and around the world.

[5] Around $330m of radio network-related capex is expected to be required over the next 4 years, and $900m over the next 10 years.

2 Introduction:

Firstly, we would like to compliment IPART on this Issues Paper, and the level of research that has clearly been undertaken to prepare the background information and summary of areas for consideration.

The provision of radio communications services for law enforcement, emergency organisations and other government agencies is a complex issue – both in terms of understanding the advanced technology deployed, and the unique and demanding operational needs of the user agencies.

We believe this Issues Paper provides an excellent foundation to enable a broader audience to comprehend and debate the key points towards establishing a methodology for distributing costs between the different agency organisations.

Motorola has an 80 year history in partnering with emergency services and law enforcement agencies to provide mission critical radio communications solutions around the world.

We can draw from our experience supporting most State and Federal Government agencies radio networks in almost every State and Territory in Australia. In addition to providing the key technology solutions, Motorola has been contracted to operate the NSW and SA GRN's, and provide the Melbourne Metropolitan Radio Network (MMR), and Mobile Data Network (MDN) under a completely outsourced model for the Victorian Police, Ambulance and Fire services.

Motorola can also provide a commercial perspective through experience in providing managed business critical radio networks such as our Zeon Digital network in Victoria, NSW and Queensland.

Motorola has been intimately involved with the NSW GRN since its inception, including the initial design and implementation in 1993. We have worked with each of the 34 agencies to assist migration from their older, conventional (non-shared) networks to the GRN. Despite the initial trepidation from the agencies, from our interaction with them it appears all have adapted well to the paradigm of a shared network. In the process, the NSW GRN has been extremely successful in consolidating what would otherwise be 34 disparate networks into one homogenous network.

More recently in April 2009, Motorola was awarded the contract to take over the management of the NSW GRN whilst implementing an upgrade of the network to the latest digital Project 25 (P25) Standard.[6] As the network manager, Motorola has been able to provide further insight into the traffic distribution and user requirements.

[6] Motorola provides the services to invoice the monthly charges to agencies on behalf of the Telco Authority, but does not partake in any of this revenue. Motorola receives an annual fee for the provision of network management services, which is not directly related to the number of terminals, or agencies using the network.

3 Operation of Public Safety Radio Networks

Whilst there are some similarities between Two Way Radio networks and Mobile Phone networks in terms of the basic wireless technology employed, they are fundamentally different in the functionality they provide. Mobile Phone networks are designed to provide communications typically between individual users, whereas Two Way Radio networks are designed to provide all-informed instant group communications. For example, in the time taken to dial a single mobile phone, a radio user will have communicated critical information with another team member, or hundreds or even thousands of other users.

Mobile phone networks are designed for a *commercial* grade of service, and carriers take a "best endeavours" approach to delivering the services to their users.

Emergency Services networks are designed to demanding *mission critical* standards to ensure they continue to perform during major events and disasters. Our State and Federal Government and Public Safety Organisations are held accountable in their response to emergencies and disasters, and so the communications networks must also continue to operate to a guaranteed grade of service during even the most extreme circumstances.

3.1 Conventional Radio compared with Trunking Networks

Traditional two way radio networks, referred to as ***Conventional*** radio networks, have a common radio channel for all users. Radio sites may be linked together to extend the channel over a wider coverage area. However, only one person can talk at a time – so there is a practical limitation of how many sites can be linked together in a conventional network. Also, radio users must manually select another channel on their radio when moving from one coverage area to another. Because everyone can hear each other, typically a conventional radio network is more suitable for a single agency, or user group. Conventional radio networks may become congested during a disaster or event requiring intense radio communications. Therefore, public safety agencies train their users to adhere to strict radio procedures to avoid a break down in communications.

An agency may need to install additional radio channels at the site to increase the capacity, and different agencies must install their own separate conventional channels on each radio site. This becomes inefficient since one or more channels may be overloaded whilst others are quiet.

For this reason, ***Trunking*** was invented to allow all the channels at a site to be automatically shared by a large number of different user groups. Multiple agencies can communicate in groups on virtual channels, known as "talkgroups". Because the next available radio channel is automatically selected from the pool, all base station resources are used more efficiently, requiring less frequency spectrum, and less base equipment at the site. Everything being equal in terms of traffic patterns and loading, it can be shown statistically that if three or more conventional channels are required at a site (either for three different agencies or an agency needing more capacity), trunking will provide a more efficient grade of service, and therefore less spectrum required.

Also, all the trunking radio sites can be linked together to provide seamless coverage over the entire operational area without the requirement for the user to change channels on their radio.

Other key benefits of trunking include:

- **Multi-agency:** Many agencies can share the same Radio Network infrastructure, whereas each conventional network suits only a single agency.
- **Intrastate operability and Interstate Interoperability**: Intrastate, or Interstate Agencies can be set up to roam onto the trunking network for support during a major disaster.
- **Network Changes**: Additional radio sites, capacity expansions, changes in frequencies, or restructure of an agency operational area can be made seamlessly without reprogramming the entire fleet of radios as is required in a conventional network
- **Network Access**: Unlike conventional networks, trunking networks require subscriber radios to be enabled on the network to gain access. Additionally, trunking radios can be set up with authentication so that only radios programmed with a unique encrypted access code can use the network.
- **Integrated Voice and Data:** Modern P25 Digital networks support voice and data capability for applications such as Computer Aided Dispatch, GPS location, short messaging, over-the-air programming (OTAP), encryption over-the-air rekeying (OTAR) etc. However, data may become impractical on a conventional network due to the need to share the same channel with voice. Trunking can integrate data applications significantly more efficiently.
- **Efficient Operation During Congestion:** During periods of intense communications during a disaster or other critical operation, the trunking system automatically queues requests from user radios and allocates channels in an orderly fashion. This avoids the chaotic effect of users attempting to transmit over the top of each other as often occurs on conventional channels during peak periods.
- **Priority Access & Emergency:** Trunking users can be allocated priority levels to ensure more urgent communications are given priority. User radios can be programmed with an emergency button that immediately sends an alarm – even if there are no voice channels available - and places the user at the top of queue for access to the next available voice channel.
- **Spectrum Efficiency & P25 Phase 2:** As previously indicated, when three or more channels are required, trunking provides more efficient use of the available spectrum and channel resources. The NSW GRN can also be upgraded to support P25 Phase 2 (currently a trunking–only Standard), which effectively doubles the capacity for every voice channel on the network.

Despite the operational benefits of Trunking, Conventional networks will continue to be more cost effective where only one or two agencies require radio coverage. This is particularly relevant in the more remote areas of the state where the additional cost of establishing a trunking site would be difficult to justify.

The P25 standard is designed specifically to allow backwards compatibility between P25 trunking and conventional operation.

Furthermore, the modern digital IP technology allows agency conventional radio networks to be integrated with the GRN's Trunking core. This provides the capability for agency conventional networks to be managed and monitored by the GRN NOCC, including collection of traffic statistics, whilst interconnecting conventional channels to trunking talkgroups for roaming and interoperability. Conventional base stations can be upgraded into full trunking sites where three or more agencies are sharing a radio site.

Based on this, agencies modern digital conventional networks could also be considered for inclusion in the IPART "whole of government" costing strategy if desired.

4 Government Radio Network Operating Models

Government Radio Networks (GRN's) are generally operated under three broad models.

1. **Government owned and operated** – Examples in Australia include the Northern Territory Police, Fire and Emergency Services, and the Western Australia Police networks
2. **Government owned, managed by an operator** – Examples include NSW GRN and SA GRN which are operated by Motorola
3. **Outsourced Service on behalf of Government –** Examples include the Melbourne Metropolitan Radio Network (MMR) and the Mobile Data Network (MDN) where Motorola provides all of the network infrastructure and radio terminals, and operates the network to provide a completely outsourced service for Police, Fire and Ambulance.

Another special case is the ACT ESA, who have established their own GRN sites for ACT Fire, Ambulance and Emergency Services, but share the NSW GRN NOC.

In terms of sharing costs, typically where an agency has set up a network for their own use, and offers to share the network for use by other agencies, the apportioning of the costing is relatively straight forward, since the lead agency will dictate the costing and terms of use to the other shared user groups.

Similarly, the fully outsourced models must have well defined cost structures, and strict specifications for coverage and grade of service for each of the users, which tend to allow easier apportioning of the costs between the agencies.

Apportioning the costs between agencies on the shared GRN's, such as the NSW GRN, can present the biggest challenges. This is because often the agencies are simply making use of the network that is available, which has not necessarily been tailored to meet their specific operational requirements. The costing mechanism can become even more complex when the GRN is expanding, or being enhanced, since agencies may wish to be part of the decision and prioritisation process.

5 Cost Drivers for Public Safety Radio Networks

There are five (5) broad components driving the capital, and to a lesser extent the operational costs, of Public Safety radio networks such as the GRN.

These components can be broken down as follows:

(1) Central Site(s) = Network Management

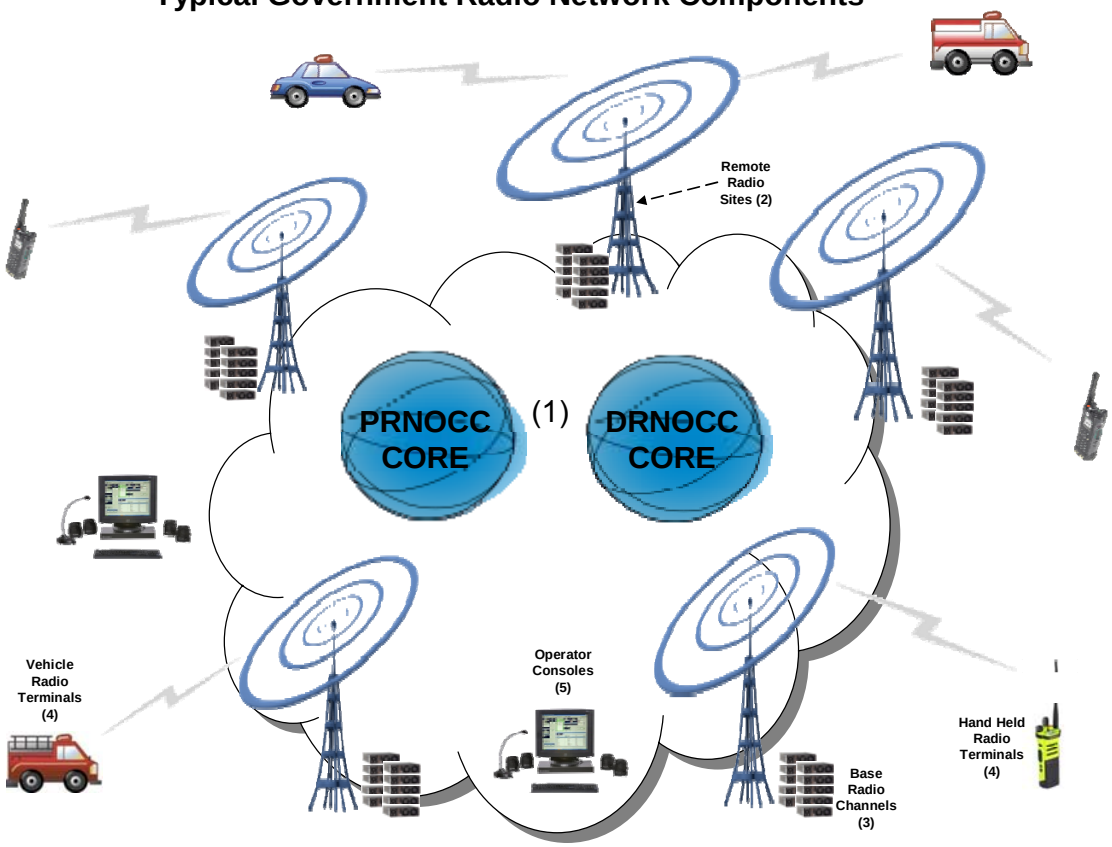
(2) Remote Radio Sites = Coverage

(3) Radio Channels = Capacity

(4) Radio Terminals = Agency vehicle radios, hand held radios and mobile data terminals (MDT's)

(5) Operator Consoles = Agency Communications Centre equipment

Typical Government Radio Network Components



In the case of the NSW GRN, the ***Central Site*** consists of the Primary Network Operations Control Centre (PRNOCC) Core. All of the PRNOCC equipment and functionality is duplicated at a Disaster Recovery NOCC (DRNOCC) Core, which acts as a completely geographically redundant backup should the PRNOCC be destroyed or inaccessible during times of major network upgrades. The NOCC contains all of the core equipment required to control, monitor and manage the operation of the network. The NOCC also accommodates the network management team that provide 24 x 7 monitoring and management of the network.

The ***remote radio sites*** are strategically established throughout the desired operational area to provide radio ***coverage*** to the agency radios in the field. Once the agencies have defined their operational area, network engineers can use sophisticated tools to model the theoretical coverage, based on an agreed grade of service. Agencies need to specify if they require vehicle (mobile) coverage, or hand held (portable) coverage. Typically portables require more sites than mobile coverage due to lower transmit powers, and need to take into account operations inside vehicles and buildings etc. Coverage in digital systems is specified by a target "Delivered Audio Quality" (DAQ), over a percentage Area Reliability (%AR). For example, a DAQ = 3.4 at 97 % AR.

A typical radio site consists of a secure equipment shelter fitted out with air-conditioning, backup power, and a tower or mast structure to accommodate the antenna arrays etc. There are currently approximately 150 trunking radio sites in the NSW GRN shared by the 34 agencies for integrated voice and data services. Some radio sites have been built exclusively for the GRN, whilst others incur a rental charge from an existing site owner to share space in the equipment room and tower. All these radio sites include links back to the NOCC. These links can either be built as part of the GRN site and so be included in the CAPEX, or as a service obtained from a link provider (OPEX). The GRN is regularly adding more sites to improve the coverage provided to the agencies.

Base ***radio channels*** installed at the remote sites carry the voice and data radio traffic to and from the agency radios in the field. Each site may contain a single channel (in the case of a conventional radio network) or up to twenty eight (28) trunking channels that can be automatically shared ("trunked") between many different agencies. The more channels installed on a site, the more ***capacity*** is available for simultaneous agency radio conversations. The Grade of Service (GoS) for capacity can be specified in a number of ways. One common method is to define the percentage of calls that experience a "busy" (a delay due to all channels being already in use) during the busiest hour for the site. The main metric for the NSW GRN specification for Grade of Service is 0.1%. That is, 1 in a 1000 calls can be delayed. During the initial design phase, the network engineers use either known traffic models from the agencies, or typical template traffic profiles based upon the user type, to calculate the required number of channels at each site to meet the target GoS. Once the network has been built, the traffic is continuously monitored, and capacity adjusted by addition or transfer of base station channels at the sites as required to meet the target GoS. Ultimately, the availability of spectrum, space on the radio sites and cost constrain the amount of capacity able to be provided at each of the radio sites.

The radio ***terminals*** are used by the agencies in the field to communicate with each other. The terminals consist of the vehicle mounted radios, hand held portables and mobile data terminals (MDT's) that can either be vehicle mounted or hand held computers. Modern voice and data radios are actually sophisticated micro computers that interact with the infrastructure to form an integral part of the overall network. Any features, or upgrades required in the infrastructure usually require an equivalent capability in the user terminals. Therefore, the terminals need to be considered as part of the overall network.

Agency ***operator consoles*** are installed at the agency communications centres to allow agency operators to communicate and co-ordinate their users in the field. Because consoles are connected directly to the network via links, they use significantly less radio site capacity than if the operators used a fixed radio. There are currently 112 Agency Consoles connected via links directly to the core of the network. Similar to the agency terminals, the consoles interact with the infrastructure and are an integral part of the overall network. Because they are directly connected to the core, all security upgrades, or GRN infrastructure upgrades must also include the upgrade of the agency consoles, and therefore they must be considered as part of the overall network.

Based on the above, the combined operational and capital cost for typical GRN trunking and conventional networks is determined by:

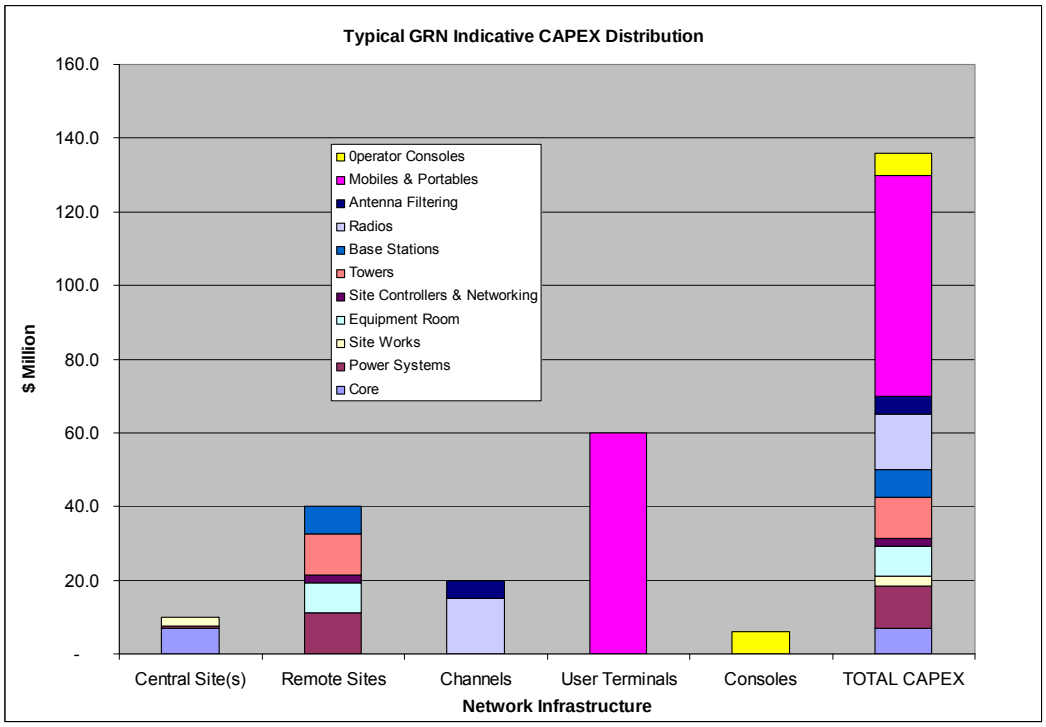
(A) Network Management Cost + Coverage Cost + Capacity Cost + Terminals Cost + Consoles Cost = Total Network Cost

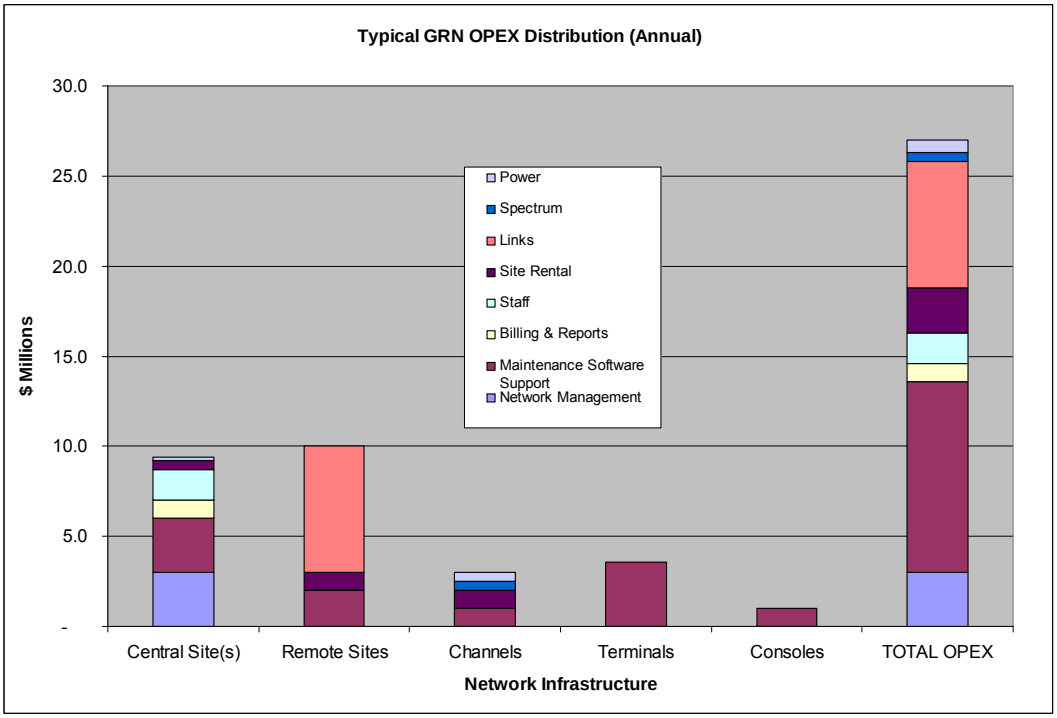
In terms of infrastructure and equipment, this is equivalent to:

(B) Central Sites + Number of Remote Radio Sites + Number of Radio Channels + Number of Terminals + Number of Consoles = Total Network

In other words, the capital and operating costs (most of which are fixed in nature) associated with having a GRN in place comprises the costs of the shared network management (central sites), the cost associated with sizing the GRN in order to provide the appropriate level of coverage operationally required by each agency (number of sites), plus the cost of providing an adequate level of capacity given the amount of airtime different agencies actually need to utilise (number of channels). Importantly, this needs to take into account any additional capacity to be reserved for peak demand during an emergency. There would also be costs relating to the number and type of the terminals and consoles an agency requires.

Motorola is not privy to the total capital or operational costs of the NSW GRN. However, based on our experience for a typical equivalent sized Government Radio Network, an indicative distribution of capital and annual operational expenditure between these categories could be as illustrated below.


Typical GRN Indicative CAPEX Distribution
160.0
140.0
120.0
100.0
80.0
60.0
40.0
20.0
-
$ Million
0perator Consoles
Mobiles & Portables
Antenna Filtering
Radios
Base Stations
Towers
Site Controllers & Networking
Equipment Room
Site Works
Power Systems
Core
Central Site(s)
Remote Sites
Channels
User Terminals
Consoles
TOTAL CAPEX
Network Infrastructure


Typical GRN OPEX Distribution (Annual)
30.0
25.0
20.0
15.0
10.0
5.0
-
$ Millions
Power
Spectrum
Links
Site Rental
Staff
Billing & Reports
Maintenance Software Support
Network Management
Central Site(s)
Remote Sites
Channels
Terminals
Consoles
TOTAL OPEX
Network Infrastructure

6 Points to consider in apportioning the costs

6.1 Basis for cost apportionment

Most multi-agency radio networks have some mechanism to apportion part of or all costs between the agencies. Once the total costs of the network have been established, then an assessment can be made on a logical way to distribute these costs between the agencies. As recognised in the IPART Issues Paper, to achieve this equitably may create a significant challenge. This is because all the agencies have different traffic usage models, coverage requirements, numbers of radio terminals, priority levels etc. and the network must be built to meet expected peak capacity in the event of an emergency, notwithstanding that for the majority of the time the network would only be catering for normal everyday usage levels.

Apportioning costs according to usage is also complicated by the fact that most of the costs associated with the GRN are fixed in nature and due to economies of scale, the incremental cost associated with usage of the network is relatively low.

Furthermore in the case of the NSW GRN, many agencies, and in particular the larger agencies, have deployed conventional networks throughout the state, with user radios programmed to operate on both the conventional and NSW GRN trunking network as required.

All of these factors add a layer of complexity to the cost apportionment exercise. Clearly it is not just a simple matter of dividing the total network costs by the number of terminals, and then applying costs on a per terminal basis for each of the agencies.

6.2 Objectives for cost recovery

Mission Critical Radio Networks are established to allow the public safety, emergency services and law enforcement agencies to provide Public Protection and Disaster Relief (PPDR) to protect our community. These networks also provide the platform to allow interoperability for supporting intrastate and interstate agencies during a major disaster. Therefore, one key policy objective in setting any cost recovery regime should be to ensure agencies continue to maximise the utilisation of these networks. Failure to do so would effectively undermine the reasons for having the network in the first place.

Whilst pricing to recover costs can be an effective means of sending messages to users about the cost of the resources involved – thereby promoting economic efficiency – the degree to which users will respond to such price signals will depend upon their ability to exercise discretion in the use of the relevant service.

In the case of the GRN, the policy objective of providing the GRN may be undermined to the extent that price signals deter usage of the network at times when public safety should be the overriding consideration. We consider that this is a significant risk that needs to be addressed in this instance particularly given the large amounts of capital expenditure that is

expected to be required over the next 4 to 10 years and the impact this will have on prices. To the extent that users elect to abandon usage of the network, this will require the costs to be shared amongst a smaller number of users.

6.3 Cost apportionment

The mechanism for apportioning the costs needs to be as equitable as possible, whilst being simple to implement and maintain.

By applying a logical, building block approach, it is possible to reach a compromise to apportion the costs reasonably equitably between the agencies. Often the ratio for distributing the costs for multi agency radio networks is set during the implementation of the network, and reviewed at regular intervals thereafter – for example each year as the network is expanded and enhanced. This allows certainty in setting budgets for the future years. Government Radio networks have a relatively small number of agencies (compared to commercial networks), so the requirements and portion of the costs for each organisation can usually be determined and tailored individually – rather than trying to make a “one size fits all” approach.

Once the portion of cost per agency has been established – each agency can then distribute this amongst their different user groups if required. Often, it is at this stage that agencies divide their portion of cost by their number of terminals to establish a “price per terminal”.

Typically, because these networks are established predominantly for the public safety, emergency services and law enforcement agencies, the majority of the costs are usually borne by these organisations, with any additional agencies only needing to share costs based upon the incremental loading they place on the network. Volunteer organisations may be charged minimal, or even zero costs in line with community service obligations. Agencies that are government owned enterprises may be charged a rate that would be similar if they were to obtain the equivalent services from a commercial operator.

The following approach can be used as a guide to determine the ratio of costs between the various agencies.

6.3.1 Central Sites (Network Management Costs)

As indicated above the fixed costs associated with the central sites and network management can usually be proportionally distributed amongst the law enforcement, public safety and emergency services agencies. Typically this can be divided evenly between these agencies, assuming they have equivalent coverage and capacity requirements across the state.

6.3.2 Radio Site Costs (Coverage)

It may be appropriate to recover the costs according to the number of sites each agency requires to access to provide the desired coverage for their operations. This could be achieved in practice by each agency nominating the sites they wish to be validated on. If desired, this approach could be simplified by dividing the state up into three or four broad regions, with each agency nominating the region or regions they need to access for their operations. For example:

- Region 1 = Greater Metro Area
- Region 2 = Northern portion of state
- Region 3 = Southern portion of state
- Region 4 = Western portion of state

Alternatively, as is the case in Australia, often the agencies will divide the state up according to the definition used for radio spectrum assignment. For example:

- High Density
- Medium Density
- Low Density

6.3.3 Agency Utilisation of Bases (Network Capacity)

The next point to consider is the proportion of the ***capacity*** to be used (or reserved) for each agency. In other words, the number of ***channels*** required to support the agency's traffic. This can be determined by either applying the same parameters used by the network design engineers when they recommended the capacity at each site, or measuring the portion of the channel capacity actually utilised by the agency. This can be achieved by measuring the total number of channel minutes used by each of the agencies. For example, an agency transmitting on a talkgroup for a minute across ten sites would use ten channel minutes.

Given that utilisation of network capacity peaks at times of major disasters or emergencies, and such events by definition do not occur on a predictable basis, establishing utilisation by reference to a short period of history would result in average utilisation statistics which do not provide a genuine measure of utilisation. Over time, this could result in agencies experiencing highly volatile charges and may result in ongoing dispute around the reasonableness of the charges. Therefore, any measurement of airtime would need to be made over as long a period as possible to take into account events such as floods, fires and other disasters.

Again, typically the public safety, law enforcement and emergency services agencies either utilise the most capacity during normal day to day operations, or require additional capacity reserved for disasters and other special events. In order of magnitude, Police, Ambulance and Fire services tend to use the most capacity. Other emergency services and essential services agencies may have higher usage depending on any specific events such as

storms, fires, floods etc. Therefore, apportioning costs based on utilisation needs to be averaged over a long period of time.

6.3.4 Terminal Charges

Charging for each terminal can be made on the basis of the capital and operational cost associated with maintaining the radio terminals.

Most government radio networks show that there is a very large difference of network utilisation based on the average channel airtime per agency radio.

This is because all agencies have different traffic profiles and coverage requirements. Furthermore, a large number of the agency radios may operate predominantly on their conventional networks and be registered on the GRN trunking network purely to allow deployment if required to operate out of their normal operational area.

Therefore, any apportioning of costs on a per-registered radio basis typically needs to be based predominantly on the replacement cost and ongoing support for the terminals, rather than trying to apportion the infrastructure utilisation on a per radio basis.

The point here is that the number of radios used by an agency often do not relate to the proportion usage of the network.

7 Response to list of issues

1 Do the trends in GRN's operating and capital expenditures appear reasonable? 28

In Australia, all State and Federal Government and Public Safety radio communications will be forced to undergo unprecedented change over the next 5 to 10 years. The main catalyst driving this change is the need for all Government agencies to conform to ACMA's recent 400 MHz band Spectrum Reforms, which will impact not only the NSW GRN, but most Government agencies currently using radio in NSW. Based on current ACMA deadlines for the high density areas of NSW, most of the changes will need to be in effect by 2015, with the remaining areas conforming by 2018.

It is our experience that many State and Federal agencies are overdue upgrading their networks from older analogue to digital technology, having been awaiting the outcome of the ACMA review of the 400 MHz band.

In NSW, we would expect that the above combined with the State Government initiative to form the Telco Authority and consolidate existing agency radio communications, particularly the NSW Police, will require capital investments similar to those forecast.

Given the above, the trends in GRN's operating and capital expenditures do appear reasonable.

2 Is there another feasible method for establishing the GRN's total efficient costs other than the building block approach? 28

Where cost recovery has been established as a desired objective, the building block approach is commonly applied to determine the total costs of regulated infrastructure. There are alternative approaches for setting prices relative to costs which typically involve variations on the extent to which costs are linked to the firm's own costs (e.g. by reference to some external benchmark), and how forensic the approach is to setting the price path is set over time. However, many of these alternatives can be complex in their application and there is relatively little precedent on their application in Australia.

The building block approach is a feasible method for establishing the efficient costs of the NSW GRN given that it ensures that it takes into account both operating and capital costs and allows the network owner to earn a reasonable rate of return on investment. The concepts underpinning the building block methodology are simple, and the approach is also commonly applied in Australia as evidenced by its usage by IPART and other Australian regulators in setting prices in network industries.

3 In determining the allowance for regulatory depreciation, is 'straight line' depreciation appropriate, or should we use another approach? 28

Regulatory depreciation provides an allowance to recognise the decline in service potential of an asset due to the deterioration of capital infrastructure. The proposed approach of 'straight line depreciation' allows the value of the asset to be depreciated in equal increments over the life of an asset which implies that the service potential of the relevant asset is expected to be utilised equally in each period over the life of the asset.

As the assets in the NSW GRN are likely to be long-lived and of a steady-state nature, we believe that straight line depreciation is the most appropriate approach to allocate the asset costs over time and promoting stability in prices. Further, straight line depreciation is simple, transparent and is widely used by IPART and other Australian regulators in various network industries. It can also be modified to take into account of the potential for asset redundancy due to technological obsolescence by adjusting the assumptions on economic life.

Motorola would be happy to provide typical life of the various network infrastructure and terminal assets commonly used for depreciation purposes.

4 In determining the allowance for a return on assets, are there grounds for departing from our usual WACC approach and its standard parameter valuations? 28

Prices that are set using the building block methodology include an allowance for a return on capital. Within the building block methodology, the return on capital is derived by applying a return to the value of the regulatory asset base. The rate of return is commonly estimated based on a Weighted Average Cost of Capital ("WACC") approach, which in turn requires values to be attributed to various underlying parameters based on accepted asset pricing frameworks.

The parameter values to be adopted in estimating the WACC are typically subject to significant debate between regulators and regulated businesses. It is not the intention of this submission to comment on the reasonableness of the WACC parameter value assumed by IPART, except to note that where the building block methodology is applied to set cost-reflective charges and a rate of return is to be determined, the methodology and assumptions should be based on appropriate principles and precedents.

5 Should we allocate costs between categories of users primarily on an impactor pays or a beneficiary pays approach, or on an approach that blends the 2 or on some other approach altogether? 31

Because the GRN is established primarily for public safety, emergency services and law enforcement, it appears logical that these users should be apportioned the majority of the cost. This suggests that an "impactor pays" approach would be more appropriate.

However, it must be appreciated that the "impactor pays" principles was designed to address the situation where an impactor entity creates the need for a service or a regulation which needs to be funded[7]. Under such circumstances, charging the impactor entity for the costs of the service or regulation provides signals to the impactor about the costs that their actions create.

Therefore, in the case of the GRN, we need to be careful that the role of user agencies as "impactors" does not create or lead to a situation where agencies consciously or unconsciously reduce their use of the network. For example by requesting that radios be disabled from using the network, and so not be available for rapid deployment during an emergency or disaster.

6 What is the appropriate balance between fixed and variable charges? What is the justification for this balance? 34

Whilst the network management system in the NSW GRN can provide reports that would support variable charges based on airtime, it is not normally a preferred method for public safety networks. The costs to operate the network are virtually fixed, even if the network is not used at all. Also, Government funding and agency budgets do not normally suit variable costs.

The extra overhead of administering and applying variable costs should not be underestimated. As network managers, Motorola spend a significant amount of time providing explanations and supporting information to clarify any variations of charges to customers.

However, a history of network utilisation from previous years can be appropriate to assist in setting the formula for apportioning of the costs between the agencies. For example, the annual capacity used proportional to the other agencies. (refer section 6.3.3 above)

[7] The term "polluter pays" is often used in natural resource areas, making it clear that the intent is to provide price signals to the polluter.

7 What is the most appropriate unit of consumption? If it is terminal numbers, are there grounds for setting different prices for active and inactive terminals? 34

For the reasons described in section 6 above, terminal numbers, whether active or inactive, are not solely a relevant measure of consumption on the GRN's.

Where GRN agencies are charged on a per radio basis, each agency is usually charged a different rate that has been set to apportion the costs according to a process similar to the following.

Given the reasonably small number of agencies (compared with a commercial network) it should be possible to analyse each agency and apportion the costs based upon their use of the network in terms of:

(a) Proportion of central site and network management
(b) Number of sites required to be accessed to meet coverage requirements
(c) Capacity needed, based on the percentage of total channel utilisation required

The ratio of costs can be reviewed regularly, taking into account changes in usage patterns, expansions and enhancements.

The same approach can be applied for both conventional and trunking networks, where infrastructure such as remote sites and links can be shared between agencies.

As indicated in section 4, in addition to recovering these costs for the infrastructure, consideration should also be given to covering the costs of the ongoing support and upgrades of agency user terminals and consoles, as these form an integral part of the overall network.

8 Is some form of time-of-use pricing, distance-based pricing or a premium for high-priority connection to the GRN appropriate? 35

We believe it would be more equitable to recover costs from agencies based on the number of sites they need to access to provide their required coverage requirements, plus an assessment of their proportional utilisation of the network. Public safety, emergency services and law enforcement agencies will normally have the higher priority access to the network. However, consideration may be required for additional cost recovery from an essential services or other agency requiring higher than normal priority access. Refer to our comments in section 5 and 6 above.

9 What would constitute equitable pricing of the GRN services used by the ACT Emergency Services, RailCorp, other essential service providers and isolated infrequent users? 35

ACT ESA is a special case, since they predominantly utilise sites established and operated at their cost in the ACT. Other NSW agencies also benefit from roaming onto the ACT ESA sites. Therefore, we expect a fee for utilisation of the core, and proportion of the NOCC services, would be the most equitable approach for ACT ESA.

We note that although coverage has been extended along the rail corridors by the GRN, there is a requirement for other agencies, predominantly Police, Fire, Ambulance and SES to also communicate in these areas in the event of a rail disaster or terrorist attack. It also needs to be taken into account that RailCorp have funded some rail tunnel GRN sites that are used by the other agencies. Therefore there is probably a special case for RailCorp, taking into account the contribution they bring to the overall network.

Some other agencies have also contributed to the GRN infrastructure by adding their own sites to the network, to which other agencies share access.

Essential service providers and other agencies could contribute for use of the networks based on a "beneficiary pays" approach – which would reduce the cost to the public safety, emergency services and law enforcement agencies.

We would expect that volunteer organisations would receive special consideration, perhaps being permitted to access the network at minimum, or no cost.

10 What was the size of your charges and bills for access to the GRN in 2009/10 and 2010/11, and what proportion of the total business operating costs (excluding depreciation and interest) did the bills represent in those years? 36

Not Applicable to Motorola Response

11 If you were funded by statutory contributions, what was the size of those contributions in 2009/10 and 2010/11 and what proportion related to the charges levied on you by the GRN? 36

Not Applicable to Motorola Response

12 Whether it is justified to phase in full cost recovery or to recommend Community Service Obligations, and how either approach should be applied? 37

As described earlier on in our submission, the GRN was established as a tool to allow public safety, emergency services and law enforcement agencies to function more effectively in the event of major disasters or emergencies. Given the role of the GRN, a key policy objective is to ensure that agencies continue to maximise the utilisation of the

network. Any cost recovery mechanism which fails to support this would undermine the objective of continued investment in the GRN.

Cost recovery charges which deter the use of the GRN, even at times of major disasters when public safety should be the paramount consideration, will create inefficient outcomes. If agencies perceive that cost recovery charges are excessive, it is likely that they will abandon use of the network, which will then result in the remaining users bearing even higher charges as the largely fixed costs are shared amongst a smaller number of users. In Motorola's view, there is a real risk of this occurring given the significant investments that need to be made over the next 4 to 10 years and the impact this will have on cost recovery charges. If cost recovery is to be applied, it will almost certainly be necessary to phase in full cost recovery to mitigate such risks.

13 What are the implications of national developments and the application of competitive neutrality principles for this review? 39

From a national perspective, the impact of ACMA 400 MHz spectrum reforms will act as a major catalyst for change as agencies will be forced to review their radio requirements and consequentially drive consolidation onto the GRN's. This is going to drive unprecedented growth over the next 5 to 10 years. The GRN's will also need to change frequency of operation at many sites throughout the network, and must be upgraded and expanded to accommodate the additional demand. Any attempt to apportion the costs across the agencies will need to take into account the benefit of these expansions and enhancements. For example, if additional sites are required to be added for some agencies, it would not be equitable for all agencies to have increased charges if they did not require access to those sites. Typically the public safety, emergency services and law enforcement agencies need to access most (if not all) the sites in the network, so would be expected to incur most of the costs.

Competitive neutrality principles aim to eliminate any competitive advantages accruing to government businesses which (potentially) compete with the private sector, which arise solely as a result of their public sector ownership[8]. Observation of competitive neutrality principles requires charges to be set at levels which do not discriminate against the private sector provision of the service, and thereby, exclude competition from the private sector

One way of ensuring that user charges are compatible with competitive neutrality principles is to benchmark the user charges that IPART will determine with the prices charged by commercial radio networks that provide similar business critical radio services.

14 Are there other issues relevant to this review, and, if so, what are they? 39

1. As indicated, Motorola does not believe apportioning costs to agencies based solely on the number of terminals they deploy is the most effective way to distribute the costs for operating the network.

[8] NSW Treasury, Policy statement on the application of competitive neutrality – Policy & guidelines paper, January 2002

This is because the number of terminals is not necessarily representative of the impact or benefit an agency has on the network. One single radio used by an agency to link their conventional networks together can result in a very large load on the network. Conversely, agencies with a large number of radios normally using other conventional networks may be discouraged from proactively programming the radios to be capable of using the GRN for interoperability during a disaster, if this results in higher costs arising from a charge per radio.

2. The mechanism for distributing the costs needs to take into account the agencies unique user requirements, in particular their demand on the network resources in terms of the number of sites required for coverage and channels for capacity. The mechanism also needs to accommodate the unprecedented change the networks are being forced to undergo over the next 5 to 10 years due to the ACMA spectrum reforms, and the government initiative to consolidate agency communications. This will require a firm, costed plan, with forecast expenditure and timing.

3. The costing model should accommodate agency conventional networks. Digital networks may be integrated into the GRN core if desired, and it is anticipated that agencies will be encouraged to share infrastructure in line with the Telco Authority initiative for consolidation.

4. Whilst we recognise the terms of reference currently exclude agency data requirements, we would respectfully suggest this to be reconsidered. There is a growing demand from agencies to utilise the integrated voice and data capability that is now available in the digital conventional and trunking networks. Also future plans could involve overlaying a Public Safety grade broad band network.

5. Agency radio terminals and consoles are recommended for inclusion in the proposed costing models, as they form an integral part of the GRN operation and have a significant impact for ongoing upgrades and expansion plans of the overall network.

8 In summary

From our experience, by utilising a building block method, it is possible to break down the components driving the costs of a Shared Government Radio Network. Motorola would recommend taking a “whole of network” approach, and include all elements required to deliver the service. This includes terminals, and agency consoles that form an integral part of the network. Whilst we recognise it is currently out of scope for this review, we would also recommend including agency mobile data requirements, since this is also integrated into the new digital architecture of the infrastructure and terminals.

Forecast expansions and upgrades can be included where known to build a total cost per year. Consideration should be given to including both trunking and conventional network expansions to build a “whole of government” approach to total costs.

Unfortunately, rarely, if ever, does “one size fit all” when it comes to apportioning these costs between the different agencies.

However, by forensically breaking down each of the agencies unique requirements in terms of coverage and capacity to meet their operational needs, it is possible to equitably distribute the costs of the network. The actual mechanism for charging the agencies can be very simple, being applied once a year or as required. Agencies can then apportion these costs within their own organisations if required, which may include using a per-terminal rate if they desire.

Motorola considers that the NSW GRN delivers important public safety benefits to the NSW community at large and to the agencies which use the system, who are able to rely upon the network during day-to-day operations and times of emergency.

Given that the costs of these networks are largely fixed in nature, and also the importance of ensuring that agencies continue to maximise the utilisation the network, it is important that the pricing mechanisms do not discourage use of the network.