Spotting tomorrow's forest fires

August 1 2008

A wimax-based connection to the internet enables fire-monitoring efforts in remote and mountainous regions.

A forest fire remote monitoring system has been successfully tested in Portugal that could prevent the destruction of millions of hectares, as well as save lives.

Vigilant monitoring of mountainous forest is very difficult and expensive – but a fire that takes hold can be even more expensive. The fires in Greece in summer 2007 destroyed more than 2700 kilometres of forest and farmland, as well as more than 1000 homes, and they caused the deaths of over 80 people.

The system tested in remote forest areas of Coimbra in Portugal uses 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). With WiMAX, remote spots can have a broadband connection without the need to lay expensive cable.

“We selected this environment to test our WiMAX solution because in a normal city or town you have plenty of communications channels, such as UMTS telephony or ADSL,” says Enrico Angori, a leading researcher on the project. “It is in extremely remote areas that it makes sense to use this wireless technology.”

WiMAX is not new. But the EU-funded WEIRD research team behind the Portuguese project extended the resilience and flexibility of the WiMAX technology. Bi-directionality was also tested, meaning that the fire monitors can pan or zoom onto a potential trouble spot with the remote cameras as well as receive signals from them.

Fighting fire with images

The fire monitoring system can reserve bandwidth for critical transmissions. Using an ‘authentication authorisation and accounting’ protocol, called DIAMETER, data traffic is identified and prioritised to ensure that vital video images, infrared heat images, verbal warnings or wind direction data are not interfered with or blocked by low-priority data traffic, such as emails.

The WEIRD team seamlessly integrated WiMAX with a range of other network technologies to enable high-quality, end-to-end communication, whatever the route.

The fire-monitoring system is designed to use ‘next-generation networks’ (NGN), decoupling the applications from the underlying transport stratum. Whatever the underlying network, the fire monitors’ signals will

be passed end to end.

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 – that allowed non-NGN applications to take advantage of the enhanced quality of service and seamless mobility features of the wireless fire-monitoring system.

Increasingly, WiMAX is being viewed as a complementary technology to existing wireless communication access channels, such as wifi and mobile telephony services. Therefore, the successful and seamless integration of WiMAX via 'media-independent handover' is an important step forward.

User-friendly fire

WEIRD researchers also developed software that hides the complexity of the configuration of the end-to-end communication channel. Whatever equipment or versions of WiMAX are used, an ordinary user can quickly and easily establish an end-to-end communication path, allowing them to concentrate on what is important – their job.

Further improvements in seamless handover of a communication flow from one system to another will be a future area of focus for the team, according to Giuseppe Martufi, another researcher with WEIRD.

"There are some coverage problems with the mobile version of WiMAX, says Martufi. "When you go indoors, for example, the coverage of mobile WiMAX decreases. It would be interesting to develop a seamless connection allowing you to move from mobile WiMAX to your home network that uses WiFi," he muses.

WEIRD received funding from the EU's Sixth Framework Programme

for research.

Provided by ICT Results