New project enables mobile phone use in areas with no reception

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Paul Gardner-Stephen (left) talks with a colleague in the wilderness using his new system. Credit: Village Telco

(PhysOrg.com) -- Australian scientists have invented software that enables mobile (cell) phones to work in remote areas where there is no conventional coverage and in locations where the infrastructure has been destroyed through disaster, or is not economically viable. The technology enables ordinary mobile phones to make and receive calls without the need for phone towers or satellites.

Leader of the team, Dr Paul Gardner-Stephen of Flinders University in Adelaide, South Australia, named the project the Serval Project, after an African wildcat renowned for its problem-solving abilities. The aim is to "provide fast, cheap, robust and effective telecommunications systems"

for areas where there is currently no telephone infrastructure, or where it has been destroyed by natural disasters or civil unrest.

The project includes two systems that can operate separately or be combined. One is specifically for disaster areas, and consists of a temporary, self-organizing and self-powered mobile phone network that operates via small phone towers dropped into the area by aircraft.

The second system consists of a permanent mesh-based phone network between Wi-Fi enabled mobile phones, with no tower infrastructure required. Eventually, the system will also include the "Batphone," which will be a specially designed phone able to operate on other unlicensed frequencies.

The systems use open-source software developed by the team and dubbed Distributed Numbering Architecture (DNA). The software allows mobile phones to make calls out and receive calls on their existing numbers. The mesh network technology was developed by Village Telco and is integrated with the software to create a mesh network in which each phone acts as an independent router.

Dr Gardner-Stephen said the device essentially "incorporates a compact version of a mobile phone tower into the phone itself." It uses the Wi-Fi interface in modern Wi-Fi-enabled phones, carrying voice over it in such a way that it does not need to go back to a tower anywhere.

The current range between phones is only a few hundred meters, which limits the usefulness of the system in remote areas, but Gardner-Stephen said adding small transmitters and more devices could expand the range considerably. The real benefit of the current system would be in disaster areas where there are plenty of phones but the towers are destroyed or the infrastructure is no longer functioning. In the recent Haiti disaster area for example, the mobile phone network was knocked out for over

two days after the earthquake struck, and did not return to normal operation for a week.

Director of the Research Centre for Disaster Resilience and Health at Flinders University, Professor Paul Arbon said the systems could prove invaluable in disasters, providing an instant network allowing people to call out and receive calls from concerned relatives, and helping volunteers to coordinate the response. The system could also provide the community with updates and warnings.

The systems have been successfully tested in remote areas of the Flinders Ranges in South Australia where there is no mobile phone reception, with the three researchers creating a network over one square kilometer. The next stages in the project are to increase the range and improve sound quality. The team is also working on developing a method of dropping the temporary towers into disaster areas.

Dr Gardner-Stephen said the system could be operational within 18 months provided the project receives adequate funding. He said his dream was for every mobile phone to be equipped with the system so that if there is a disaster all the phones in the region will automatically switch to the mesh network mode of operation as a fallback.

More information: www.servalproject.org