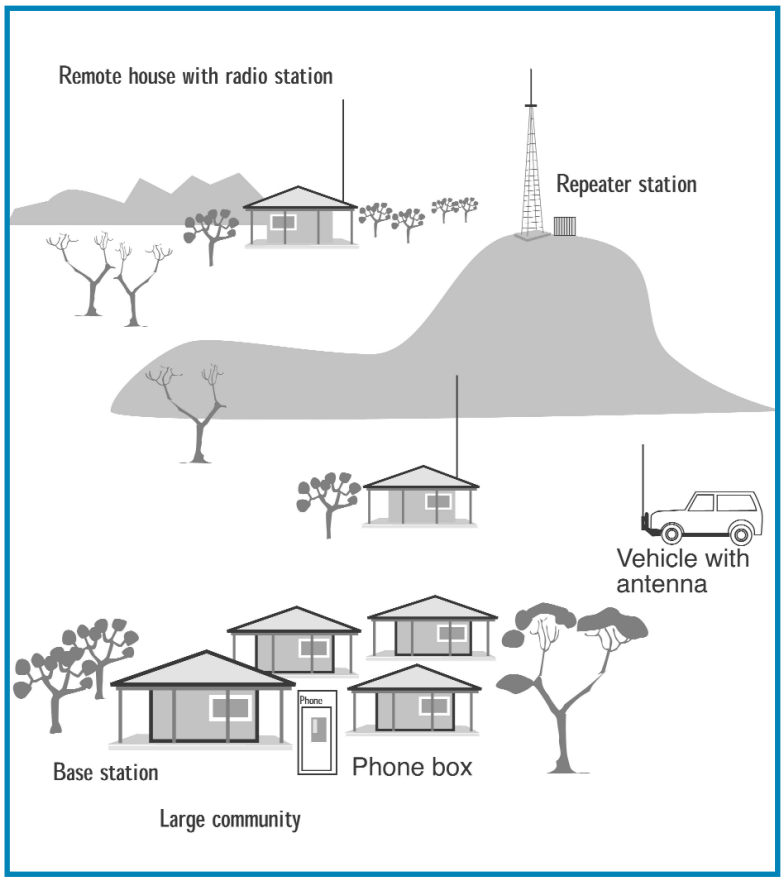
BUSH TECH #20

Local radio networks



Access to communication technology such as a two-way radio or telephone is of great importance to many people who live in remote outstations and homelands Sometimes, people do not feel safe without these services. A telephone or two-way radio means people can get help quickly if a family member is sick or in need of other assistance. Communication technology provides a 'mantle of safety'.

However, telecommunications infrastructure is limited in many remote communities . The ***Community Housing and Infrastructure Needs Survey*** (CHINS) 2001 found that 54% of small communities (population less than 50 people) did not have access to a telephone.

In many communities, people have a strong knowledge and history of using two-way radio to communicate, particularly through the use of HF radio for contacting the Flying Doctor Service, etc.

Communities in some regions are returning to radio as a useful way to communicate; e.g. Kanymari Project in the Wellesley Islands in the Gulf of Carpentaria and PY Com in the Anangu Pitjantjatjara Lands. A local two-way radio network can provide people with 'free' communication in the local area. Sometimes, the network can provide limited access to the telephone network.

This BUSH TECH describes the basic concepts and outlines the key issues to consider when investigating whether a local radio network could be useful in your community.

A typical network

In many cases a radio network will be set up to allow people living in small homeland or outstation communities to communicate with people in the nearest large community or service centre. It can also allow people to communicate between small communities. Vehicles can be equipped with radios for communication as people move around country.

Each small community in the network will have a set of basic radio equipment (described over the page). A 'base' station will be located in the nearby large community or service centre. This station may be located and run from the Community Council Office. In some regions, people may choose to provide access to the public switched telephone network via the radio network. The base station will be equipped with a **telephone interconnect**, which connects the radio network to the telephone service. This allows people at other stations in the radio network to dial into the telephone network, using a keypad.

Sometimes, a station may be separated from other stations by a hill, or by a long distance, so it is not possible for this station to communicate directly with the other stations in the network. However, it may be possible to reach the remote station by introducing a repeater into the network. A **repeater** is an automatic station that receives a radio signal and re-sends that message over a wider area. Repeaters are usually situated on the top of a hill or other high structure.

Different bands – different uses

There are a range of different types of radio waves. Often, these are identified as different 'bands' The bands most commonly used for community radio networks are HF (High Frequency), VHF (Very High Frequency) and UHF (Ultra High Frequency). These behave in very different ways as they travel through the atmosphere and interact with the earth's surface.

- **HF radio** – This is often used for long distance communication. HF waves can be reflected off a portion of the atmosphere, known as the ionosphere. These waves are reflected back to earth, thereby providing opportunity for long distance communication. HF waves also propagate directly between stations via surface waves. Communication over short to medium distances can be problematic. Due to the complex interaction of HF waves with the atmosphere, signal quality can be highly variable. HF communication can be very susceptible to various forms of electromagnetic'noise' leading to poor signal quality. Repeaters will not generally be required for an HF network
- **VHF radio** – These signals are primarily line of sight, with typical ranges of 20 to 100kms;, a longer range than for a comparable UHF system. Signal quality often is better, than that of HF systems. Repeaters may be required to support a VHF network.
- **UHF radio** – These signals are primarily a line-of-sight frequency band with typical ranges of 20 to 30kms. Signal quality often will be better than that of HF systems. Repeaters may be required to support a UHF network.

The band chosen for a local radio network will depend largely on the distance between communities and the type of country (e.g. hilly or flat) In some places, a combination of bands could be selected.

Issues to consider

Distance between outstations and topography: Distance will determine the most suitable frequency band. Use a topographic map to show the location of stations etc, when talking to suppliers.

Locations for repeaters: Identify possible sites for repeaters, if required, such as nearby hills, existing towers or any other prominent features; e.g. a water tank.

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Local radio networks (continued)

Network users: Estimate how many 'stations' will be needed and of what type; i.e. base, fixed or mobile.

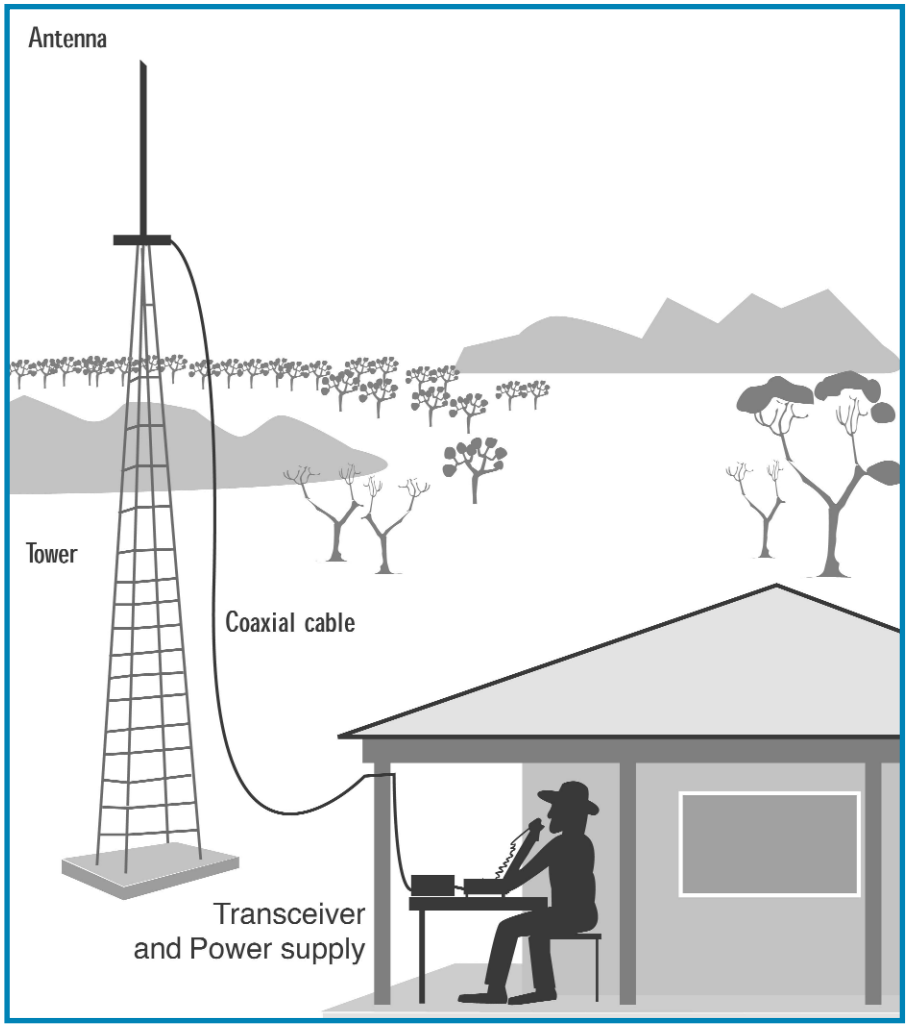
Network features and services: Identify the range of services that people are seeking from a radio network (i.e. simple point to point communication, telephone interface, the ability to email or send a fax, etc.). Think about how existing radio systems already being used in the region can be integrated into a new network. Think about expected future needs for network expansion and upgrade. Consider how reliable the communication links need to be.

Power supply: All stations in the network, including repeaters, will need access to an adequate and reliable power supply. Pretty much all radio equipment requires a 12V DC supply. Think about how this might be achieved. Solar power is likely to be the most realistic option for repeater sites.

Cost: It's good to identify a rough budget for the amount to be spent on the network. This will assist in identifying whether the desired network features and characteristics are affordable. In costing a network, try to be aware of possible 'hidden' costs. For example, the cost of solar power systems for repeater sites or the cost of doing repeater site surveys.

Repair, maintenance and training: Negotiate a routine maintenance and technical support arrangement with suppliers and installers (i.e. an ongoing service contract). If possible, it is worth carrying spares for all equipment (including transceivers) in order to minimize disruption to service as a result of equipment failure. Also negotiate with suppliers and installers to provide training for community members who will be using the equipment.

Licensing: In many cases, radio equipment used in a local network will need to be licensed. This will involve payment of an annual fee for each licence. For information on licensing, contact the Australian Communication Authority.



Basic equipment

This is the basic equipment for a typical community station.

Transceiver

The two-way radio or 'transceiver'. is a piece of equipment designed both to receive radio signals and to transmit or send them, so it is both a transmitter and a receiver. CB radios or the old Flying Doctor radios are common examples of transceivers. Generally, the transceiver will come with a microphone. It can be located in a house or other building on a table or bench. It should be arranged so people can be comfortable when using the radio.

Antenna

The transceiver will be connected to an antenna, mounted outside, well above nearby buildings and away from trees. The antenna is designed to send the radio waves out, and also to 'capture' the signals being received. The design of a suitable antenna configuration is a critical to the success of a network. Careful consideration of antenna design is particularly important when communication distances exceed a few kilometres.

Tower

Antenna may be fitted to a tower, to ensure the antenna is mounted high enough. Alternatively the antenna could be mounted on the side of a building. The main thing is to make sure that the antenna sits above any nearby buildings and trees.

Coaxial cable

A coaxial cable will be used to connect the transceiver to the antenna. This cable should be as short as possible, in order to minimize signal loss from the cable.

Power supply

The transceiver needs a power supply, usually 12 V DC. Many fixed stations will need to be equipped with a regulated power supply to convert 240 V AC to the required 12V DC. A transceiver can run off a car battery when it is mobile.

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For more information

Australian Communication Authority, www.aca.gov.au

International Development Research Centre - *The Wireless Toolbox* web.idrc.ca/en/ev-10592-201-1-DO_TOPIC.html

PY Media, www.waru.org