WHITE SPACES COMMUNICATIONS

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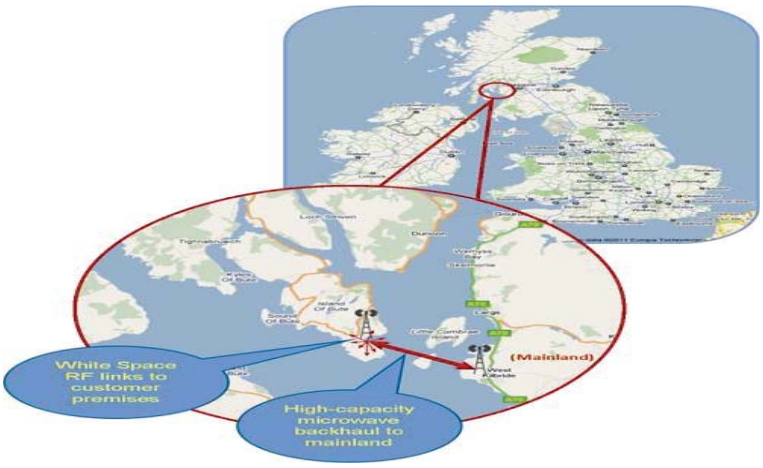
- **Key words**

Advanced engineering (including robotics / control systems) - Communications - Data management - Sensors / instruments/ electronics - Software engineering / development

- **Description**

'White spaces' are gaps in the radio spectrum in frequency bands, which can be used to offer new wireless applications to benefit consumers and businesses.
Industry is already testing a range of uses for this technology, such as internet access for ships and boats in the Orkney Islands, wireless video streaming of animals at ZSL London Zoo, new 'machine-to-machine' networks for flood defence in Oxfordshire and Wi-Fi-like services at the University of Strathclyde.



On 12th February 2015 the Office of Communications (Ofcom), Independent regulator and competition authority for the UK communications industries, gave the green light for industry to harness the benefits of an innovative new wireless technology, following a series of successful industry trials.
White space spectrum in the TV frequency band is appealing for industry because it can travel

longer distances and more easily through walls than the bands mainly used by other wireless technologies, such as Bluetooth and Wi-Fi.
Ofcom is now putting in place the foundations for industry to use TV white spaces. A key part of this work has been to allow these airwaves to be shared, while managing the risk of interference for current users.
To avoid interference, databases will communicate with these devices to give them technical constraints they must operate within. These databases identify locations, frequencies and times where white space devices will not affect existing users and will apply rules, set by Ofcom, which put limits on the power levels they can operate at.
These frequencies are currently used for digital terrestrial TV, and on a sharing basis with wireless microphones used for programme making and special events (PMSE), among other services.
Based on the trials and stakeholder feedback, there is considerable interest from industry in developing this technology. Ofcom believes commercial applications for this white space technology could emerge by the end of the year.
Ofcom is exploring how the white space in other spectrum bands could be used for similar innovation in the future.
Ofcom is also supporting other forms of wireless innovation and has already released spectrum which can be used for machine-to-machine networks.

The UK is among the first countries in Europe to provide spectrum specifically for this technology, which will form a major part of what is becoming known as the 'Internet of Things', networks of devices communicating with each other online.
There has been considerable interest in the technology with multiple trials running across the UK. Both public and private organisations are taking part, testing a variety of innovative applications, using spectrum temporarily licensed by Ofcom:

- Live video streaming: Google and ZSL London Zoo, along with equipment providers MediaTek and 6Harmonics, have launched a trial this week to use a TV white space network to stream live video of the Zoo's meerkats, Asian otters and giant Galapagos tortoises to YouTube. The trial will use Google's spectrum database and will help ZSL London Zoo test the technology for use in additional efforts to monitor and protect endangered animals in the wild.
- Flood defence: using TV white space technology, Love Hz and Nominet are working with the Oxford Flood Network, a citizen-built wireless sensor network, which provides early flood warnings for the community. Water levels are monitored in real-time and sent over white space using Adaptrum devices.
- Next generation Wi-Fi and city sensing: The University of Strathclyde's Centre for White Space Communications has been working with Microsoft, 6Harmonics, MediaTek, Spectrum Bridge, and Sky - with backing from the Scottish Government. The pilot explores how the latest technology, including triple-band Wi-Fi, can enhance internet coverage in indoor and outdoor urban locations and enable 'smart city' functionality, including linking webcams and other sensors.

- Internet on ships and boats: CloudNet IT Solutions, Fairspectrum and Carlson Wireless Technologies are using white spaces to provide internet connectivity and communications to ferries travelling in the Orkney Islands and Pentland Firth, which have no wireless broadband availability. CloudNet are also looking to extend this trial to other transport operators in the area. Separately, Microsoft, Neul and 6Harmonics have been working with Click 4 Internet on the Isle of Wight to test how the technology could work with boats at sea.
- Broadband coverage enhancement: King's College London, the Joint Research Centre of the European Commission, and Eurecom, are leading an EU effort to investigate various scenarios for providing backhaul over TV white space to achieve broadband access in challenging situations. This includes studying long-distance roof-top white space links and long-distance in-building and between-building white space links. As well as coverage enhancement, these services could provide broadband for security, emergency and disaster relief situations. An important capability being investigated is the aggregation (merging) of TV white space links and channels to maximise capacity and address challenging and innovative communication applications.

White space technology is one way of meeting the growing demand for data in the UK. Ofcom is separately planning to free up more spectrum later this year, or early 2016, potentially for high speed mobile broadband. This follows the successful completion of the 4G mobile spectrum auction in 2013.

White Space Trial on the Isle of Bute, Scotland

On 27th March 2012, a collection of journalists and reporters visited the Isle of Bute to hear about the White Space rural broadband trial that is taking place on the southern part of the island. They were given an overview of BT's plans to increase broadband coverage in rural areas by BT Scotland Director, Brendan Dick, and this was followed by an overview of the White Space trial on Bute, given by Chris Gibbs, Director of Insight, Innovation, and Futures at BT Openreach.

A number of local residents participating in the trial gave accounts of how the arrival of broadband has transformed their lives. Many of them run their own local businesses, and the ever-increasing drive to do all manner of things on-line (e.g. tax returns, ordering of supplies, checking livestock pedigree) makes decent broadband connectivity more of a necessity than a luxury nowadays.

The BBC's technology correspondent, Rory Cellan-Jones, was able to make a video call on his iPad from a remote location some 5-6km from the local telephone exchange, something that would have been completely unthinkable 12 months ago.

The trial on Bute is supported by the UK's Technology Strategy Board, and involves six collaborating partners - BT, BBC, Netpropagate, Berg Design, Steepest Ascent, and the University of Strathclyde.

- **Applicability of Technology to Maritime SMES**

Provision of internet access for ships and boats in areas which this was previously difficult or very expensive. Video streaming of events and animal behaviour, 'machine-to-machine' networks for flood defence.