

What is cognitive radio?

Cognitive radio is an intelligent, adaptive radio and network technology that automatically seeks a vacant radio frequency. To the end user, this delivers a smooth and seamless wireless data transfer.

Benefits to participants

The programme offers funding, expertise, market research and seminars. In addition, it provides a networking environment to companies and research organisations both in Finland and internationally.

International cooperation

Trial offers international partners an opportunity to cooperate with the key players in Finland. The Finnish programme participants are expected to establish collaboration with advanced research in Europe and overseas. The programme is looking for corresponding trial environments and test beds to cooperate with.



Tekes, the Finnish Funding Agency for Technology and Innovation

Tekes is the main public funding organisation for research and development (R&D) in Finland. Tekes funds industrial projects as well as projects in research organisations, and especially promotes innovative, risk-intensive projects. Tekes offers partners from abroad a gateway to the key technology players in Finland.

Tekes programmes – part of the innovation chain

Tekes programmes are an essential part of the Finnish innovation system. These programmes have proved to be an effective form of cooperation and networking for companies, universities and research institutes for developing innovative products, processes and services. Tekes programmes boost development in specific sectors of technology or industry, and the results of the research work are passed on to business systematically. The programmes also serve as excellent frameworks for international R&D cooperation.

For more information:

www.tekes.fi/ohjelmat/trial
www.tekes.fi/programmes/trial

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Trial Environment for Cognitive Radio and Networks

Trial

Tekes programme 2011–2014



Trial Environment for Cognitive Radio and Networks

The volume of wireless data transfer is expanding at an explosive rate. The current wireless networks are struggling to carry the data traffic generated by smart phones and other mobile devices. Cognitive radio is expected to provide a significant boost for wireless communications and introduce new business opportunities.

The aim of Tekes' Trial Environment for Cognitive Radio and Networks programme is to transform Finland into a globally attractive cluster of expertise and unique trial environment for cognitive radio and networks. The trial environment enables the research and development of products, services and applications associated with cognitive radio.

The total budget of the programme is estimated at EUR 30 million, of which the share of Tekes funding would be approximately EUR 14.5 million.

Active trial environments in Finland

VTT Cognitive Trial Environment

VTT cognitive trial environment is built into VTT's Converging Networks Laboratory (CNL) in Oulu where the trialing of different wireless networks and solutions is possible in a controlled environment. Demonstration of the cognitive trial environment optimises resource use among different wireless networks. Different factors are taken into account in the cognitive decision making including e.g. quality of service, node locations, and available networks.

VTT cognitive trial environment is extensible as new services, networks, and equipment can be integrated with a decision engine by using an event-based Cognitive API. Web-based user interface will be available to visualise collected information and decisions based on them.

CWC Cognitive Trial Environment

The CWC cognitive trial environment is a real time test bed environment for testing and prototyping new cognitive functionalities on wireless and wired test environments. The trial environment focuses on prototype implementation of a cellular scenario, where all the layers can be tailored to facilitate the needs of cognitive radio network. However, also ad-hoc networking scenarios are possible and CWC has an initial, award winning distributed ad-hoc network that uses spectrum sensing to find white spaces.

The focus of CWC trial environment is to enable researchers to test and develop cognitive engines in CWC's wireless research test beds called Linux enriched (LE) – WARP platform.

CENTRIA Cognitive Field Trial Environment

CENTRIA's environment is LTE live test network. Test network consist of three 2100MHz and two 800MHz base stations (eNB) and one laboratory base station. Test network has its limitations due to commercial base stations and frequency permits. Information for example which cell is serving the user equipment and handover (HO) situations can be collected from LTE network. Because of commercial base stations mainly software based cognitive solutions can be tested. Also compatible user equipments can be tested in the test network.

Please find more information on trial environments in Finland from Trial website.

WISE - White Space Test Environment for Broadcast Frequencies

Turku TV white space testbed has been set up in WISE project to develop and validate technical solutions, accelerate commercial utilization of white spaces, and to support the contributions to the regulatory work on cognitive radios. WISE project partners are Turku University of Applied Sciences, Aalto University, University of Turku, Nokia, Digita, Fairspectrum and Ficora. The test network and laboratory are located in Turku, Finland. The project offers partners globally unique test environment, where a real digital television transmission can be interfered. WISE consortium has a solid experience on TV White Space networks and equipment, TV White Space radio license application process, wireless system testing and geolocation databases.

EECRT – End-to-end Cognitive Radio Testbed

EECRT project creates a "living lab" cognitive radio testbed. The testbed is intended for investigating Dynamic Spectrum & bandwidth Management (DSM) and Cognitive Radio Resource Management (CRRM) algorithms, Radio usage business models, Radio interface selection algorithms with the focus on end-to-end performance and Cognitive radio algorithms for physical layer usage. The testbed provides a software platform where new algorithms can be implemented and tested in a real radio environment.

EECRT project is conducted by Aalto University's Department of Communications and Networking (Comnet).

Nokia Cognitive Radio Testbed

Cognitive Radio Testbed (CRT) is aimed at studying the co-existence of heterogeneous radio access networks. Co-existence technologies provide more efficient use of scarce radio resources. This can occur both within a single radio access technology (e.g. IEEE 802.11) and between radio access networks of different technologies (e.g. IEEE802.11 and industrial radios using the same ISM-band). Cognitive Radio Testbed features a signaling system that allows various access points or base stations to exchange information and/or agree about the used radio resources. This is based on work under progress in IEEE802.19.1. However, since that standard is not yet frozen, the current implementation does not represent yet the final standard. The testbed also features a visualization tool for displaying graphically the status, protocol messages etc.