

Putting a virtual doctor in the ambulance

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(PhysOrg.com) -- A new ambulance communications system will enable doctors to diagnose and begin treating critically ill patients before they reach hospital.

Diagnosing and treating a critically ill or injured patient as early as possible can mean the difference between life and death. A new communications system between a moving ambulance and its hospital base allows the simultaneous transmission of bandwidth-hungry video and ultra-sonic images, telephone communications and patient data, all at the same time.

Medical teams can therefore gather vital and detailed information about the patient's condition and advise the ambulance team on patient treatment as they rush towards the hospital.

The ambulances transmit and receive high-quality data over wimax, a microwave access technology that can deliver data at up to 75 megabits per second over a range of 70km between fixed points (802.16.d), or its mobile version can provide 15mb/s over a four-kilometre radius (802.16.e).

“If you are transmitting data in high quality, it is very important that you don't lose any bit of information,” says Enrico Angori, a leading researcher on the WEIRD project. WiMAX is the cheapest channel to use and the channel that can deliver the best quality of service.”

WiMAX is not new, but the research team on the EU-funded WEIRD

project extended the resilience and flexibility of the WiMAX technology and created a user-friendly package that can easily be used in ambulances by non-computer specialists.

Practical and usable solutions

“The main part of our work is to make it easy for end-users to make use of the benefits of new technologies like WiMAX,” explains Giuseppe Martufi, another member of the WEIRD research team.

The team achieve this by developing software that hides the complexity of the configuration of the end-to-end communication channel, whatever the different equipment or different versions of WiMAX used. It means that the paramedic onboard the ambulance can quickly and easily establish an end-to-end communication path without specialist training, allowing them to concentrate on what they do best - saving lives.

Bandwidth can be reserved for the ambulance’s critical communications using a protocol called DIAMETER that identifies data traffic and prioritises it, ensuring communications are not blocked by low-priority data traffic, such as emails.

Seamless end-to-end connections

One of the most important features of the ambulance communications system is its ability to create end-to-end links between two points by seamlessly integrating the WiMAX signal with the other wireless communication technologies encountered, such as mobile telephony.

The WEIRD researchers developed software that takes advantage of the features of ‘next-generation networks’. NGNs layer information, decoupling the applications from the underlying transport stratum.

Whatever the underlying network, the ambulance's signals will be passed seamlessly, end to end.

A few years ago, developers had envisaged global WiMAX networks replacing our present communications infrastructures. Increasingly, WiMAX is being viewed as a complementary technology to existing wireless communication access channels.

So, the successful seamless integration of WiMAX with 'media-independent handover' is an important step forward.

Not all applications are designed to run on NGNs. For these, the research team built a series of adaptors - known as WEIRD agents or WEIRD application programming interfaces. WEIRD agents allow non-NGN applications to take advantage of the enhanced quality of service and seamless mobility features offered by the ambulance communications system.

WEIRD received funding from the EU's Sixth Framework Programme for research.

This is one **of a series of three** articles on the WEIRD project. See also 'Spotting tomorrow's forest fires' and 'Monitoring against another Pompeii'.

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